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THE MINES HANDBOOK

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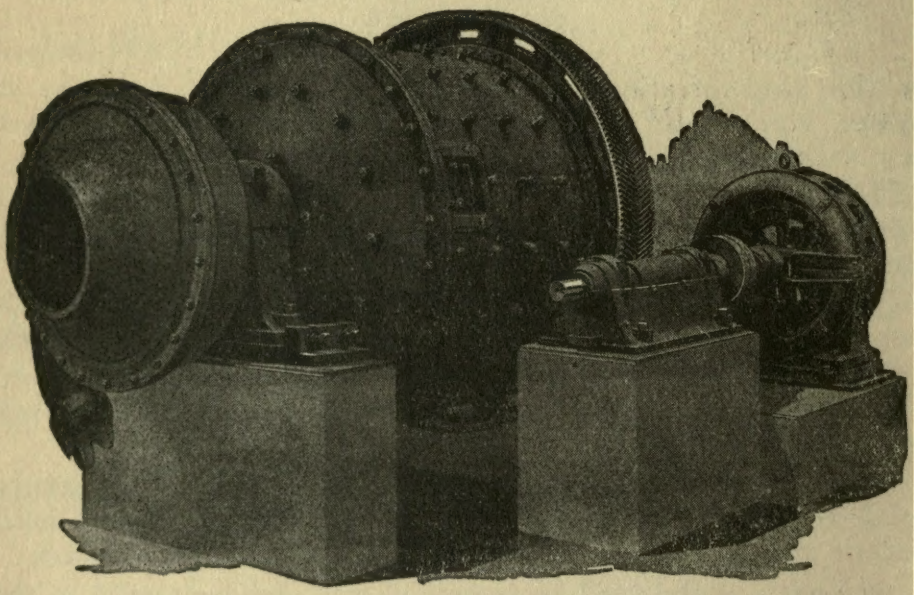

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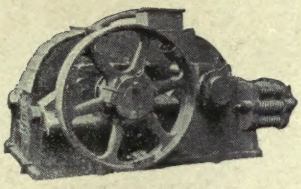

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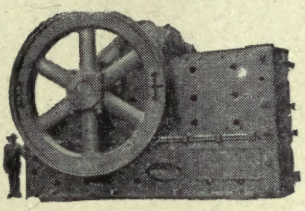

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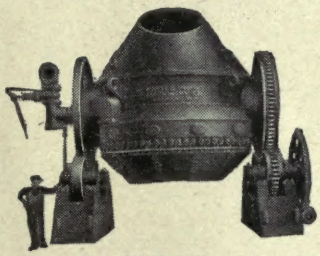

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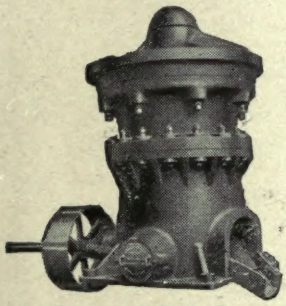

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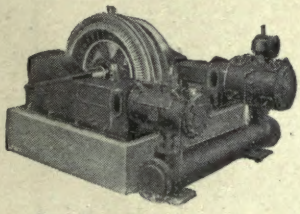

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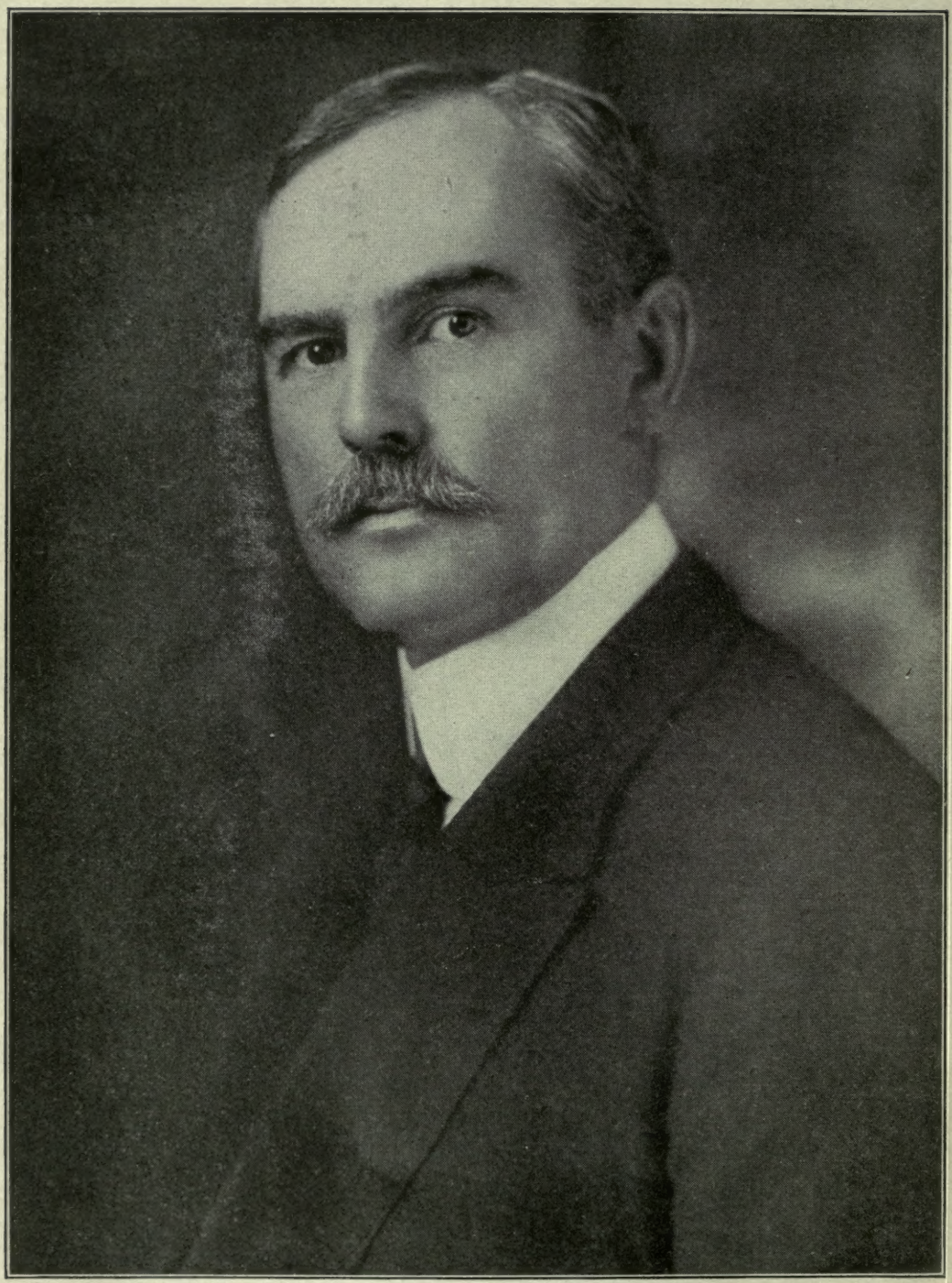

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THE COPPER HANDBOOK

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A MANUAL OF

THE MINING INDUSTRY OF THE WORLD

BY

WALTER HARVEY WEED, E.M.

Former Geologist in the U. S. Geological Survey, 1883-1906; Member Institution of Mining and Metallurgy of America; Fellow Geological Society of America; Author: Copper Mines of the World; Geology of Butte, Montana; Nature of Ore Deposits, etc.

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1920

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PREFACE

The present volume, covering the mining industry for 1918, 1919, and first quarter of 1920, has been entirely re-written and descriptions of newly organized companies added. Statistical chapters covering all the metals are again given, and a glossary and chapter on ore minerals included.

The list of obsolete securities, or so-called "Dead List," has been omitted to make room for the thousand or more new companies added. A complete list of obsolete mining stocks will be published in a separate volume. A full list of the iron mining companies of the Lake Superior district is given, and the many mining corporations of the lead and zinc fields of Missouri, Oklahoma and Kansas are included.

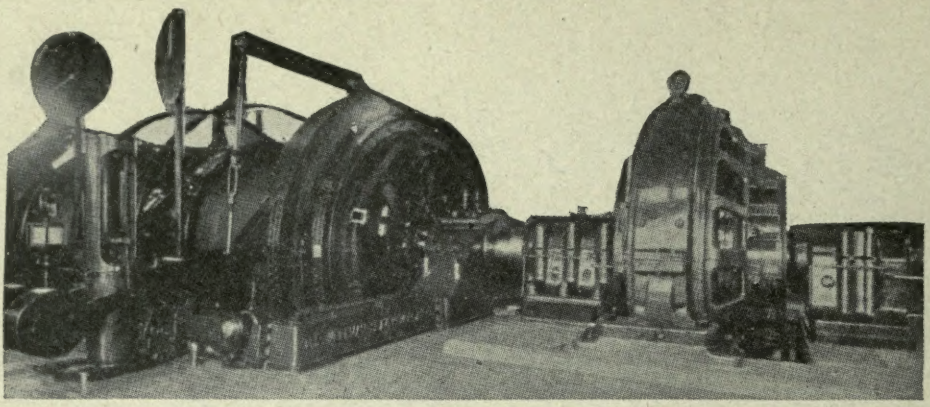
The year 1919 was a very dull one for the base metal mining industry, and the big companies curtailed their production, while the smaller mines were shut down. The present year will see a widespread and active demand for all the metals, and a corresponding expansion of mine work.

The MINES HANDBOOK will hereafter be published annually, the delay in issuing the present volume being due to labor conditions and a shortage of paper.

Mr. M. von Bernewitz and M. Stencel have again been my valued assistants in the preparation of the book.

WALTER HARVEY WEED.

Tuckahoe, N. Y., April, 1920.



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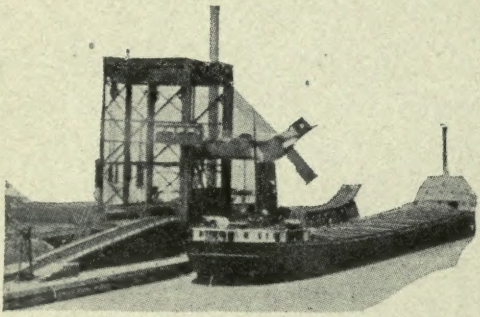

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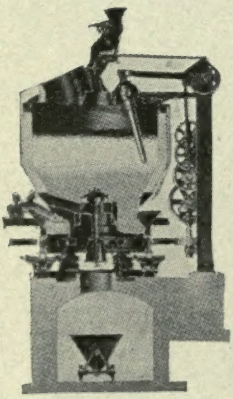

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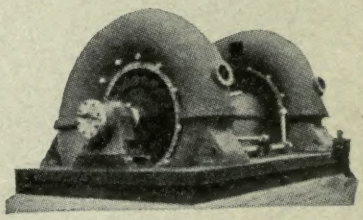

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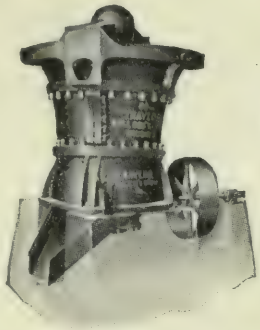

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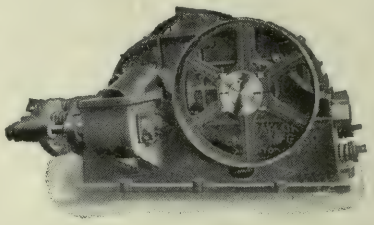

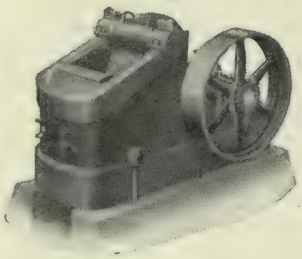

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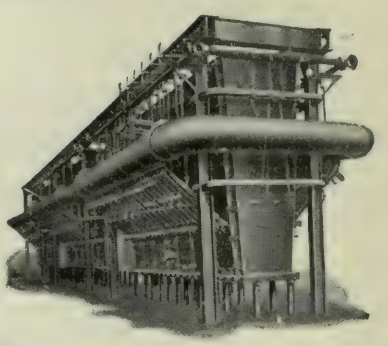

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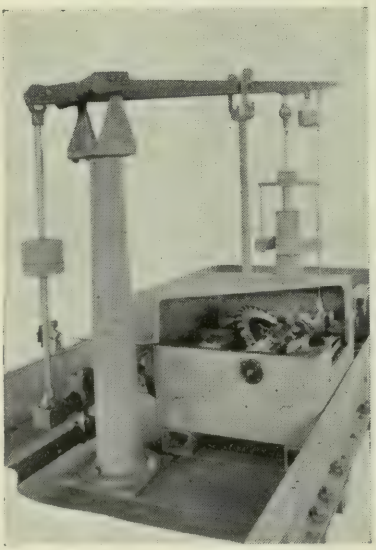

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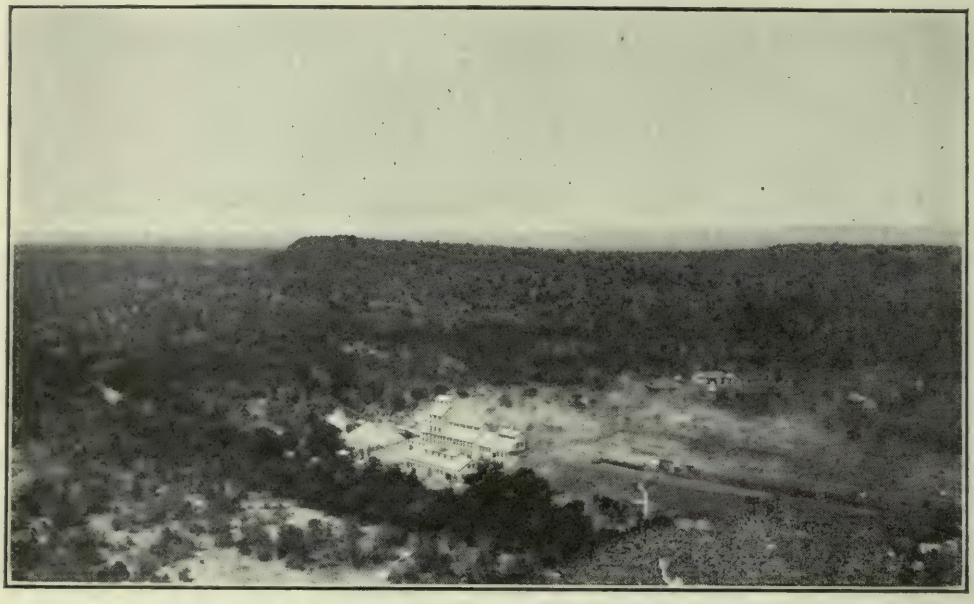

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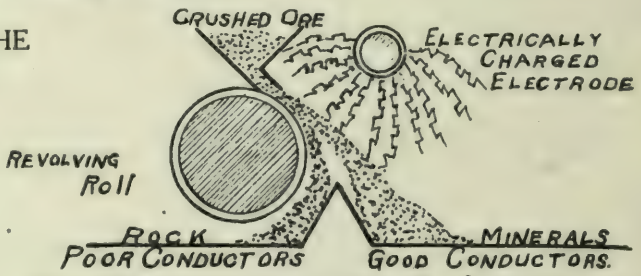

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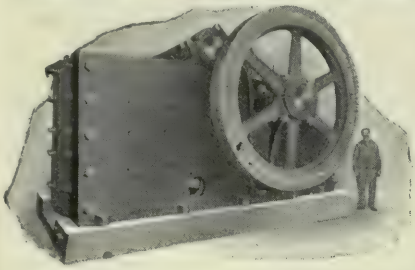

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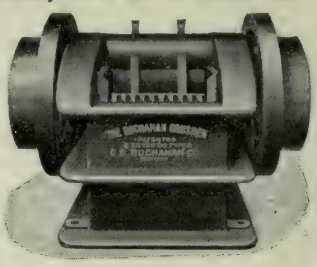

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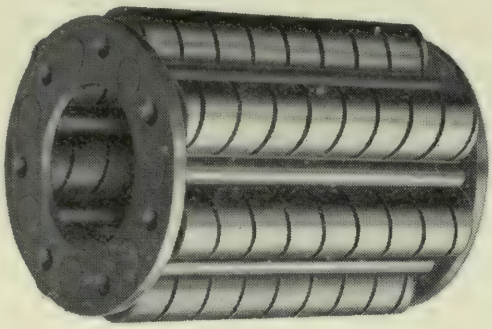

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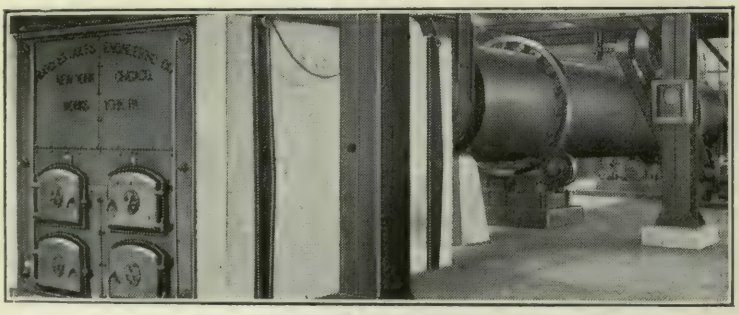

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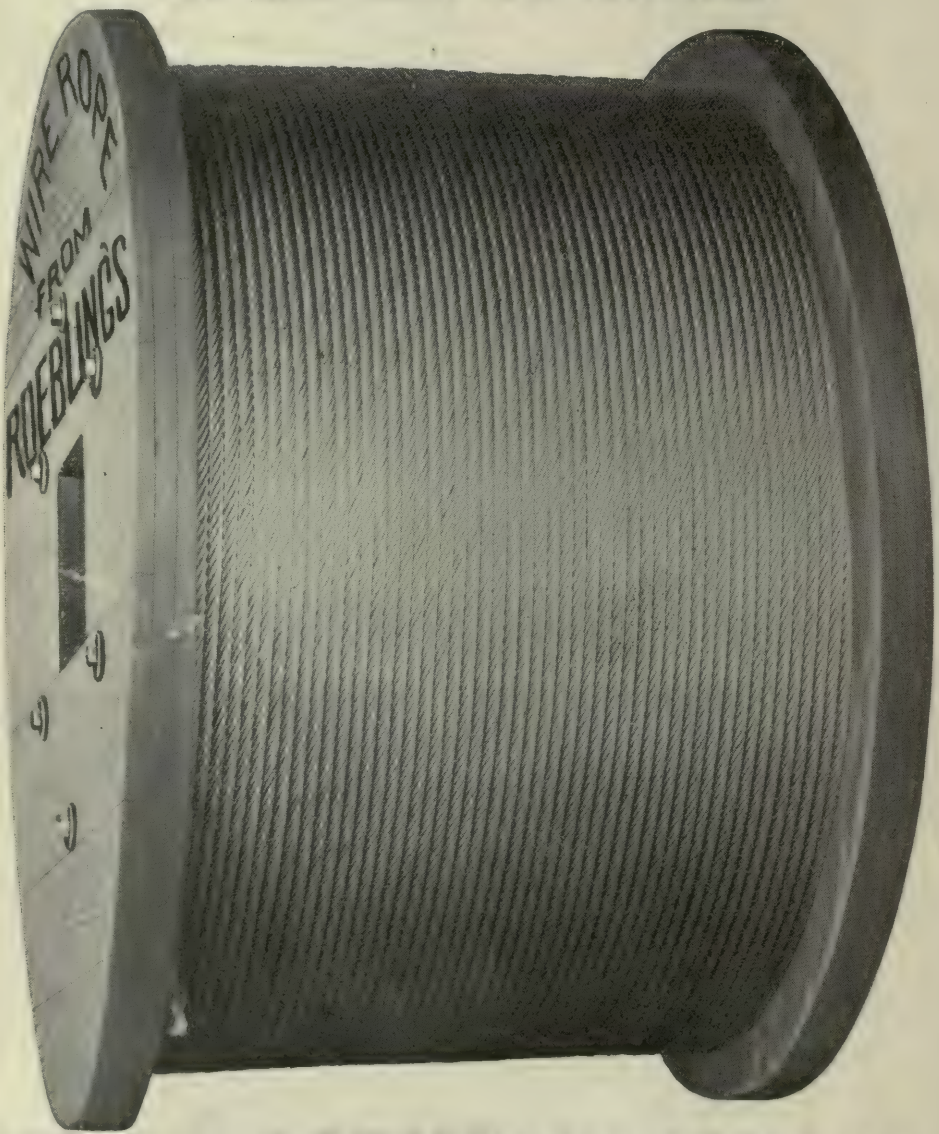

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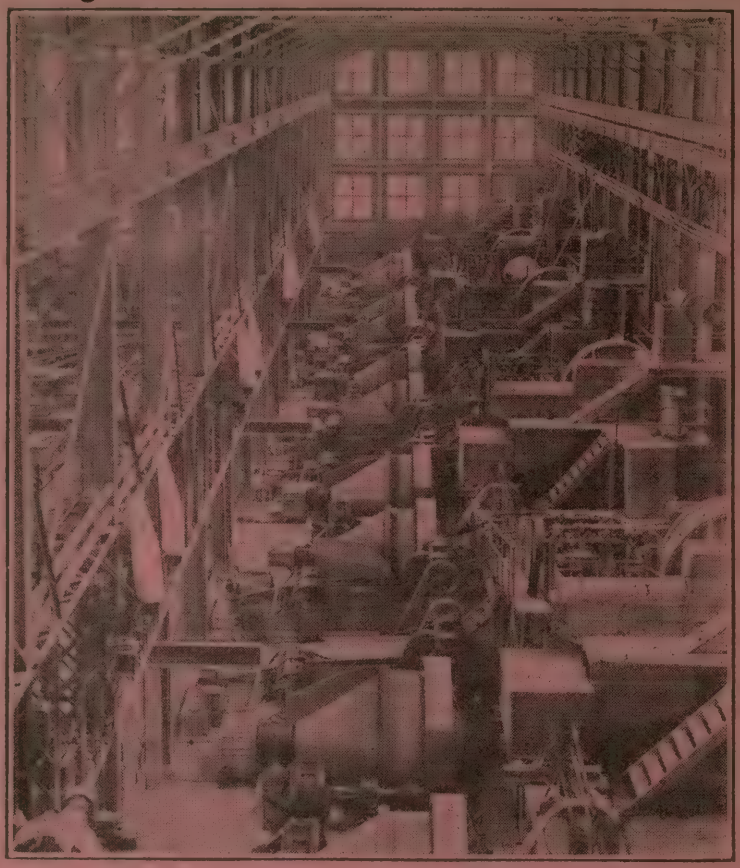

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(Descriptions of Mining Companies begins in Chapter IV)

CHAPTER I

GLOSSARY OF MINING TERMS

The following glossary of mining, milling, and trade terms will be found useful by many readers.

Acicular. Needle-shaped.

Acid. An acid of silicious rock is one in which bases are combined with silica. The antithesis of basic.

Adit. A level mine opening driven into a hill or mountain.

Adobe. Sun-dried brick used in all Latin-American countries.

Air-blast. A violent explosion caused by the escape of air compressed by the settling down of rocks in the upper workings of a mine.

Air-Compressor. A machine for condensing air to a pressure sufficient to actuate machinery. The compressed air is forced through pipes to various parts of the mine, or surface plant, and used in the same way as steam for driving drills, pumps, hoists, etc.

Air-doors. Doors built in mine passageways to stop air currents.

Air-drill. A drill driven by the elastic pressure of compressed air.

Air-shaft. A shaft used to provide ventilation for deep workings. Two shafts, one opening on slightly higher ground than the other, will provide natural ventilation underground, when connected by a drift, the longer shaft becoming a chimney, and the shorter an inverted syphon, down which the air is sucked with great force.

Alkali. Potash and soda are the common alkalis. An alkali is the opposite of an acid; it turns red litmus blue, and forms salts with acids.

Alloy. Two or more metals united mechanically, but not chemically by fusion.

Alluvium. Soil or broken rock deposited by the action of water.

Altered. An altered rock is one that has undergone changes in its chemical and mineralogical structure since its original deposition.

Aluminous. Containing aluminum.

Amalgam. An alloy of mercury with another metal such as gold, silver or copper. Mercury will not amalgamate with iron.

Amalgamation. The process of extracting gold and silver from crushed ores by amalgamation with mercury. The quicksilver is expelled later by heat, and recovered for further use.

Amorphous. Without form.

Amygdaloid. A trap rock, containing vesicles or small rounded cavities filled by mineral matter such as calcite, agate, etc. Rock is spotted and in outcrop often pitted as amygdules weather out, leaving cavity. In the Lake Superior district copper-bearing amygdaloids frequently show native copper in the cavities left by the leaching out of the soft minerals originally therein.

Analysis. A determination of the constituents of a chemical substance.

Anhydrous. Devoid of water.

Anode Copper. Copper from a converter, cast in molds into plates with ears, and used in cells of electrolytic refineries.

Anticline. An arch or fold of rock-strata bulging upwards, in U shape; is the reverse of syncline.

Antigua. In Mexico, is a mine worked by Spaniards or Mexicans at a time so remote—from 50 to 300 years—that particulars have been forgotten; sometimes valuable, but "every antigua is not a bonanza."

Antimonide. An ore of any metal chemically united with antimony.

Apartado. Aparatado de correos is Spanish for postoffice box; usually abbreviated to Ap.

Apex. The top or uppermost part of a vein. In the United States the ownership of the outcrop or apex carries the right to follow the vein downward beneath another's ground, if within one's end lines extended.

Arastra. A circular rock-lined pit in which broken ore is pulverized by stones attached to horizontal poles fastened in a central pillar and dragged around by mules.

Arenaceous. Sandy; carrying silica as sand.

Argentiferous. Silver-bearing.

Argillaceous. Clayey.

Aroba. A Spanish weight of 25.36 lbs. avoirdupois; Portugese, 32.38 lbs.

Arroya. A gulch.

Arsenide. A mineral composed of arsenic combined with another metal.

Arsenopyrite. A mineral composed of arsenic sulphur and iron; often carries gold or silver also.

Assay. A test or ore or metal to determine the exact amount of any metal or metals contained in it. Usually fire assay; smelting on a small scale.

Assessment Work. The work required annually by the U. S. government, on an unpatented mining claim to keep title.

Attle. Cornish term for waste rock.

Auriferous. Containing gold.

Back. The rock above mine opening like the ceiling of a room. The part or section of a vein between two levels or between a level and the surface.

Bad Air. Air vitiated by powder fumes, noxious gases or insufficient ventilation.

Ball Head or Stamp. A steam stamp, named after its inventor.

Barilla (De Cobre). Spanish term for particles of native copper, cleaned (concentrates). Equivalent to the "mineral" of Lake Superior mines. Used mainly in Bolivia among tin producers.

Barranca. A deep gulch or canyon, with precipitious sides.

Barrel Work. Masses of crude native copper, picked out by hand before ore passes beneath stamp. Was formerly shipped in barrels to the smelter.

Barrow. A wheelbarrow.

Basalt. A dark colored heavy igneous rock, carrying much iron; a trap rock.

Base. Impure; an alkaline element.

Base Bullion. Copper or lead carrying much gold or silver.

Base Metal. Any of the non-precious metals.

Basic. Low in silica; containing more than enough iron and lime to form a good slag.

Basin. A syncline; a trough in the earth's surface.

Battery. A set of stamps, usually five in a stamp mill.

Bearing. The course of direction, as that of a mineral outcrop in degrees, east or west of, north (meridian).

Bed. A seam or layer of stratified rock. Used in some mineral districts for flat veins or lodes.

Bed Rock. The solid rock underlying stream gravel or rock.

Bedded Vein. One parallel with the bedding of the country rock.

Bells. Signals for lowering and hoisting the bucket, skip or cage in a shaft usually are given by bells, the number of strokes indicating the nature of the load, the place for stopping, etc.

Bit. The cutting end of a boring tool. A steel drill; a short hollow cylinder of soft steel, used in diamond-drilling. The diamonds are set around the inner and outer edges of the bottom of the bit, and cut into the most refractory rocks when the bit is rotated.

Black Copper. Impure copper, smelted, but containing impurities requiring refining.

Black Jack. Sphalerite, zinc blende of dark color.

Blanched Copper. Copper containing a large amount of arsenic, practically forming an alloy.

Blast. (N.) Air forced through tuyeres into a blast furnace or Bessemer converter. (V.) to explode gunpowder or dynamite.

Blast-Furnace. A cupola furnace in which ore is smelted, with the aid of air pumped in under pressure.

Blasted. A blasted miner is one who has been injured by the explosion of dynamite or gunpowder.

Blasting. The breaking of rock by means of high explosives, inserted in holes bored in the rock for the purpose.

Blende. Zinc-blende or sphalerite; sulphide of zinc.

Blind Drift. A drift connected with other workings of the mine at one end only; a cul de sac.

Blind Lode. A lode not outcroping at surface.

Blister Copper. Copper of 96 to 99% purity; applied to product of Bessemer converter.

Blocking Out. Exposing the ore in a mine so that it can be extracted by stoping. Properly speaking, ore is not blocked out for stoping until opened on three sides.

Blossom. The oxidized, softened outcrop of an orebody altered by weathering.

Blout. A mass of quartz, often mineralized, that is often isolated and not connected with a vein; an abbreviation of blow-out.

Blower. A fan used to force air into a mine; a blowing engine.

Blowing Engine. An engine for forcing air into blast furnaces under pressure, often about one pound avoirdupois per square inch.

Blowing In. A smelting furnace is blown in, when charge is ignited, fusion begins and the process of reduction by fire is begun.

Blowing Out. A smelting furnace is blown out when the metal and slag are tapped out, and the fires are allowed to die out.

Blowout. An outcrop larger than the orebody beneath; see blout.

Bluestone. Copper sulphate.

Bonanza. Spanish for pay-ore. Usually applied in United States to a body of exceptionally rich ore, especially in silver mines.

Bonnet. The cover or roof of a cage; also a steel casting connecting the piston-rod with the upper end of a stamp-shaft.

Bostonite. A light colored igneous rock composed mainly of potash feldspar.

Bore Hole. A drill hole bored for test purposes.

Bort (Bortz). A form of crystallized carbon between the diamond and the black diamond.

Botryoidal. Resembling a bunch of grapes.

Bottom. A mass of impure copper formed below the matte, in matting copper ores.

Boulders. Loose, rounded masses of rock, larger than cobbles.

Box Canyon. A canyon closed at one end.

Branch. A vein branching off from the main orebody.

Brattice. A screen for the regulation of air currents in a mine.

Breast. The face or innermost end of a mine working.

Breccia. A rock formed of angular fragments cemented together.

Brecciated. Broken into angular fragments partly or wholly cemented together.

Broken. A vein is broken when dislocated by faults.

Broken Ground. Rock strata where the walls are poorly defined and the general formation shattered.

Bucket. An iron or steel bucket used for hoisting men or ore in a mine. In a vertical shaft a bucket swings free, but in an incline shaft the bucket runs on a skidway of plank timbers.

Buddle. A conical table on which ore is dressed; formerly used in Cornwall, etc., and recently applied to a new concentrator.

Bulkhead. A wooden or masonry partition walling off part of a mine or protecting it against soft or creeping ground; also a damming back water.

Bullion. Includes any of the base metals containing gold and silver; also mixture of gold and silver.

Bullion Bars. Unrefined gold and silver melted and cast into bars.

Bunch. A small mass or pocket of exceptionally rich ore.

Bunchy. An orebody containing small scattered masses or bunches of ore.

Cable. The steel wire rope used in shafts for hoisting buckets, skips or cages.

Cage. The elevator used in vertical shafts for hoisting ore and rock, and for lowering men, timber, etc.

Calcareous. Limey.

Calcine. To drive off sulphur, carbonic acid gas, or other volatile constituents of an ore by heating.

Calcining Furnace. A furnace for roasting ore to drive off sulphur, previous to smelting; also for heating cement materials.

Calcite. Crystallized calcium carbonate.

Cam. A double-curved tooth, fixed on a shaft, for lifting gravity stamps.

Camp. A mining town.

Canyon. A deep gorge with precipitous walls.

Cap. The top piece of a framed set of mine timbers; copper caps containing fulminate of mercury, used to explode dynamite in blasting rock.

Capping, or Cap-Rock. The rock or other ground above a mineral deposit.

Captain. In most mining fields where Cornishmen are employed the foreman in charge of mining work is termed a captain.

Carbonaceous. Any mineral in which carbon and oxygen are chemically united.

Carbonates. A term commonly applied in the western part of the United States to oxidized lead ores, usually argentiferous.

Carboniferous. Rocks of the coal age of geological eras.

Carga. A Mexican weight of 300 lbs. avoirdupois.

Cartridge. Dynamite put up in cylindrical cases of oiled paper to fit the holes bored by drills.

Casing. The wooden lining of a shaft; an iron pipe put down outside of a diamond drill hole when passing through soft or broken ground, to prevent the hole becoming clogged by matter intruding from outside.

Casting Copper. Impure copper better suited for casting into various forms than for drawing into wires or rolling into sheets.

Cave. A natural opening or vug in a rock formation; the part or complete falling in of a mine.

Caving System. A plan of mining, by which the worked out upper levels and surface are allowed to subside gradually, as the mine workings are deepened.

Cement Copper. Regulus; the loose and usually impure copper deposited on iron by copper-bearing waters.

Cerro. Spanish for a mountain or hill showing rock outcrops.

Chalybeate. Iron-bearing waters.

Chamber. A large stope.

Change House. Building where miners change their clothing before entering a mine.

Change Day. The day when miners are transferred from day shift to night shift, or the reverse.

Chapeau de Fer. French term for an oxidized iron outcrop; gossan or iron hat.

Charge. The amount of ore, flux and fuel fed to a smelting furnace.

Chert. A coarse impure chalcedony or flint.

Chile Bars. Bars of Chilean blister copper, weighing about 200 lbs each.

Chilean Mill. A grinding apparatus with three heavy wheels running around in a circular pan.

Chimney. An orebody or pipe shape in an approximately vertical position.

Chloride. A mineral (or ore) of any metal united chemically with chlorine; usually applied to hornsilver ore.

Chloride. (V.) To work the oxidized part of an ore deposit on a lease or tribute; a term used in the western part of the United States.

Churn Drill. A drill having a churning motion, used for boring oil wells, test-holes, etc.

Chute. A hole, usually lined with planks, used for dropping ore or waste to a lower level of a mine.

Claim. The area of 600′ x 1,500′, or 20 acres of U. S. public land staked off and claimed by a prospector or miner. Size of claims varies in different countries.

Classifier. A machine which separates mineral particles according to their weight.

Clay Gouge. A thin seam of clay separating ore, or ore and rock.

Clay Slate. An argillaceous slate.

Clean-Up. The collection or gathering together of accumulated ore or metal in a mill or smelter.

Cleavage Planes. The more or less regular lines along which slates and other metamorphic rocks break into slabs or leaves.

Coarse Jigs. The jigs used to handle the larger sizes and heavier grades of ore or metal.

Coarse Metal. Matte resulting from the first smelting in old-style smelting of oxidized copper ores.

Cobbing. Breaking masses of ore into lumps by hand hammers and sorting ore out.

Collar. The top of a shaft; surface timbering of a shaft.

Colloids. Non-crystalline materials.

Compartment. Mining shafts usually are divided into two or more compartments or sections, separated by framed timbers and planking.

Concentrate. The ore or metal, after part or complete elmination of gangue rock.

Concentration. The process of separating the metallic part of an ore from the waste rock or mineral in which it has been enclosed. It involves crushing to free the metallic particles. The separation may be by gravity, either dry or in water; by oil or froth flotation, or magnetic separation.

Concentrating Table. A table on which a stream of finely crushed ore and water flows downward and the heavier metallic minerals lag behind and flow off in a separate compartment.

Concentrator. A plant where ores are concentrated; a jig or machine for separating ore or metal from gangue-rock, the process usually employing a rocking or oscillating motion, aided by jets of water, whereby the worthless gangue is carried off and the heavier mineral remains.

Conchoidal. Breaking with a curved or shell-like face, or fracture.

Concretion. A rounded mass or nodule formed of mineral matter gathered about a center.

Conductivity. Electrical conductivity is measured by the resistance offered to the passage of an electrical current.

Conglomerate. A rock formed of pebbles and rounded boulders cemented together. Sedimentary conglomerates are ancient shore deposits whose pebbles and sands are hardened into rock. Volcanic conglomerates are formed of rounded masses ejected from volcanic vents cemented together by volcanic sand or ash (tuff) rock.

Construction Account. Many mining companies summarize their finances so that the cost of operation is divided into two classes, one being for general working expense and the other for construction, sometimes classed as capital account. It includes new buildings and machinery on surface and frequently new mine openings.

Contact. The junction of two dissimilar bodies of rock, as limestone and porphyry.

Contact Deposit. A mineral deposit found between two unlike rocks, usually applied to an orebody at the contact between a sedimentary rock, limestone, shale or sandstone, and an igneous rock.

Contract. In mining applies to an agreement between operator and workman to pay latter so much per foot for excavating drift or stope. These men are known as contract miners and are usually skilled workmen. They work harder than men on wages, due to the incentive of higher earnings.

Copper Ore. Rock carrying copper mineral or minerals. See detailed descriptions of copper-bearing minerals in Chapter III.

Core. A drill core.

Cornish Pump. A form of mine pump actuated by long rods reaching from surface down mine shafts.

Costeaning. Proving an ore deposit or vein by trenching across its outcrop at approximately right angles.

Counterbalance. Hoisting plants usually are worked in counterbalance for deep shafts. The weight of the descending cage or skip is used to partly offset the weight of the ascending cage or skip.

Counter Vein. A cross vein running at approximately right angles to the main orebody.

Country Rock. The predominant rock about an ore deposit.

Course. The direction or strike of a vein; a stretch of mineralized matter in a vein.

Crab. A hand winch.

Creeping. The slow movement of the rock in mine workings caused by the pressure of super-incumbent and adjacent rock masses.

Cretaceous. A geological age characterized by chalky beds in England. The limestones of Arizona and Mexico are largely of Cretaceous age, and so are the coal-bearing beds of the Rocky Mountain region.

Cribbing. Close-set round timbers supporting an underground roof, or lining a shaft.

Croppings. Outcrops.

Cross-Course. An intersecting vein.

Crosscut. A mine opening, similar to a tunnel, that is driven across the rocks at approximately right angles to the orebody; a drift follows the lode or vein.

Cross Vein. An intersecting vein.

Crucible. A vessel of refractory material in which ores and fluxes are melted.

Crystals. Geometrical forms, with plane faces, of infinite variety, assumed by the majority of minerals.

Cupola. An upright furnace used in smelting.

Cupriferous. Copper-bearing.

Cut. To intersect an orebody; the portion of a working face of mineral removed at one operation.

Cwt. A hundredweight, or 112 lbs avoirdupois.

Cyanide. (V.) To treat crushed rock with a weak solution of cyanide of potash or of soda, dissolving the gold and silver, which is recovered by precipitating it with zinc (or aluminum for certain silver ore).

Datum Level. The level (usually sea-level or mean level of nearest considerable body of water) from which altitudes are measured in surveys.

Dead Roasting. Sulphide ores are dead roasted when all the sulphur possible to drive off by roasting has been eliminated.

Dead Work. Underground work which is not in ore; the opening of new shafts, drifts, and winzes preliminary to the stoping of the mineral bodies.

Debris. Broken down rock material; the fragmental material broken off by frost, etc., from rock exposures; talus.

Decomposed. Rock or ore altered and leached by air and water.

Decrepitate. To break into fragments with violence, under the blowpipe or great heat.

Dendrite. A moss or fern-like mineral stain or film usually of manganese or iron oxides.

Denouncecment. In Mexico, the formal filing of a claim to mineral land.

Denudation. The uncovering of rock or an ore deposit by the weathering of wind and water, or glaciation.

Dessication. Drying out; loss of water from any given substance.

Detritus. Debris; broken down rock, usually applied to gravel, etc., moved and deposited by streams or glaciers.

Denouncement. In Mexico, the formal filing of a claim to mineral ore deposit and to open up new and further amounts of ore.

Diabase. A dark trap rock composed largely of a felt of lathe shaped crystals of plagioclase feldspar, plus ferro-magnesian minerals, etc.

Diamond-Drill. A machine used for boring holes in rocks, with a hollow cylinder for a bit, whose end is set with black diamonds or bort.

Die. The iron block in a mortar, onto which ore is fed for crushing by a stamp.

Dike. A vein of igneous rock; locally, a reef or wall of rock projecting above the ground; also applied to the hardened waste material filling fissures.

Diorite. A crystalline granitic rock with predominant plagioclase feldspar.

Dip. The inclination or angle at which a lode or vein pitches downward into the earth.

Dip Compass. A compass having the needle fixed to swing in a vertical plane, so it can be readily deflected by magnetic rocks.

Dirt. Frequently used to designate ore broken underground; for instance, in Joplin district, Missouri.

Disintegration. The breaking down of rock through weathering.

Disseminated Ore. Ore carrying fine particles of metallic minerals, usually sulphides, scattered through rock or gangue matter.

Disturbed. An orebody is disturbed when lacking defined walls and settled character.

Dolomite. Magnesian limestone; carbonate of calcium and magnesium.

Donkey. A small auxiliary hoisting engine, usually operated underground and actuated by compressed air, or used for preliminary work at new shafts or exploring pits.

Downcast. A shaft having a downward air current.

Draftage. An arbitrary allowance claimed by some British smelters to cover loss of weight in transport.

Dress. To separate ore from gangue rock by hand or machinery.

Dressing Floor. A floor where ore is sorted by cobbing and picking.

Drift. A horizontal passage in a mine following the lode or vein.

Drift Copper. Native copper found in gravel and clay, far from original orebody, from which it has been carried by glaciers.

Drifting. Opening drifts; driving.

Drill. A steel bar with chisel shaped end used for boring in rock; is struck on the other end by a hammer, or is forcibly driven against rock by air piston.

Drill-Core. Solid, cylindrical cores of rock cut out by a diamond drill. These form a record of the strata through which the drill has passed.

Driving. Extending a drift horizontally.

Drum. The cylinder of a hoisting engine, around which the rope is wound.

Druse. The crystallized crust lining a cavity in rock or ore.

Dry Ore. Argentiferous ores containing insufficient lead for fluxing in a smelter.

Ductile. That which is capable of being extended in length by tension, as into wire.

Ductility. The capacity of a metal to elongate, when under pull from the ends, without cracking or breaking.

Dump. A place for depositing rock taken from a mine; a pile of ore or rock.

Dyke. See dike.

Dynamite. Nitro-glycerine held in wood pulp, infusorial earth, or some similar article, to render it safer in use. Strength varies according to percentage of nitro-glycerine contained.

Eisener Hut. German for iron hat, or gossan, occurring above an ore-body.

Electrolyte. The solution in which electrolytic separation of metals is carried on.

Electrolysis. The separation and redeposition of metals by electroyltic action.

Electrolytic. Applied to copper means copper made from impure metal by electrical decomposition and redeposition. The bar of impure copper is gradually dissolved and the pure metal redeposited at the opposite pole of the battery, while other metals fall as black slime to the bottom of the tank in which the solution (electrolyte) is held.

Elvan. Cornish name for dikes of greenstone, porphyrite and granite.

Erosion. The wearing away of surface masses of rock and soil by the elements, or by glacial action.

Eruptive. Igneous rocks, brought to the earth's surface or outer crust by volcanic activity.

Escarpment. A rock wall, nearly or quite vertical.

Exfoliation. The separation of thin leaf-like layers from a rock mass.

Exploders. A fulminating cap for setting off high explosives.

Exploitation. The productive working of a mine or ore deposit.

Exploration. Prospecting work; looking for ore.

Face. The inner or working end of any mine opening. A face of ore is the ore shown at the extreme end of a drift, stope, or tunnel.

Fahlband. A zone or band of crystalline rock, carrying finely disseminated metallic sulphides.

Fall of Ground. Rock falling from the roof into a mine opening.

False Set. A temporary set of timber.

Fan. A machine for forcing or sucking air into or out of a mine.

Fathom. Six feet. In stoping, a fathom is a cube of six feet.

Fault. Dislocation of a vein or of a rock stratum.

Feeder. A branch or small vein joining a larger one.

Ferruginous. Containing iron.

Filling. The waste material used to fill up old stopes or chambers; allowing a mine to fill with water.

Filter. A machine for removing the solution or moisture from crushed ore, either by forcing it under pressure or sucking it through canvas or cloth, leaving the muddy ore behind.

Fines. The finer particles of ore or metals saved in concentrating processes.

Finisher Jigs. The jigs used to save the smaller particles of ore in a concentrator or stamp mill.

Fire. The miner's warning cry when a blast is to be set off is "fire."

Fissile. Splitting easily into plates.

Fissure Vein. A fissure in the earth's crust filled with mineral matter

Flake Copper. Very thin scales of native copper.

Float. Loose ore or rock, away from its parent mass, on the surface.

Float Copper. Drift Copper.

Float Ore. Loose ore, often water worn ore, found at a distance from its outcrop.

Flocculent. Resembling tufts; cloudy masses of slightly cohorent material floating in a liquid.

Floor. The floor of a drift or other horizontal mine opening; the rock bed beneath an orebody.

Flour Copper. Very fine scaly native copper that floats on water and is difficult to save in milling.

Flotation. A process of concentrating or separating out the valuable metallic sulphide minerals of an ore, by mixing the pulverized ore with acid and oil and agitating it by air or paddles to make a scum or froth that takes up the metallic minerals and floats them off, leaving the waste behind.

Flume. A launder or conduit for carrying water.

Flux. Substances used in furnaces to form a fusible compound with the waste matter and make slag. In assaying, borax, soda, salt, etc., are used; in smelting, limestone, ironstone, etc.

Fluxing Ore. An ore containing appreciable metallic minerals, but smelted mainly because containing fluxing agents required in the reduction of richer ores.

Foliated. Having a laminated structure.

Foot. The foot-wall.

Foot-wall. The rock wall under a vein or underlying inclined mineral deposit.

Fork. The branching of a vein.

Formation. A term used by miners for any particular body of rock, as a granite formation, a sandstone formation. Geologists limit term to groups or rock beds of similar age.

Founders Shares. The few shares issued to the individuals organizing a stock company. In companies owned outright by other companies, founders shares are issued to as many individuals as are required to incorporate and hold the offices required for corporate management, as the laws do not permit a corporation, which is an artificial person, to form another corporation, or to serve as a director of another corporation.

Free. A metal is free when virgin or native, and not combined chemically with any other element.

Free Milling. An ore that readily yields metallic contents by simple means, such as amalgamation or cyanidation.

Freeze. A furnace freezes when the molten charge solidifies.

Friable. That which may be pulverized or broken up easily.

Froth. Foam; a mass of bubbles.

Furnace. A structure for the smelting or roasting of ore.

Fuse. A cotton cord with a gunpowder core, so made as to carry fire to an explosive.

Fusible. That which may be melted.

Fusion. Melting; alloying metals while liquid, through heat.

Gabbro. A rock composed mainly of plagioclase feldspar and iron magnesia minerals.

Gad. A small steel wedge or chisel.

Galena. Lead sulphide; see Mineralogy.

Gallery. A drift or level.

Gallows Frame. The timber or steel framework over the mouth of a

shaft, carrying a sheave-wheel, over which the hoisting rope passes to the engine; now commonly called head frame.

Gangue. The waste rock or mineral in which ore or metallic particles are held.

Gash Vein. A gash-shaped fissure vein, rapidly pinching downward.

Geode. A hollow crystal-lined cavity, or the rounded mass containing such a cavity.

Geological Horizon. Rocks of one geological age.

Geology. The science of the formation of the earth and the rocks of which it is made.

Giant Powder. Dynamite.

Girt (or Girth). A horizontal brace in direction of a drift in mine timbering.

Glaciation. The erosive effect produced by glaciers.

Glance. A metallic sulphide showing a bright shining surface. Copper glance is chalcocite; silver glance is argentite.

Glory Hole. A large open pit from which ore is or has been extracted.

G. M. B. Good Merchantable Brands, an English grade of refined copper. Term replaced by "Standard."

Gneiss (pronounced nice). A banded coarse-grained rock often formed of the same minerals as granite, often in patchy and irregular arrangement. May be a diorite gneiss, granite gneiss, etc.

Gob. Waste used to fill worked-out openings.

Gophering. Prospecting work confined to digging shallow pits or starting adits. Term used from similarity of this work to the crooked little holes dug in the soil by gophers.

Gossan. Iron hat; is the leached capping, usually quartzose, showing yellow to reddish brown iron stains found overlying veins.

Grade. The percentage, or value of ore and partly refined metals; the percentage of rise in roads or mine openings driven on an approximately horizontal plane.

Gram. A metric weight of 15.4 grains or 1-500 of a pound avoirdupois.

Granite. A dense, granular rock of igneous origin, composed of varying proportions of quartz, feldspar and mica.

Granulated. In the form of grains.

Gravity Stamp. A stamp, usually set in batteries of five, in which the piston is raised by a cam, the stamp crushing the charge in the mortar by its weight, when allowed to fall.

Greenstone. An altered basic porphyry; usually andesite or diorite.

Grizzly. A screen or grating of heavy iron rails or steel bars, through which the smaller pieces of rock or ore fall through.

Groundsill. The bed-piece of a set of mine timbers.

Guides. Perpendicular square wooden strips or stringers for guiding cages in vertical shafts. Cables or steel rails are used instead in some mines.

Gut. To rob, or extract, only the rich ore of a mine.

Hade (American). Inclination or dip of a vein, measured from the vertical, while dip is measured from the horizontal. Becoming obsolete, and should not be confounded with rake of an ore-shoot.

Hanging. The hanging wall; the rock on the upper side of a mineral vein or deposit.

Hardinge Mill. A cone-shaped cylinder, resting horizontally and half filled with pebbles, which fall and crush ore when mill is revolved.

Haulage Plant. A mechanical installation for the underground tramming of rock, operated by ropes, compressed air, or electricity.

Head or Heading. An underground level or airway in a mine; also water pressure.

Head Frame or Gallows Frame. A framework of 2 or 4 legs, made of wood or steel, fitted with sheaves, over the mouth of a shaft.

Heap-Roasting. Burning the sulphur out of ores piled in heaps, with a small amount of wood or other fuel.

Heave. A horizontal dislocation of a vein or bed caused by a fault. Also applied to the rolling out of line of a lode in making depth.

Hectare. An area 100 meters on each side; called pertenencias in Mexico; equals 2.471 acres.

Hoist. An engine for raising ore from a mine and for lowering men and material.

Holing Through. A drift or other mine opening is holed through when a connection is made between two separate sections working toward each other.

Horizon. The sky-line, commonly used in the sense of absolutely flat, as shown by a spirit level. Geologically, all rock strata of the same geological period.

Horse. A mass of country rock enclosed in a mineral vein or deposit.

Horsepower. A measure of power of an engine. One horsepower is rated as equivalent to raising 33,000 lbs. avoirdupois to a height of one foot in one minute.

Horse-Whim. A windlass operated by horses.

Hot Blast. Heated air supplied to a blast-furnace.

Hungry. Nearly or quite barren.

Hunt & Douglass Process. A leaching process, using chloride of iron and salt, to dissolve oxide ores of copper.

Huntington Mill. Somewhat similar to a Chilean mill.

Hutch. See Jig.

Hydrated, Hydrous. Containing water combined chemically.

Hydro-Metallurgy. The reduction of ores by wet processes.

Igneous. Rocks consolidated from a molten state; includes not only volcanic rocks but those deep-seated rocks, hardened under cover, which have been exposed to view by erosion, or artificial openings.

Impregnated. Containing metallic minerals, scattered or diffused through the mass; properly used in referring to country rock carrying mineral similar to that in the vein.

Incrustation. A solidified coating, usually crystallized.

Infiltration. The deposition of mineral matter from percolating waters.

Ingot. A mass of metal cast in a peculiarly formed mold; applied only to gold, silver, or copper. Iron and lead are cast in pigs.

In Place, In Situ. Rock or ore that is in the position where deposited by nature.

Intrusive. Igneous rock masses pushed up through other and older rock formations.

Iridescent. Showing the colors of the rainbow.

Iron Hat. Gossan; outcrop of iron-stained material over an ore deposit or vein.

Jack. A miner's term for sphalerite; is called black jack, ruby jack, or rosin jack, according to color.

Jig. A machine for concentrating ore; i. e., separating the metallic mineral from the waste, by means of oscillatory or vibratory motion, aided by jets of water. The heavier minerals sink, and the lighter rock or gangue is carried off by the current.

Jump. To locate and take possession of mineral lands held or claimed by another party.

Kaolin. China clay.

Keweenawan. Pertaining to or of the Keweenaw formation or rocks in which the Lake Superior copper veins occur.

Kibble. A bucket used for hoisting material in a shaft.

Kilo or Kilogram. A metric weight of 2.2046 lb.

Kilometer. 0.621376 miles. For rough computations may be figured as 3/5 of a mile.

Kin. A Japanese weight of 1.31 lbs. avoirdupois.

Kindly. The appearance of rock carrying or promising to carry good mineral value.

Ladderway. The series of ladders giving ingress and egress to a mine; the compartment in which the ladders are located.

Lagging. Timber, usually of small diameter, placed over the cap-timbers of incline shafts and drifts, to prevent damage from falling rock.

Lamina. A thin plate; plural is laminae.

Lamellar. In thin sheets of laminae.

Lander. The top man at the mouth of the shaft who receives signals from below, and attends to the unloading of rock sent up in buckets, skips or cages.

Launder. A wooden flume or sluice, used to convey water, or tailings held in suspension in water.

Lava. Rock from volcanoes.

Leach. To dissolve metals out of ore by water or acid, or both.

Leaching. The process of extracting a metal from its ores or salts by treatment with a solvent, such as weak acid.

Lead. (pronounced leed). A mineral body.

Leader. A small vein running into a larger one.

Ledge. The solid vein or lode.

Leg. An upright timber supporting the cap of a set of timber.

Lens. An orebody of lenticular form.

Lenticular. Having the shape of a double convex lens.

Level. A horizontal opening in a mine, usually connected with a shaft. Levels are commonly opened at stated intervals as depth is gained—usually at 100 feet in modern mining practice. The word "level" frequently is used interchangeably with the word drift, but is more comprehensive. Both drifts and crosscuts may be opened on a level, though a crosscut is not a level.

Limestone. A rock composed of lime carbonate.

Lixiviation. The process of leaching out the metallic contents of ores.

Locate. To locate a mining claim is to file a notice claiming ownership, at the point where mineral is discovered, and to put up stakes or monuments at the corners of the rectangular area claimed.

Location Work. Labor required by law to be done on mining claims within 60 days of location, in order to establish ownership.

Lode. A metalliferous vein. In Lake Superior region refers to the mineralized beds; is used generally as synonymous with vein; used by geologists as meaning an aggregation or congerie of mineralized veins.

Long Ton. An English ton of 2,240 lbs. avoirdupois.

Low Grade. Ore whose recoverable value yields but slight profit per ton. Carrying mineral value but sparingly.

Magma. An originally molten mass of rock coming to the earth's crust from depth.

Magmatic Segregation. The process by which the different constituents of molten rock masses crystallize at varying temperatures with a tendency to separate themselves, so far as circumstances allow, from the other compounds.

Malacate. A horse whim with vertical drum used for hoisting in Mexico. Sometimes is called a Zacatecas malacate.

Mass. Copper; a solid chunk of native metal.

Massive. Rock without defined lines of cleavage; ore occurring without appreciable gangue, as contra-distinguished from ore disseminated throughout a gangue.

Matrix. The rock between imbedded objects, such as a particle or mass of ore or native metal. More rarely a metallic mineral is the matrix cementing together rock particles.

Matte. A furnace product composed of copper and iron sulphides, produced by shaft or reverberatory fusion. Usually contains 30-40% copper, but varies from 20-60%. Is blown to blister copper 98-99% fine in bessemer converters.

Matting. The process of smelting sulphide ores into matte.

Mesa. Spanish for tableland or plateau.

Mesh. The size of openings in a screen.

Metalliferous. Carrying metal.

Metallurgy. The science and practice of reducing metals from ores and minerals.

Metamorphic. Rock that has been changed from its original condition by pressure, chemical action, heat, or other causes.

Metamorphosis. The process by which changes in structure are affected in a rock form by heat or percolating waters.

Metasomatic. Replacement, particle by particle, so that original structure is often preserved.

Meter or **Metre.** 39.37 inches.

Metric Ton. A weight of 2.204.6 lb. avoirdupois.

Mica. A scaly transparent mineral. Biotite is brown or black mica; muscovite or isinglass is the clear mica used in stoves, lanterns, electric apparatus, etc.

Mill. Works for treating ores without smelting.

Milling. Dressing ore in a mill; also dumping ore in a winze to be drawn off into cars or wheelbarrows on a lower level.

Mill Run. The treatment of a definite quantity of ore in a mill; also the result or yield thereof.

Mill Test. The determination of the metallic contents and recoverable values in any given ore by the milling of a sufficient quantity to afford average milling conditions.

Miner. In strict construction, the man that does the drilling and blasting in a mine. In a broader sense, all men working underground.

Mineral. Ore or rock containing metal. In the Lake Superior district the term mineral has a special use, being employed to designate the concentrate of native copper, with its small amount of admixed amygdaloid or conglomerate, as it comes from the mill, before going to the smelter.

Mineral Belt. The strip or zone of mineralized territory in a given formation or district.

Mineral Right. The ownership of mining rights under the surface of land owned by another holder. Mineral rights sometimes are reserved in selling land in some districts.

Mineralized. Carry metalliferous minerals.

Miner's Inch. The amount of water that will flow through an opening one inch square under a six-inch head, which is 2,274 cubic feet in 24 hours, or 94¾ cubic feet per hour, equal to 655 wine gallons or 593 imperial gallons hourly.

Mining Engineer. Graduates of technical mining schools are given the degree of engineer of mines and sign the letters M. E. after their names. The letters M. E. stand for mechanical engineer, when given by a school, but are often used by men engaged in mining, who lack scholastic degrees, as an abbreviation for mining engineer, or mining expert.

Missed Hole. A drill hole, charged with explosives, which fails to be set off by the fulminating cap.

Moil. A steel bar, like a drill, except that it is sharpened to a point instead of having a cutting face.

Molybdenite. A graphite-like, flaky lead-colored mineral found in some ores; composed of molybdenum and sulphur.

Momme. A Japanese weight equal to 3.75 grams or 2.4113 pennyweights.

Monocline. Upturned beds of rock that have a practically uniform dip.

Monzonite. A granitic rock intermediate between diorite and granite.

Morgen. A South African land measure—2.1165 acres, or 1.44 claims.

Mortar. An assayer's mortar in which rock or ore is crushed with a pestle. A mortar is the box, about the stamp of a mill, in which the ore is stamped and crushed.

Mother Lode. The main lode of the district. In America applies to the mineralized belt of the principal California gold region.

Mouth. The surface entrance or opening of an adit, tunnel or shaft.

Mucker. Ore shoveller, who loads the mine cars and in most mines is also a trammer, pushing the cars to the shaft or tunnel mouth.

Mullock. Australian for waste rock broken underground.

Mundic. Pyrrhotite, magnetic pyrite; iron sulphide.

Mynpacht (South Africa). A part (10%) of a farm, which the owner has the first right to locate or peg out, when the farm is proclaimed a public goldfield.

Nickeliferous. Carrying nickel.

Nodule. A small concretionary, rounded mass of mineral matter.

Non-Conformable. Rock strata not associated originally in the position now occupied.

Nugget. A lump of native metal; usually applied to gold.

Open-Cast, Open-Cut. A mine worked as a quarry, or pit open to the sky.

Ore. Metallic minerals; mineralized material or rock, holding metallic minerals. Called pay ore when it can be profitably worked; low-grade ore when it yields but slight profit.

Ore-Car. A mine car for carrying ore or waste rock.

Ore-Chute. An opening in ore or rock through which ore is dropped downward. Also used for ore bins and pockets.

Ore Dump. A heap or pile of ore at the tunnel mouth or top of shaft.

Ore-Shoot. An orebody or portion of a vein carrying high-grade, or payable ore. Usually has a vertical or diagonal dip on the plane of the dip of the vein.

Orthoclase. A white, or pale-colored feldspar composed of silicate of potassium and aluminum. Occurs as white crystals or spots in porphyry.

Outcrop. The apex, or part of a vein or mineral deposit that is exposed at the surface of the earth.

Outlier. An isolated mass of rock or group of rocks lying at a distance from the main body, and separated therefrom, on the surface by a different rock formation.

Output. Production.

Overburden. Waste material, usually drift or alluvium above the solid rock, or orebody.

Overhand Stoping. Removing ore in ascending steps.

Oxide. An ore of any metal or metals chemically united with oxygen.

Oxidize. To unite with oxygen. Many minerals and most metals oxidize with greater or less rapidity when exposed to air or water.

Panning. To wash gravel, etc., in a pan, so that the sand and gravel is loosened and thrown out and the gold or heavy metallic minerals left in the pan.

Patent. A deed given by the Government, to mineral lands.

Patio. A walled yard with paved floor in houses and mine plants, in Mexico and other Spanish countries.

Paystreak. The rich band, part, or zone in a vein or ore deposit which carries the profitable, or pay ore.

Pegmatite. Very coarsely grained granite; a giant granite.

Penthouse or **Pentice.** A shed-roof erected in the bottom of a shaft, when sinking, to protect miners from accidental fall of rock, timber or tools from above.

Peroxide. The oxide of any metal containing the greatest proportion of oxygen.

Pertenencia. The unit of a mineral claim in Mexico; 100 meters square, or one hectare, 2,471 acres.

Peter Out. To pinch out, or feather out and end.

Petrology. The study of rocks by thin sections and microscope.

Phosphate. An ore of any metal or metals with which phosphorous and oxygen are chemically united.

Picul. A Chinese weight of 133⅓ lb.; commonly used in the Orient.

Pillar. A section, or block or ore left in place to support shafts or roofs.

Pinching. The narrowing of a vein.

Pinching Out. The narrowing of a vein to extinction.

Pipe Vein. An orebody of chimney form.

Pitch. The angle and direction of dip or take of an ore-shoot in a vein. If a vein dips east, an ore-shoot may pitch at a flatter angle than the vein, to the N. E. or S. E.

Plain. A flat or nearly level country.

Placer. A deposit of metal-bearing gravel or alluvium.

Plant. The machinery equipment of a mine or reduction works. In general use the term includes buildings, housing, machinery.

Plat. To draw to scale. In Lake Superior and Australian usuage it is the station or enlargement of a level, to give extra space for loading and unloading the cage, skip, or bucket.

Plumbiferous. Carrying lead.

Plutonic. Rocks of deep-seated, igneous origin.

Pocket. An orebody of small extent; a natural underground reservoir of water; a cavity cut in the rock underground to hold ore; a bin at shaft house or mill, in which ore, flux, or fuel is stored.

Pockety. Carrying only occasional bunches of good ore.

Poling. The process of deoxidizing molten copper and tin in a reverberatory furnace by stirring with long poles of green timber.

Poll-Pick. A tool having a pick on one end, and a poll, or hammer head, on the other.

Pood. A Russian weight of 36.112 lb. avoirdupois.

Poppet-Head. Framework or gallows frame over a shaft, for sheave-wheel and hoist rope.

Porphyritic. Carrying isolated crystals in a ground mass, like plums in a pudding.

Porphyry. Properly, is any igneous rock showing phenocrysts, i. e., distinctly isolated crystals in a dense or crystalline matrix. Porphyry may be granite, quartz, or one of several other rocks.

Pound. The troy pound alone is used for gold, silver, and platinum only. It is 0.82286 of an avoirdupois pound. A pound of gold weighs 12 troy ozs. or 5,760 grains and the avoirdupois pound 7,000 grains.

Primary. The first; primary ores are those first or originally formed in an ore deposit, before alteration began. Also applies to the oldest rock formations.

Prop. A heavy timber placed with its foot against the floor of a mine opening, and its top against the roof, to support the rock above.

Prospect. To seek for mineral; a new mining property that has not yet been developed enough to be called a mine.

Prospector. A searcher for mineral deposits.

Protoxide. The oxide of any metal containing the least proportion of oxygen.

Puddingstone. A coarse conglomerate showing rounded pebbles.

Pulp. Pulverized ore or concentrate.

Pulverize. To crush to powder.

Pulverulent. That which may easily be reduced to powder.

Pyrrhotite. Iron sulphide, often called mundic or magnetic pyrite.

Pyrite. Iron disulphide; fool's gold.

Pyrites. A local term for pyrite and for sulphide ores; more properly, iron disulphide.

Pyrolusite. A black manganese ore containing 63% manganese.

Quarry. An open pit, of varying size, sometimes several acres, from which stone or ore is mined.

Quarter-Section. In the United States a quarter of a square mile; 160 acres, laid out in a parallelogram, each side of which is one-half mile in length.

Quartz. Crystalline silica; any hard silicious ore, in miners' usage.

Quartz Claim. In the United States mining claims are of two classes:

placer claims, carrying mineral, usually gold, in alluvium; and quartz lode claims, any prospect carrying metalliferous bodies in place.

Quartzite. An altered (metamorphosed) crystalline sandstone.

Quartzose. Rock having much quartz in its composition.

Quicksand. Fine sand, which flows easily when wet.

Ragging. Cornish for rough cobbing; broken lumps of ore of medium size.

Raise or **Rise.** A shaft or winze that is being opened from below. Sometimes called upraise or uprise.

Rake. The pitch of an ore-shoot on the plane of the vein. Also applied to cross veins, which are sometimes called rake, or counter veins.

Range. A mineral belt; also in many American states a surveyor's term for describing and locating lands. The state is surveyed in sections, towns, and ranges. A township comprises 36 sections and is a square of six miles. Each township receives a double number, one for the town and one for the range. The towns are numbered consecutively from south to north, and the ranges are similarly numbered from east to west. Thus T. 2 N., R. 5 W. means Township 2 north or 12 miles north and Range 5, or 30 miles west of the State meridian.

Reamer. A tool like a bit, used to enlarge a hole previously drilled.

Reduction. The separation of metals from their ores.

Reef. A quartz vein or lode; a projecting ledge or inclined wall like an outcrop. The gold deposits on the Rand are termed reefs.

Refining. The elimination of impurities from crude metals, or separation of metallic alloys obtained in the reduction of ores.

Refractory. A refractory ore is one that cannot be smelted or otherwise treated by ordinary metallurgical processes. A refractory stamp-rock is one that is pulverized with unusual difficulty.

Regulus. The metallic material that separates and settles in the bottom of a pot of molten matte, or slag.

Reniform. Kidney-shaped.

Reserves. The amount of payable ore, developed and ready for extraction, or blocked out ahead of immediate requirements.

Reverberatory Furnace. A smelting furnace in which the flame from the grate below is reflected back by the roof on the charge of ore.

Rise. A raise or opening driven upward.

Roasting. Driving off sulphur and other volatile elements from ore by heat. When done in a furnace, under great heat, the process is called calcining.

Rob. To remove pillars and other supports from a mine for their mineral content, regardless of the future of the property.

Rock. Lake Superior; applied to ore mined and ready for the stamp mill. In English practice ore is called "Stone." More properly applied to the stony matter surrounding ore, or constituting the earth's crust; is a synonym for stone.

Rock-Crusher. A machine for reducing rock or ore to smaller sizes. Crushers are of two types, the jaw and the gyratory. The jaw-crusher works by means of swinging jaws; the gyratory operates on the plan of a coffee-grinder, only that the motion is somewhat eccentric.

Rock-Drill. A power drill.

Rock Filling. Waste rock, used to fill up worked-out stopes to support the roof.

Rock-House. Lake Superior; the building (usually the one over the shaft) where copper-bearing ore from the mine is dumped from the ore skip (or bucket), is screened, crushed and stored in a bin, ready for shipment to the mill.

Rolls. Heavy steel rolls, worked in pairs, like a clothes wringer, for crushing rock and ore.

Roof. The rock overhead in a mine opening.

Room. Similar to a stope; term usually applied to mines working mineral bodies lying nearly horizontally.

Royalty. A percentage of the ore or value thereof paid to the land owner by the lessee of the mine; often a fixed sum for each ton of ore extracted.

Run. See mill run. A bar or course of ground better or worse than the average value of the mine.

Running Ground. Superincumbent material that breaks off readily and falls into the mine openings.

Saddle. Depression or U-shaped fold; the reverse of an arch or anticline.

Safety Cage. A cage furnished with automatic appliances to stop its descent in case the cable breaks.

Salting. Placing rich foreign ore, minerals or substances in a mine to deceive intending purchasers or other interested parties.

Sample. A specimen of ore from a mineral deposit. A selected sample is misleading because containing far above average value, and splendid samples frequently come from the poorest mines. An average sample is what its name purports—if it be an average sample.

Sampling. Cutting a representative part of an ore deposit, which should truly represent its average value. Most usually a trench-like cut 4 inches wide and 2 inches deep, cut into the clean face of ore and across its course. Honest sampling requires good judgment and practical experience.

Sand Pump. A pump, usually centrifugal, designed to lift water carrying large quantities of coarse tailings or sand in suspension.

Sand. Tailings from the stamp mills of Lake Superior copper mines; in fact, from any mills.

Sand (or Tailings) Wheel. A large wheel, having buckets on its inner perimeter, for elevating water carrying stamp-sand.

Scale Copper. Copper in very thin flakes.

Schist. A crystalline, usually micaceous rock of foliated structure, made up of superimposed flattened particles.

Scoria. Slags from copper smelters; volcanic ash.

Scoriaceous. Of the nature of scoria.

Scram. To search for ore in a mine that is apparently worked out and to extract it.

Screen. A grating of perforated metal or woven wire.

Seam. A thin layer of rock or ore.

Secondary Enrichment. An enrichment of a vein or an orebody by material of later origin, often derived from the oxidation of decomposed overlying ore masses. Nature's process of making high-grade out of low-grade ores. First discovered by Weed and announced by publication in Geol. Soc. of America program, Dec. 8, 1899. Confirmed by Emmons and by Van Hise, Feb., 1900.

Sectile. Easily cut.

Section. A field or district; also, in the U. S. a square mile of land.

Sedimentary. Rocks formed by deposition from water, as contra-distinguished from rocks formed by igneous action.

Selvage. A clay seam along which parting occurs; also called fluccan.

Set. A framed form of timber, used for supporting ground in a mine.

Shaft. A pit or deep mine opening.

Shaft-House. A building at the mouth of a shaft, where ore or rock is received from the mine.

Shale. A hardened clay with fissile structure.

Shear-Zone. A belt in which the rocks are crushed by many parallel fissures.

Sheave. A grooved wheel, notched to carry rope; an open pulley.

Shift. A miner's work period of 8 to 10 hours' time; a force of men employed on one turn.

Shift Boss. A mine boss, or under-captain, in charge of a gang or shift of miners.

Shoot. See ore-shoot. To fire or explode dynamite in holes drilled for that purpose. An erroneous spelling for chute.

Short Ton. A weight of 2,000 lb. avoirdupois.

Shot. A blast of some explosive.

Shot Copper. Small rounded particles of native copper, somewhat resembling small shot in size and shape.

Shrinkage Stoping. Taking out ore by blasting it down on a heap of broken ore. Working space for drilling is kept open by drawing out part of the ore from an opening beneath. Is a method of overhead stoping.

Silica. Quartz, a compound of oxygen and silicon. Ordinarily sand is composed largely, if not wholly, of silica.

Silicate. A mineral composed of any metal or element chemically united with silica.

Silicious. Containing much silica or quartz.

Sill. The floor-piece of a set of mine timbers.

Sinking. The process of deepening a shaft or winze.

Sinking-Pump. A movable pump, usually vertical, hung in a shaft, and lowered, as the shaft is deepened.

Skip. An iron box, open at the top, running on guides, on four wheels, and hauled by a cable; used for hoisting ore and rock, and for lowering timber.

Skip-Road (or Way). A track of T-rails, spiked to wooden sleepers, on which a skip runs.

Slag. The melted rock or waste separated from the metal in a smelting furnace.

Slice. To remove ore in mine in pillars, or by successive slices.

Slickenside. A polished rock surface, showing striations produced by the opposing walls of a fracture rubbing and grinding against each other in the movement produced by earth stresses.

Slide. A bedding fault, or slipping caused by the subsidence of the overlying rock formation; also applied to masses of loose rock, or ore on a mountain slope.

Slime. Exceedingly small particles of rock and mineral held in suspension in water. This mud is called slum.

Slime Table. A circular revolving table, on which slim flows and minute particles of mineral are saved.

Slip. A fault.

Sludge. The mixture of rock and water, or slime, formed by a diamond-drill.

Sluice. A wooden trough, box, flume, or launder.

Smelter. Works where ores or crude metals are reduced by fusion.

Soapstone. Steatite; a soft unctuous rock.

Soft Ground. Heavy ground; rock about underground openings that does not stand well and requires heavy timbering.

Sollar. A platform or ladder landing in a shaft.

Spathic. Containing carbon dioxide; a carbonate.

Specimen. A sample of mineral selected because typical, unusual or exceptionally rich.

Speiss. Impure metallic arsenides produced in copper smelting; ore particles finely disseminated through a rock, usually occurring as impregnations.

Spelter. The common term for metallic zinc.

Sphalerite. Zinc blende; zinc sulphide; the most common zinc ore mineral; is often found associated with galena and chalcopyrite.

Spile. Lagging driven ahead of the regular timbering in treacherous ground.

Spitzkasten. Pyramidal boxes wherein ores are concentrated and sized by a jet of water fed from below.

Spoon. A long-handled spoon, used to scrape out drill holes.

Sprag. A prop or cross-timber set to secure the hanging wall in a stope. A short piece of wood used to block the wheels of a mine car.

Spur. A short, small branch from a vein.

Square Sets. A frame of mine timbers with mortised and tenoned sill, top piece and uprights of equal length, joined at right angles.

Squib. A fuse.

Squeeze. The slow settling down of the roof in mine workings without fracture.

Stack. The chimney of a furnace; usually employed to designate a number of furnaces, when used in the plural.

Stamp-Mill. A mill for crushing and concentrating minerals by stamps and jigs, etc.

Stamp-Rock. Ore containing fine copper that must be crushed and jigged to recover the metal. Use restricted to Michigan.

Stamps. Machines to crush rock or ore by heavy blows.

Stamp-Shoe. The heavy chilled iron casting attached to the lower end of a stamp piston, and does the actual crushing of rock in a stamp-mill. It hits against a round steel block called a die.

Stanniferous. Tin-bearing.

Station. A chamber in a shaft, cut out for pumps, landing place, etc.

Station-Pump. A mine pump permanently placed, as distinguished from a movable sinking-pump.

Steatite. Soapstone; a greasy mineral, having a talc base.

Step-Fault. A series of faults, rising like steps.

Stockwerk. A mass of rock penetrated by numerous small stringers of ore, the entire mass averaging sufficiently rich in metallic material to warrant its mining and treatment.

Stone. See Rock.

Stope. (V.) To mine or extract ore. (N.) The workings between levels or drifts, in which ore is broken down in a series of chambers and taken away for treatment.

Stoping. Breaking down the mass of pay-rock or ore above a drift. When stoping in an orebody of average width, miners can break rock much more quickly and cheaply than when driving the drifts.

Stoping Ground. Part of an orebody opened by drifts and raises and ready for breaking down.

Strata. The successive beds or layers of sedimentary rocks.

Stratified. Having regular layers of varying rock varieties.

Stratum. A layer or bed of rock.

Streak. The color given by a mineral when scratched or when rubbed on porcelain.

Strike. The horizontal direction of a vein, measured by the points of the compass; a discovery of ore.

Stringer. A thin seam of ore.

Strip. To remove the overburden of waste, drift, or alluval soil overlying an orebody.

Stripping. The waste or overburden above an orebody.

Structure. The form of a mineral, whether granular, crystalline or amorphous.

Stull. The top-piece of a set of mine timber. A timber prop supporting the roof of a mine opening.

Sulphate. A chemical compound (or a mineral) of a metal combined with sulphuric acid; an ore of any metal or metals with which sulphur and oxygen are united chemically.

Sulphide. A mineral or ore of any metal or metals with which sulphur is combined chemically.

Sulpho-antimonite. A mineral in which sulphur and antimony are united chemically with a metal.

Sulpho-arsenite. An ore mineral of any metal or metals with which sulphur and arsenic are united chemically.

Sulphuret. A sulphide; term becoming obsolete, but used in California.

Sump. The pit at the bottom of a shaft, where water collects; also in cyanide plants.

Surface Rights. The ownership of the surface of land only, where mineral rights are reserved.

Swabstick. A stick used to clean out drill-holes.

Syncline. Canoe or U-shaped fold of rock layers; the reverse of an anticline.

Table. A concentrating machine for separating finely crushed particles of ore from gangue.

Table Land. A plateau.

Tailings. The sandy and gravelly residue or refuse matter from a concentrating mill.

Tamp. To closely pack clay or other sticky earth into a drill-hole above the cartridges, to give greater force to the blast.

Tap. To draw off molten metal or slag from the vent of a furnace.

Taper Off. Cornish for stopping work temporarily.

Tenor. The percentage or average metallic content of an ore, matte, or impure metal.

Terrero. Spanish for heaps of partly leached ore.

Tertiary. The third great geological period preceding the present Quarternary period.

Test-Pit. A shadow pit sunk to look for mineral.

Texture. A rock structure; is fine or coarse grained, porphyritic, etc.

Throw. The displacement of a vein caused by faulting.

Timber. The wooden logs and sticks used for underground supports.

Timberman. One who works at timbering a mine.

Ton. Long, 2,240 lb.; metric, 2,204 lb.; short, 2,000 lb.

Tonelada. Spanish for long ton.

Township. Abbreviated T. or Twp.; see Range.

Trachyte. A light-colored volcanic rock made of alkaline feldspar with black mica and hornblende.

Tram. To load rock or ore in cars and push same to the shaft, a tramway.

Trammers. Men who load and tram the broken rock underground.

Trap. A dense gray, blue or greenish rock of volcanic origin; usually an old and altered basaltic rock.

Trend. The general direction of a mineral body.

Trestle. A frame-work of timbers, carying tram-tracks.

Tribute. The money per ton or percentage of ore extracted which is paid by lessees to owners for the privilege of working a mine.

Tripod. The three-legged iron frame on which the working parts of a power-drill rest; a three-legged wooden frame over the mouth of a pit or shaft.

Trommel. A revolving cylindrical sieve for sizing ore.

Troubled. A vein is sometimes called troubled when disturbed or faulted.

True Fissure Vein. All mineralized fissures are true fissure veins. Term commonly used as meaning a fissure vein with promise of holding to great depth, in contra-distinction to a gash vein.

Tsubo. A Japanese measure of 6 feet square, equalling 36 square feet.

Tube-Mill. A steel cylinder half lined with flint pebbles or steel balls, which crush ore when the tube is revolved.

Tufa. A limestone formed by spring waters. Name frequently used in place of tuff.

Tuff. Volcanic ash, cinder, and lapilli, ejected from volcanic vents and deposited in layers from air or water and solidified by time and superincumbent pressure. Name also used for coarser volcanic debris, including breccia and conglomerate.

Tunnel. A practically horizontal opening entirely through a hill or mountain. Term is commonly used instead of adit, which is a horizontal gallery having only one opening to surface.

Turbine. The most efficient form of water-wheel; also a new form of steam-engine in which the entire movement of the power-producing parts is rotary instead of reciprocating.

Tuyeres. The pipes in a furnace wall by which air is supplied under pressure, to either blast furnaces or bessemer converters.

Unconformable. With a break between rock beds lying at different angles or with erosion surface between.

Underhand Stoping. Cutting out ore from the floor of an opening. Removing ore in descending steps.

Underlay, Underlie. The downward extension of a vein or bed beneath the ground. Is technically the horizontal departure of a vein from the vertical measured in feet, per fathom (or 100′). Mineral bodies lying under a given tract, though not outcropping on surface.

Unpatented. Mining claims to which a deed from the U. S. Govt. has not been received. They are subject to annual assessment work, in order to maintain ownership.

Unstratified. Rock that is not bedded in layers.

Unwater. To free from water; to pump out or drain a mine.

Upcast. A shaft having an upward air current.

Upraise. A raise, an upward opening in a mine. Term almost obsolete, "raise" being preferred.

Van. To wash ore on a shovel, like panning.

Vanner. A concentrating table or machine for dressing ore by means of vibratory motion, aided by jets of water to carry away waste rock.

Vara. A Spanish-American measure of length, of 33 inches.

Vein. A rock fissure filled with mineral matter; a mineral body having defined walls. See contact vein and fissure vein.

Veinstuff. Vein filling; also used for gangue.

Vertical Shaft. One sunk at an angle of 90° with the horizon, or directly downwards toward the center of the earth.

Virgin. Native metal occurring elementally, as distinguished from ore minerals, which are chemical compounds.

Vitreous. Of a glassy nature.

Volatile. That which can be driven off as vapor, by heat.

Vug. A cavity in the rock; usually lined with a crystalline incrustation.

W. The chemical symbol for tungsten.

Wall. The side of a mine opening or drift. The waste or country rock on each side of a vein.

Wall-Plates. Are the two side pieces of a set or frame of shaft timbers, as distinguished from the end pieces.

Water-Jacket. An outer casing for a blast-furnace, in which water circulates, to keep the metallic furnace-walls from melting because of the intense heat of the charge.

Water-Level. The level above which water does not rise, when a mine is allowed to fill. The water-level is often the point below which altered and enriched ores are succeeded by base unaltered sulphides.

Weathered. Changed by long exposure to air and water.

Wet Process. Leaching or lixiviation.

Wheal. Cornish for mine.

Whim. A windlass with a vertical drum revolved by horse-power and used for hoisting.

Whip. A fixed pulley with hoisting rope passed through it and pulled by a horse or mule.

Wilfley. A Wilfley concentrating table; about 20,000 in use throughout the world.

Winch. A windlass.

Winding. Hoisting with rope and drum.

Windlass. A device for hoisting from a pit or shaft, by means of coiling a rope or cable around a drum, with crank handles.

Winze. A shaft, usually short, extending downward from the floor of a mine opening.

Wire Bars. Refined copper cast into bars for wire drawing.

Workings. The underground openings of a mine.

Wulfenite. See molybdenum in minerals.

Zinc Blende. Sphalerite; sulphide of zinc.

Zinckiferous. Carrying zinc.

Zinc Sulphide. A compound of zinc and sulphur. See minerals.

Zn. The chemical symbol for zinc.

CHAPTER II

MINERALOGY OF THE ORE MINERALS

ORE MINERALS:

Ores as mined are very seldom composed entirely of ore minerals, usually consisting of a mixture of quartz, or other non-metallic mineral, or of altered rock and metal-bearing minerals. The mixture constitutes ore when it contains enough value, in one or more metals, to pay for the cost of mining, concentrating, transportation, smelting, and marketing. As this cost varies with each mine and locality, and the price of every metal, save gold, also fluctuates, there is a wide range of value to ore. The Alaska gold quartz mines operating on a gigantic scale can mine, mill, and extract their product for less than $1 per ton, whereas many smaller mines cannot make a profit on $3 ore of similar character. Copper ores show a much greater margin, between the costs at the Utah Copper Co. and those of small vein mines.

In the following pages I have given a list of the more important ore minerals of each metal. It is intended only for general reference, the minerals being arranged under the name of the metal. For sight tests and recognition of ore minerals, see "Practical Field Mineralogy," Farrell-Moses, 1912.

ALUMINUM.

Bauxite. 74% alumina. Hydrated alumina. Regarded as a hot spring deposit. Occurs in pockets in clay in Arkansas.

Corundum. 53% aluminum. A bluish-gray, brown or white mineral which is harder than and will scratch any other mineral except diamond; will scratch steel. The clear red is the gem ruby and the blue, sapphire, found in many basic igneous dikes in Montana, especially in the sapphire mines at Yogo.

Cryolite. 12.8%aluminum, sodium alumina fluoride. A Greenland ore, essential to aluminum reduction.

Gibbsite. 65.4%alumina. Hydrated alumina, derived in Arkansas deposits from decomposition of a granite rock (Elaeolite syenite).

ANTIMONY.

Stibnite. Antimony glance 71.4% antimony.Is the common ore; a sulphide of the metal. Is in process of deposition at Steamboat Springs, Nevada. Antimony occurs in many silver ores. Is common in tetrahedrite or silver-bearing copper minerals. Antimony ores are mined at Pine Creek, near Wardner, Idaho. Specific gravity, 4.5.

ARSENIC.

This metal is largely derived from arsenopyrite deposits, from nickel or cobalt arsenides, common at Cobalt, from enargite, copper arsenide, at Butte.

Arsenopyrite, or **Mispickel,** a sulpharsenide of iron, with 45% arsenic, which looks like iron pyrite, but emits a garlic odor when struck. Occurs in fissure veins, with gold ores. Ruby, silver and other minerals rich in silver also contain arsenic. Gravity, 6.

Bismuthinite. $Bi_2 S_3$, 81.2% bismuth, a sulphide of bismuth. Gravity, 6.4. The metal is a subordinate constituent of many gold, tin, and silver ores, especially those of Leadville, Colo. It is obtained mainly as a by-product from gold-silver and lead ores and not from ores mined for this metal itself.

CADMIUM.

Greenockite. Is the only important ore mineral, the yellow sulphide, which occurs with zinc (sphalerite) ores in the Mississippi states.

CHROMIUM.

Chromite. FeO, Cr_2O_3, or chrome iron ore, with 68% chromium, is the sole ore of commerce. Gravity, 4.5. It resembles magnetite, the black iron oxide ore.

COBALT.

Cobaltite, or cobalt sulpho-arsenide, with 35.4% cobalt.

Erythrite. A cobalt bloom, 37.4% cobalt, a creamy raspberry red mineral, formed by oxidation; a hydrated arsenious oxide.

Smaltite. Cobalt arsenide with 28.2% arsenious oxide. A silver-white mineral, harder than cobaltite; garlic odor when struck. Gravity, 6.5.

COPPER. Cu. Native copper. The chemical symbol Cu is an abbreviation of cuprum, the Latin word for copper. The metal, native or refined, has the following names in modern languages; kupfer in German; koppar in Swedish; kobber in Norwegian; cobre in Spanish and Portuguese; cuivre in French, rame in Italian.

Atomic weight, 63.2. Belongs in the first group and is the leader of the fifth series of Mendeleéf's Periodic System. The group is as follows: 1, hydrogen; 2, lithium; 3, sodium; 4, potassium; 5, copper; 6, rubidium; 7, silver; 8, caesium; 9, unknown (possibly terbium, atomic weight 160); 10, gold; 11, unknown. The fifth series, of which copper is the basic leader, is as follows: 1, copper; 2, zinc; 3, gallium; 4, germanium; 5, arsenic; 6, selenium; 7, bromine. The three metallic elements falling between series four and five in Mendeleéf's table are iron, cobalt, and nickel. The frequency with which these three elements are found associated with copper, and the ease with which all four metals replace one another, is notable. The general resemblance between copper, silver and gold, which form ascending steps in the same group, is readily apparent.

System of crystallization, isometric. Tetrahexahedronal forms are the most common, with much twinning. Crystals often show cavernous faces and occasionally elevations, are often distorted and pass gradually through distortions into filiform and arborescent forms. Native copper also occurs massive, in granular form, and in laminae. In the Lake Superior mines the metal occurs in all observed forms and sizes, including lamellae from microscopic flakes up to sheets of immense size and weight, crystals of greatly varying form and size, grains from microscopic size to considerable nodules, and druses, often of considerable size, show various filiform and aborescent shapes. The finest particles are grains and exceedingly minute flakes, occurring in an upper sandstone of the Keweenawan series, while the largest masses, weighing upwards of 500 tons, have been found in contact and fissure veins.

Cleavage, none; fracture hackly; tenacity, second only to that of iron. Is perfectly sectile and highly ductile and malleable, ranking in these particulars with the precious metals. Electrical conductivity, 931, as compared with 1,000 for silver, which possesses the most perfect electrical conductivity of any known metal or alloy. Conductivity for heat, 898, as compared with 1,000 for gold, the most perfect conductor of heat.

Hardness, 2.5 to 3. Specific gravity, in vacuo, at degrees Centigrade (equal to 32°, or freezing point, Fahrenheit); when chemically pure and devoid of porosity, is 8.945. Specific gravity of the ordinary copper of commerce, none of which is free from impurities, varies from about 8.75 when cast, to about 8.95 when rolled, hammered or drawn, the exact gravity depending upon how handled, as well as upon the extent and nature of the impurities contained.

Lustre, metallic. Color, copper-red. Streak, copper-red, metallic, shining. Tarnishes upon exposure to air to brownish red, and is liable to form a coating of verdigris or oxide upon long exposure to air. Atmosphere laden with moisture and carbonic acid is especially favorable to the formation of verdigris.

Fusibility: Copper is fusible at approximately 2,000° Fahrenheit, or a trifle less than 1,100° Centigrade. Color, when fused, sea-green. Copper becomes volatile under the high temperature of the electric arc.

Solubility: Copper is soluble in nitric acid, aqua regia, and strong boiling sulphuric acid, also, slowly, in dilute hydrochloric and sulphuric acids, with admission of air. When in solution in nitric or sulphuric acids will deposit metallic copper on iron immersed therein.

Affinities: Copper has a greater affinity for sulphur than for any other element, possessing also marked affinities for oxygen, carbon dioxide, arsenic, antimony and bismuth, and unites with many other elements.

Alterations: Native copper alters on exposure, especially in damp air, to

the simpler oxide and carbonate ores, such as cuprite malachite and azurite, and occasionally, in time, to the more complex ore forms.

Occurrence: Native copper occurs, usually in small quantities, in most of the principal copper districts of the world. The native metal is mined upon a considerable scale only in Lake Superior, U. S. A., and Bolivia. The Lake Superior native copper carries considerable silver, mechanically admixed, though not alloyed, but carries no gold. In districts outside of Lake Superior and Bolivia the metal occurs most frequently in connection with the oxide and carbonate ores, and occasionally with the secondary sulphide ores.

Impurities: Native copper frequently contains silver, arsenic, bismuth, antimony, zinc and occasionally mercury. Commercial copper, refined from ores, may contain any of the elements already named, and also gold, tin, lead, selenium and tellurium, the latter two elements in very minute quantities.

Azurite. $2CuCO_3Cu(OH)_2$. A basic copper carbonate containing 53.3% copper. Common names, blue carbonate of copper, blue malachite, azure copper ore. Crystallization, monoclinic. Fracture, conchoidal. Tenacity, brittle. Hardness, 3.5 to 4. Gravity, 3.77 to 3.83. Lustre, vitreous. Color, azure blue. Streak, lighter blue. Is subtranslucent to transparent. Occurs frequently in the oxidized zone of copper ore bodies, almost invariably with malachite, but is much less common than malachite. Is a valuable commercial ore of copper.

Bornite. Cu_3FeS_3. A copper and iron sulphide, containing 55.5% copper, 16.4% iron, 28.1% sulphur. Common name, peacock copper ore. Crystallization, rare isometric, with many hexagonal penetration twins. Structure, granular or compact. Fracture, small conchoidal to uneven. Tenacity, brittle. Hardness, 3. Gravity, 4.9 to 5.4. Lustre, metallic. Color, copper red to bluish brown, quickly tarnishing to irridescence, often most brilliant. Streak, pale grayish-black. Is soluble in nitric acid, with separation of sulphur. Is a primary mineral, at Butte and in contact metamorphic ores, but also occurs as the first alteration product from chalcopyrite among the secondary copper sulphides, and often carries nodules and occasionally larger masses of chalcocite. Is one of the most important ores of copper.

Bournonite. $3(Pb, Cu.)S.Sb_2S_3$. A lead and copper sulphantimonite, containing 13% copper and 42.5% lead. Crystallization orthorhombic. Structure, massive, granular and compact. Cleavage, imperfect. Fracture, subconchoidal to uneven. Tenacity, rather brittle. Hardness, 2.5 to3. Gravity, 5.7 to 5.9. Lustre, brilliant metallic. Color and streak, steel-gray, inclining to blackish gray or iron-black. Fuses easily on charcoal and is soluble in acids. Occurrence: in many copper fields.

Brochantite. $4CuO\ SO_3,3H_2O$. A basic copper sulphate containing 56.2% copper. Crystallization, orthorhombic. Fracture, uneven. Hardness, 3.5 to 4. Gravity, 3.9. Lustre, vitreous. Color, emerald-green to blackish green. Streak, paler green. Is translucent to transparent. Is found in many copper fields, and is an important commercial ore in the Clifton district, Graham county, Arizona, and Chuquicamata, Chile.

Chalcanthite. $CuSO_4+5H_2O$. A hydrous copper sulphate containing 25.4% copper. Common names, blue vitriol, bluestone, copper sulphate. Crystallization, triclinic. Structure, massive, stalactitic and reinform, sometimes fibrous. Fracture, conchoidal. Tenacity, brittle. Hardness, 2.5. Gravity, 2.12 to 2.30. Lustre, vitreous. Color, sky-blue. Streak, uncolored. Is translucent to subtransparent. Is soluble in water. Occurs as deposits from mine water in most sulphide copper mines, and is found in impure state, in beds, in Chile.

Chalcocite. Cu_2S. A copper sulphide carrying 79.8% copper. Common names, copper glance, cuprous sulphide. Crystallization, orthorhombic; also occurs massive, with structure granular to compact and impalpable. Cleavage, indistinct. Fracture, conchoidal. Tenacity, brittle. Hardness, 2.5 to 3. Gravity, 5.5 to 5.8. Lustre, metallic. Color and streak, blackish lead-gray, tarnishing to dull green or blue. Is soluble in nitric acid. Occurs in all copper districts, frequently in large quantities. Is the richest commercial ore of copper and yields more than one-half of world's copper supply.

Chalcopyrite. $Cu.S\ Fe\ S_3$. A copper and iron sulphide containing 34.5% copper and 30.5% iron. Is the primary ore of copper. Crystallization,

tetragonal, sphenoidal, often twinning, also frequently massive and compact. Fracture, uneven. Hardness, 3.5 to 4. Gravity, 4.1 to 4.3. Lustre, metallic. Color, brass-yellow, often tarnishing to iridescence. Streak, greenish black. Is soluble, except sulphur, in nitric acid, and, on being heated, yields a portion of its sulphur. On exposure to moisture and heat becomes hydrated, and copper and iron change readily to sulphates. Alters to azurite, malachite, melaconite, chalcocite, covellite, bornite, brochantite, chrysocolla, tetrahedrite, and tennantite. Is found in practically every copper field in the world, and is second only to chalcocite in importance among the commercial ores of copper.

Chrysocolla. $CuSiO_3+2H_2O$. A hydrous copper silicate carrying 36% copper. Common names, mountain green and mountain blue. Structure, cryptocrystalline, enamel-like, sometimes botryoidal. Fracture, conchoidal. Is brittle and somewhat sectile. Hardness, 2 to 4. Gravity, 2 to 2.24. Lustre, vitreous to earthy. Color, mountain green, bluish green and sky blue to turquoise-blue, with impure varieties brown to dull black. Streak, white, from pure green and blue varieties. Is opaque to translucent. Is decomposed by acids, without gelatinization. Commonly occurs with carbonate ores in the oxidized zones of copper orebodies, and is a commercial ore of value in many districts.

Covellite. Covelline. CuS. A beautiful bright blue copper sulphide containing 66.4% copper. Chemical name, cupric sulphide. Crystallization, hexagonal; also occurs massive. Is flexible in thin layers, with basal cleavage. Hardness, 1.5 to 2. Gravity, 4.6. Lustre, submetallic on crystals, dull when massive. Color, indigo-blue. Streak, lead-gray to black, shining. Occurs in most sulphide copper districts, as a secondary ore and is a valuable commercial ore of copper, when found in sufficient quantities as in Butte, Mont., Utah, Wyoming and elsewhere.

Crednerite. $3CuO\ 2Mn_2O_3$. A copper manganate containing 34.4% copper. Crystallization, monoclinic. Cleavage, basal, perfect, less distinct in other directions. Hardness, 4.5. Gravity, 4.9 to 5.1. Lustre, metallic. Color, iron-black to steel-gray. Streak, brownish black. Is soluble in hydrochloric acid.

Cuprite. Cu_2O. A copper oxide, containing 88.8% copper, being the richest copper ore. Chemical names, cuprous oxide, copper protoxide. Common names, ruby copper, red glassy copper ore, octrahedral copper ore. Crystallization, isometric, commonly in octohedrons; also occurs massive, granular and sometimes earthy. Fracture, conchoidal. Is brittle. Hardness, 3.5 to 4. Gravity, 5.85 to 6.15. Lustre, adamantine to earthy. Color, light to dark red; when fresh, usually ruby-red, but fades to duller red. Streak, brownish red, shining. Is subtransparent to subtranslucent. Occurs in most copper districts in the upper oxidized zone, frequently shading into crystals of native copper.

Enargite. $3Cu_2.As_2S_5$. Enargite grades into famatinite. A copper sulpharsenite containing 48.3% copper. Crystallization, orthorhombic; also occurs massive and granular. Fracture, uneven. Tenacity, brittle. Hardness, 3. Gravity, 4.45. Lustre, metallic. Color and streak, grayish-black to iron-black. Is soluble in aqua regia and fusible on charcoal. Occurs in many copper fields, notably at Butte, Montana, where it is a common and valuable ore.

Epigenite. Formula probably $4Cu_2S.3FeS.\ As_2S_5$. A copper and iron sulpharsenite, carrying about 41% copper. Crystallization, orthorhombric, in short prisms. Fracture, uneven. Hardness, 3.5. Lustre, metallic. Color, steel-gray. Streak, black. Is soluble in nitric acid. Occurrence: Wittichen, Baden, Germany.

Famatinite. $3Cu.S.Sb_3S$. A copper sulphantimonite carrying 43.3% copper. Crystallization, orthorhombic; is isomorphous with enargite; also occur massive. Fracture, uneven. Tenacity, brittle. Hardness, 3.5. Gravity, 4.57. Color, gray with copper-red tinge. Streak, black. Is fusible on charcoal. Decrepitates in closed tube. Occurrence: Sierra de Famatina, Rioja, Argentina; and Cerro de Pasco, Junin, Perú.

Glance. Common name for sulphide ores with dark metallic lustre. Copper glance is chalcocite.

Malachite. $2CuO.CO_2H_2O$. A basic copper carbonate carrying 57.5% copper. Common names, green copper carbonate, basic cupric carbonate. Crystallization, monoclinic. Commonly masive, but frequently incrustive and sometimes granular or earthy, and disseminated as stains. Fracture,

subconchoidal to uneven. Tenacity, brittle. Hardness, 3.5 to 4. Gravity, 3.9 to 4.03. Lustre, of crystals, adamantine, frequently with concretionary bands of varying shades from pistachio-green to bluish-green. Streak, green. Is opaque to translucent. Is soluble in nitric acid. Occurs in most copper districts, in the upper portions of the oxidized zones of ore bodies, and frequently is an important commercial ore. When massive and beautifully marked is a semi-precious stone, used for table tops, etc.

Melaconite. Massive, compact, shining or earthy dull, black copper oxide of same composition as tenorite.

Mohawkite. $(Cu, Ni, Co)_3As$. A copper, nickel and cobalt, arsenide, carrying 63 to 69% copper, 3 to 7% nickel and 0.5 to 2% cobalt, usually somewhat argentiferous. Crystallization, hexagonal, by synthesis, no crystals being found in nature. Cleavage, indistinct. Fracture, uneven. Tenacity, slight. Hardness, 4. Gravity, 8.05. Color, light gray on fresh fractures, tarnishing to purple or brassy yellow. Streak, gray. Is soluble in nitric acid. Occurrence: Mohawk mine, Keweenaw county, Michigan.

Tennantite. $4Cu_2S.As_2S_3$. A copper sulpharsenite containing 57.5% copper when pure, but shading into a great number of varietal forms. Common name, gray copper ore, in common with tetrahedrite, to which tennantite is closely related and joined by a chain of rather obscure minerals shading gradually from tennantite into tetrahedrite. The many varietal forms of this mineral are brought about by part replacement of copper by silver, lead, zinc, iron, mercury, cobalt, nickel, tin, and platinum, with a marked tendency toward mutual substitution of the antimony of tetrahedrite for the arsenic of tennantite, and vice versa, rendering the tetrahedrite-tennantite group unusually prolific. Crystallization, isometric; also occurs massive and granular, compact. Cleavage, none. Fracture, subconchoidal. Tenacity, brittle. Hardness, 3.5 to 4.5. Gravity, 4.4 to 5.1 Lustre, metallic. Color and streak, flint-gray to iron-black. Diaphaneity, opaque to subtranslucent in small splinters. Is soluble in nitric acid and fusible on charcoal. Occurrence: at numerous points, being found in greater or less profusion in most copper districts. Is not regarded usually as a commercial ore, except where argentiferous, which is commonly the case.

Tenorite. Earthy form is known as melaconite. CuO. A copper oxide, containing 79.8% copper. Common names, **Black Copper, Black Oxide of Copper.** Chemical names, copper monoxide, copper peroxide, cupric oxide. Crystallization, monoclinic; also occurs massive, pulverulent and earthy. Fracture, conchoidal to uneven. Hardness, 3 to 4. Gravity, 5.8 to 6.25. Lustre, metallic. Color, dull grayish-black when massive, steel-gray in flakes. Is soluble in nitric and hydrochloric acids. Is found in most copper districts, and is a valuable ore of copper when occurring in quantities, but much of what has been considered tenorite in the past really was chalcocite, for which it is easily mistaken when disseminated. Found in very thin, long, flexible, minute scales of glistening gray color in Vesuvian lavas.

Tetrahedrite. $4Cu_2S.\ Sb_2S_3$. A copper sulphoantimonite containing 52.1% copper. Shades into tennantite, which see, for reference to protean forms of these two closely related and frequently indistinguishable minerals. Common name, gray copper ore. Crystallization, isometric; also occurs massive and granular, coarse to fine, compact. Cleavage, none. Fracture, subconchoidal to uneven. Tenacity, brittle. Hardness, 3.5 to 4.5. Gravity, 4.4 to 5.1. Lustre, metallic, brilliant. Color, flint-gray to iron-black. Streak, grayish-brown to cherry red. Opaque in quantity, but occasionally sub-translucent in very thin splinters, giving cherry red transmitted light. Is soluble in nitric acid and fusible on charcoal. Occurrence: in most copper districts, but commonly is not regarded as a commercial ore, except when argentiferous, which frequently is the case.

GOLD.

Calaverite. A pale bronze yellow telluride of gold with 40% gold, 1-2% silver and balance tellurium. Breaks with uneven fracture and scratches easily. If burned in a forge gives beads of gold. Common at Cripple Creek and Kalgoorlie, Western Australia.

Native. As clean metallic gold; as rusty and mustard colored gold, and as pale colored electrum, an alloy with silver.

Petzite. Tellurides of gold and silver, a steel or iron gray metallic lustered mineral easily scratched with knife, slightly scaly, 20% to 25% gold; 18% to 25% silver.

Pyrite is the commonest gold-bearing mineral.

Sylvanite. A silvery telluride of gold and silver, with brilliant metallic lustre, very soft, and carries 26% gold, 12.5% silver. Common in Cripple Creek, Colorado, ores.

IRON.

Hematite. 70% iron; black to brick red color; 5.5 to 6.5 hardness; 4.9 to 5.3 gravity. Mined in enormous quantities in Lake Superior region.

Magnetite. 72.4% iron; a black, sandy material or as coarse and fine-grained masses; is magnetic; 5.5 to 6.5 hardness; 4.9 to 5.2 gravity.

Pyrite. 46.7% iron; 53.4% sulphur; brass color; occurs frequently in crystalline masses; 6 to 6.5 hardness; 4.9 to 5.2 gravity. Rarely used as a direct source of iron.

LEAD.

Galena. The common ore of lead; lead sulphide, 8.6% lead, a steely, silvery mineral that crystallizes in cubes, occurs massive, resembling pig iron, or with sheeted structure. Breaks with perfect cleavage. Is often silver-bearing. Gravity, 7.5 to 7.7.

Cerussite. White lead ore, lead carbonate, 77.5% lead, a white or gray brittle mineral with waxy lustre. Is the most common oxidized ore of lead and effervesces with acid. Gravity, 5.5.

Anglesite. Lead sulphate, 73.6% lead; a brittle, colorless, or white mineral, often coating a kernel of galena and mixed with cerussite; very common Gravity, 6.3.

Pyromorphite. Lead phosphate, 76.30% lead, a green, gray or brown mineral fusing easily to crystalline globules. Occurs in six-sided crystals and mossy fibres.

Jamesonite. Feather ore, lead sulpho-antimonide 50.8% lead, 29.5% antimony, 19.7% sulphur, steel gray, metallic hairs and needles, also compact.

Bournonite. Lead copper sulphide. See Copper.

Vanadinite. A lead chloro-vanadinite, containing 18.7% lead oxide, 19.4% vanadium oxide, 2.5% chlorine, a bright yellow, orange or brown mineral, occurring in small, sharp hexagonal crystals; fuses easily.

Wulfenite. See molbydenum.

MANGANESE.

Ores to be valuable must contain at least 40% of the metal. Only the oxide ores are valuable.

Braunite. 69.6% manganese. Occurs as brown and black bands in clay in Arkansas.

Franklinite. See under zinc.

Psilomelane. 77% manganese; earthy manganese.

Pyrolusite. 63.2% manganese; black manganese ore resembling limonite. Is the common form of the Virginia deposit.

Wad. A soft earthy brown or black ore of variable composition, generally 20 to 45% manganese, also 10 to 25% water, and oxides of iron and copper.

MERCURY.

Cinnabar. 86.2% mercury. Sulphide of mercury, a red mineral, which is easily decomposed by heat.

MOLYBDENUM.

Molybdenite. The sulphide carries 60% molybdenum. Is a soft, lead colored, scaly metallic mineral resembling graphite, but malleable and giving a greenish streak on unglazed porcelain. Easily scratched by finger-nail. Gives sulphurous odor when heated, thus distinguishing it from graphite.

Molybdite. Oxide with 66.7% molybdenum. Is an earthly yellow powder, formed by oxidation, but has never been found in commercial quantity.

Wulfenite. Lead molybdate, contains 39.3% molybdic oxide. It usually occurs in flat, resinous, lustered, yellow, orange or red crystals, in the oxidized parts of lead deposits. Arizona has several deposits.

NICKEL.

Niccolite. Arsenical nickel, copper nickel, 43.6% nickel, 56.4% arsenic; somewhat resembles native copper. Has brownish, black scratch; metallic lustre and melts on heating.

Millerite. Sulphide of nickel, 64.4% nickel, a brass yellow, easily tarnished mineral, easily scratched by a knife.

Pyrrhotite (magnetic iron pyrite). Contains 2 to 6% nickel at Sudbury, Ont. Sulphur content is about 30%.

PLATINUM.

Metallic. In America is found in the black sand of gold placers, also at the Boss mine in Nevada, and as minute crystals of sperrylite in Sudbury, Canada, nickel ores.

RADIUM.

Carnotite. See Uranium.

Pitchblende. See Uranite (uranium).

SILVER.

Argentite. Silver glance; 85% silver; a silver sulphide of leaden-gray, metallic apeparance; scratches with thumb nail.

Embolite. Silver bromide, 67% silver; resembles horn-silver.

Frieslebenite. Gray silver; 22% silver, 30% lead, 28% antimony, 18% sulphur. Resembles gray copper ore (tetrahedrite), but contains silver.

Galena. Lead sulphide. Is usually silver-bearing in our Western ore deposits.

Hornsilver. Cerargyrite; 75.3% silver, 24.7% chlorine. When pure resembles wax and cuts like it. A fragment put on zinc and wetted turns black and is reduced to silver.

Polybasite. 50.6% silver. A brittle, metallic mineral formed of silver and copper, combined with arsenic and antimony; often shows triangles on.

Proustite. Light red or ruby silver, with 65% silver; also called arsenical silver; a brilliant red or ruby colored mineral that is sub-translucent, and is bright red, when powdered.

Pyrargyrite. Dark ruby; 60% silver; antimonial silver; a dark red to black metallic lustered mineral with brilliant red streak, or purplish powder.

Stephanite. Brittle silver, 68.5% silver; an antimonial sulphide of silver with iron black color and streak.

Tetrahedrite. Gray copper ore, often rich in silver, with up to 17% silver. Usual composition, copper, 30-40%; antimony, 15-25%; sulphur, 20-25%. Brittle iron gray to black metallic mineral; an important silver ore. See under Copper.

TIN.

Cassiterite. Oxide of tin, 78.67% tin. Is the common ore of tin; when weathered, looks like wood, but is very heavy.

Stannite. Tin sulphide, rare.

TUNGSTEN.

Wolframite.. Iron manganese tungstate, 76.4% tungstic acid (WO_3). Has a hardness of 5; gravity 5, and a dark brown streak. The name covers all transitions and variations of iron-manganese tungstate from iron tungstate ferberite to manganese tungstate hübnerite.

Occurs in long, dark brown crystals, or short, stoutish columnar masses, varying to black, brilliant, lamellar masses in quartz and pegmatite. The brown varieties are softer and more brittle than the blacker form, whose thin flakes are deep red in transmitted light. Is the most common ore of tungsten.

Ferberite. Iron tungstate, 76.3% tungstic acid. A dull, coal black mineral, sometimes in an aggregate of cubic crystals, more often massive in black, sooty looking material in veins in pegmatite. Is thus far only found commercially in Nederland district, Boulder Co., Colo., and is a desirable ore.

Hübnerite. Manganese tungstate, 76.6% tungstic acid. A light brown mineral often in needle-like crystals of hair brown color, in quartz.

Scheelite. Tungstate of lime, 80.6% tungstic acid. Hardness 4.5, gravity 6. Streak white, gray or pale brown, very heavy mineral with peculiar glitter to fractured surfaces. Occurs massive, and as crystals imbedded in quartz, and

also in garnet (Hawthorne, Nev., and Bishop, Calif.). Also in gold ores, as at Grass Valley, Calif.; Seoul, Korea; Murray, Idaho; and in New Zealand.

The field test for tungsten is to crush the specimen and "pan" it, to get the heavy residue; powder a part of the residue and put it in a glass or porcelain dish; add a half ounce (tablespoonfull) of muriatic acid and heat to near boiling for fifteen minutes. Then add a few drops of nitric acid and boil one minute. Set aside a moment to settle and pour off liquid into a large tumbler of cold water. Also add cold water to residue and stir. Set aside both dishes a few minutes to settle, then pour off liquid. Canary yellow sediment in dish shows tungstic acid.

The more common test is to wrap tin foil about the specimen and boil hard in hydrochloric (muriatic) acid for 15 minutes, remove foil; a blue color indicates tungsten, but the test does not always show the color.

URANIUM.

Carnotite. 52 to 57% oxide of uranium. A vanadate of uranium and potassium; a canary yellow powdery mineral occurring in large bedded deposits of impregnated sandstone in southern Utah and southwestern Colorado. Is the chief ore of uranium.

Uraninite. Pitchblende. 65%-80% uranium. A black to dark brown, olive green, very heavy mineral, found in Connecticut, Texas, Colorado, South Dakota, and in Austria. (See Bull. 70, U. S. Bureau of Mines, for description of mines.)

VANADIUM.

Carnotite. (See above.) 18% vanadium.

Roscoelite. 21%-29% vanadium; a scaly green to brown micaceous mineral mined at Vanadium, Colo., by the Primos Co., and also found in California quartz mines.

Vanadinite. 19.4% vanadium oxide. See under lead minerals.

ZINC.

Calamine. Hydrated zinc silicate, 67.5% zinc oxide, balance water and silicon; gravity, 3.9.

Is also the trade name for oxidized zinc ores. Often occurs in clay. Is yellow to brown, rarely pale blue or green.

Franklinite. An iron manganese zinc mineral with 5.54% zinc, 51.8% iron and 7.5% manganese; found at Franklin, N. J.

Smithsonite. Zinc carbonate, 64.8% zinc oxide. Dry bone, the white carbonate of zinc, differs from calamine by effervescing in acid; hardness, 5.

Sphalerite. Blende, black jack, zinc blende, 67% zinc. Is the chief source of the metal; varies from brown to black, rarely clear resinous. Gravity, 4. Hardness, 3.5-4. Knife scratch, brown to yellow.

Willemite. Zinc silicate, with 72.9% zinc oxide. Is a greenish yellow to applegreen mineral with resinous lustre. Is only important as an ore mineral at Franklin, N. J.

Zincite. Red zinc ores, 80.3% zinc. Occurs at Franklin, N. J.

CHAPTER III

RESUMÉ OF THE MINING INDUSTRY

In this chapter, the essential, vital facts concerning the mining industry, both of the United States and of all countries of the world are presented in a series of tables, giving price and production with trade statistics, covering all the different metals. A list of smelting plants and refineries and their capacities and outputs is also given.

From 1900 to 1914 the total value of the metal production of the United States varied between $513,700,000 and $904,000,000 per annum. The total value of the metals produced for each of the last five years is: $691,000,000 in 1914; $991,730,000 in 1915; $1,620,500,000 in 1916; $2,086,200,000 in 1917; and $2,153,100,000 in 1918.

The 1919 production was lower as a result of a general curtailment and preliminary figures are: 1,278,000,000 lb. of copper, $58,488,000 of gold, 29,700,000 tons of iron, 425,000 tons of lead, 55,285,000 oz. of silver, and 446,000 tons of zinc. In the following table the output of the principal metals is summarized:

PRODUCTION OF METALS IN THE UNITED STATES

Metal	1915	1916	1917	1918
Aluminum, pounds.....	99,000,000	(*e*) 139,000,000	(*e*) 124,000,000	(*e*) 122,500,000
Copper (*a*), pounds.....	1,423,698,160	1,941,900,586	1,886,120,721	1,908,533,595
Ferro-manganese, long tons	239,824	415,534	260,225	306,076
Gold (*b*), dollars.....	101,035,700	92,316,400	83,750,700	68,493,500
Iron, long tons.....	29,916,213	39,434,797	38,612,546	38,230,440
Lead (*c*) short tons....	535,922	583,498	548,450	539,686
Quicksilver, flasks.....	21,033	29,932	36,159	32,883
Silver (*b*), Troy ounces.	74,961,075	72,883,800	71,740,362	67,879,206
Zinc (*d*), short tons....	489,519	667,456	584,597	492,405

(*a*) Production from ore originating in the United States. (*b*) The statistics are final, reported jointly by the directors of the Mint and the U. S. Geological Survey. (*c*) Production of refined lead from ore and scrap originating in the United States; antimonial lead is included. (*d*) Total production of smelters, except those treating dross and junk exclusively; includes spelter derived from imported ore. (*e*) Estimated.

METAL PRICES

The price of each metal (gold excepted, which is fixed by law at $20.67+ per fine ounce) is based upon averages of daily market prices current at New York for silver, copper and lead, and at St. Louis for metallic zinc or spelter. The prices used by the U. S. Geological Survey for calculation of values for years 1850-1918, inclusive, are as follows:

YEARLY AVERAGE

PRICES OF SILVER, COPPER, LEAD, AND ZINC

Year	Silver Fine oz.	Copper Pound	Lead Pound	Zinc Pound	Year	Silver Fine oz.	Copper Pound	Lead Pound	Zinc Pound
1850	$1.32	$0.22	$0.05	$	1885	$1.07	$0.108	$0.039	$0.043
1851	1.34	.166	.05	....	1886	.99	.111	.046	.044
1852	1.33	.22	.05	....	1887	.98	.138	.045	.046
1853	1.35	.22	.06	0.055	1888	.94	.168	.044	.049
1854	1.35	.22	.06	....	1889	.94	.135	.039	.05
1855	1.34	.27	.07	....	1890	1.05	.156	.045	.055
1856	1.34	.27	.066	....	1891	.99	.128	.043	.05
1857	1.35	.25	.06	....	1892	.87	.116	.04	.046
1858	1.34	.23	.06	....	1893	.78	.108	.037	.04
1859	1.36	.22	.055	....	1894	.63	.095	.033	.035
1860	1.35	.23	.056	....	1895	.65	.107	.032	.036
1861	1.33	.22	.05	....	1896	.68	.108	.03	.039
1862	1.35	.22	.06	....	1897	.60	.12	.036	.041
1863	1.345	.34	.06	....	1898	.59	.124	.038	.046
1864	1.345	.47	.07	.139	1899	.60	.171	.045	.058
1865	1.337	.3925	.066	....	1900	.62	.166	.044	.044
1866	1.339	.3425	.07	....	1901	.60	.167	.043	.041
1867	1.33	.2537	.065	....	1902	.53	.122	.041	.048
1868	1.326	.23	.065	....	1903	.54	.137	.042	.054
1869	1.325	.2425	.06	....	1904	.58	.128	.043	.051
1870	1.328	.2118	.06	....	1905	.61	.156	.047	.059
1871	1.325	.2412	.06	....	1906	.68	.193	.057	.061
1872	1.322	.3556	.064	....	1907	.66	.20	.053	.059
1873	1.297	.2800	.06	....	1908	.53	.132	.042	.047
1874	1.278	.2200	.06	....	1909	.52	.13	.043	.054
1875	1.24	.227	.058	.07	1910	.54	.127	.044	.054
1876	1.16	.21	.061	.072	1911	.53	.125	.045	.057
1877	1.20	.19	.055	.06	1912	.615	.165	.045	.069
1878	1.15	.166	.036	.049	1913	.604	.155	.044	.056
1879	1.12	.186	.041	.052	1914	.553	.133	.039	.051
1880	1.15	.214	.05	.055	1915	.507	.175	.047	.124
1881	1.13	.182	.048	.052	1916	.658	.272	.068	.134
1882	1.14	.191	.049	.053	1917	.824	.273	.087	.102
1883	1.11	.165	.043	.045	1918	.968	.247	.071	.091
1884	1.11	.13	.037	.044	1919	1.111	.189	.581	.739

ALUMINUM

Aluminum Production and Prices of the United States, in Pounds

1883	83	1896	1,300,000
1884	150	1897	4,000,000
1885	283	1898	5,200,000
1886	3,000	1899	6,500,000
1887	18,000	1900	7,150,000
1888	19,000	1901	7,150,000
1889	47,468	1902	7,300,000
1890	61,281	1903	7,500,000
1891	150,000	1904	(a) 8,600,000
1892	259,885	1905	(a) 11,347,000
1893	333,629	1906	(a) 14,910,000
1894	550,000	1907	(a) 17,211,000
1895	920,000	1908	(a) 11,152,000

(a) Consumption.

Aluminum Production and Prices of the United States in Pounds—*Continued*

		Per Lb.			Per Lb.
1909.....	(*a*) 34,210,000	23.18c	1914.....	(*b*) 79,129,000	18.595
1910.....	(*a*) 47,734,000	22.97	1915.....	99,000,000	31.90
1911.....	(*a*) 46,125,000	20.34	1916.....	(*c*) 139,000,000	34.00
1912.....	(*a*) 65,607,000	22.52	1917.....	(*c*) 124,000,000	37.00
1913.....	(*b*) 72,379,000	23.63	1918.....	(*c*) 122,500,000	33.60
			Total.....	941,366,779	....

(*a*) Consumption. (*b*) American Metal Market figures. In 1919, virgin metal, 98 to 99% pure, ranged from 28 to 33 cents per pound, the average being 32.14 cents. Aluminum dust, used in recovery of silver, etc., was steady around 60 cents per pound. This is also used in the explosive 'ammonal.'

EXPORTS OF ALUMINUM OF UNITED STATES PRODUCTION

1908.....	$330,092	1914.....	$1,546,510
1909.....	567,375	1915.....	3,682,117
1910.....	949,215	1916.....	15,419,134
1911.....	1,158,603	1917.....	14,586,467
1912.....	1,347,621	1918.....	10,869,388
1913.....	966,094	1919 (8 months).....	2,587,237

Imports in 1919, to September, were valued at $2,920,163.

ANTIMONY

ANTIMONY PRODUCTION OF THE UNITED STATES, IN SHORT TONS,

	Contained in antimonial lead of domestic origin		Antimony produced from domestic ore		Recovered from old alloys, scrap, dross, etc.		Average price per
Year	Quantity	Value	Quantity	Value	Quantity	Value	pound
1903.....	2,558	$445,092	570	$103,341	....	.....	....
1904.....	2,571	443,598	(*a*) 486	61,926	....	.....	....
1905.....	2,747	588,354	493	117,433	....	.....	....
1906.....	1,362	544,800	(b) 404	58,149	....	.....	20.00c
1907.....	1,561	508,886	(*b*) 351	77,300	....	.....	6.30
1908.....	2,246	359,360	(*c*)	(*c*)	....	.....	8.00
1909.....	1,617	252,252	....	.....	1,556	$242,736	7.80
1910.....	1,598	263,431	....	.....	2,779	457,979	8.24
1911.....	1,543	264,780	....	.....	2,369	406,520	8.58
1912.....	1,224	209,059	....	.....	2,506	428,025	8.54
1913.....	2,204	375,562	....	.....	2,705	460,932	8.52
1914.....	2,530	(*d*) 529,740	....	.....	2,645	(*d*) 555,450	10.50
1915.....	3,425	1,735,105	2,100	1,063,860	3,100	1,811,568	25.33
1916.....	3,496	1,775,968	1,770	.....	4,480	2,270,016	25.37
1917.....	2,759	1,142,226	390	.....	4,961	2,061,700	20.69
1918.....	2,566	646,632	50	.....	....	.....	12.58
1919.....	....	.....	....	.....	....	.....	8.16

(*a*) Estimated from the average content of the ore. (*b*) Figured as 60% of domestic ores only. (*c*) None produced from domestic ore. Figures not collected for foreign ores. (*d*) Includes actual marketed value of a few tons of antimony made as a by-product in the electrolytic refining of copper.

The average price for the 30 years preceding 1914 was 7.5 cts. per pound. The antimony deposits of the U. S. may be classed as those containing antimony only, and those whose antimonial content is a valuable by-product.

Though many deposits of stibnite are known, they cannot be worked with normal prices, because in ordinary years the Chinese and Japanese smelters can supply it cheaper than we can produce it, and because the market is limited and easily glutted, resulting in still lower prices. The domestic production has therefore come almost entirely from the electrolytic refining of antimonial lead and copper metal.

The entire world's consumption up to 1914 was less than ⅕ that of tin or 3% of that of zinc or copper. Antimonial ores to be valuable must be free from arsenic, zinc, and lead.

The Market for Antimony. The principal uses of antimony, the demand for which continues to increase, are in making type metal, babbit and other anti-friction bearing metals, battery plates, siphon tops, cable sheating, white metals for the foundation of silver-plated ware, and other plated ware, such as clock-cases, table-ware, coffin trimmings, and toys. In 1915-16 a great demand was created by the use of antimony in making shrapnel bullets, but this fell off somewhat due to the use of high explosive shells.

Its compounds are used in enamels, rubber vulcanizing, pigments, glass making, and safety matches.

ANTIMONY MINES

Antimony Corp.....Mexico
Antimony Silver Mining Co.....Idaho
Benton Mining Co.....Idaho
Coeur d'Alene Antimony Co....Idaho
Homelode Mining Development Co.....So. Dakota
Howell Mining Co.....Utah
Idaho Antimony Mining Co.....Idaho
Merchants Finance Co. (Western Metals Co.).....Calif.
Pomana Antimony Mine.....Nevada
Stanley Mining Co. (no recent production) .....Idaho
Star Antimony Co.....Idaho
Wah-Chang Mining & Smelting Co. .....China

ARSENIC

U. S. PRODUCTION OF WHITE ARSENIC, As_2O_3, IN SHORT TONS

Year	Quantity	Value	Year	Quantity	Value	Price per lb.,c.
1901	300	$18,000	1910	1,497	$52,305	3.06
1902	1,353	81,180	1911	3,132	73,408	3.01
1903	611	36,691	1912	3,142	190,757	3.48
1904	36	2,185	1913	2,513	159,236	4.37
1905	754	35,210	1914	4,670	313,147	3.77
1906	737	63,460	1915	5,498	302,116	4.30
1907	1,751	163,000	1916	5,986	555,186	5.70
1908	....	.....	1917	6,151	1,118,313	9.05
1909	1,214	52,946	1918	11,323	2,112,550	9.40

WORLD'S PRODUCTION OF ARSENIC, BY COUNTRIES, IN SHORT TONS

	1913	1914	1915	1916
Great Britain, white arsenic	1,716	2,007	2,536	2,575
Canada, white arsenic	1,538	1,576	2,174	1,983
France (arsenopyrite)	70,613	....	....	....
Germany, oxide and sulphide	5,008	....	....	....
Japan, white arsenic	....	....	15	....
Portugal, ore	925	960	....	....
United States, white arsenic	2,158	4,238	4,990	5,430

The occurrence of arsenic in metal-bearing ores is so common as to be practically universal. This is shown at the smelters treating lead, copper, and zinc ores, which emit over 20,000 tons of arsenious trioxide yearly into the atmosphere in the form of smelter smoke or fume. A small amount is saved at the Anaconda, Mont., smelter, and at the Ontario smelters treating Cobalt ores, and also in Mexico by the Mapimi smelter of the American Metal Co. Allison Butts, in The Mineral Industry for 1916, states that the amount lost yearly from the Anaconda smelter is greater than the American production.

With such an enormous wastage, it is foolish to attempt to work arsenical ores for the arsenic alone. The chief use of the metal is in glass-making and for insecticides in agriculture; the glass industry uses about half of the amount produced in this country.

ARSENIC PRODUCERS

American Smelting & Refining Co.
Canadian Smelting & Refining Co.
Deloro Mining & Reduction Co. Ontario
Metals Chemical Co. ..... Ontario
Nipissing Mining Co., Ltd. ..... Ontario
Puget Sound Reduction Co. ..... Wash.
U. S. Smelting, Refining & Mining Co. ..... Utah

BISMUTH

Occurrence. Bismuth ores are comparatively rare, though the metal occurs in many of the lead ores of the Rocky Mountain regions. The U. S. production comes entirely from electrolytic lead refineries at Grasseli, Ind., Omaha, Neb., and a few other plants. The world's supply comes mainly from Bolivian mines owned by Aramayo Francke Mines, Ltd., at Chorolque and Tasna. Another producer is the Seoul Mining Co., Korea. New South Wales and Tasmania produce a moderate amount. Occasionally lots of gold-silver or lead ore containing from 10 to 20% bismuth have been marketed in the West, but buyers gave nothing for the bismuth contained.

Prices. The price for bismuth in America, ordinarily about 65 cents a pound, was $2.75 per lb. at the beginning of 1915; toward the end of the year it sold to $4 per lb. This declined to $3.25 later on. In London the price was from 10s to 11s. ($2.40 to $2.64) per lb. in 1916. During 1917, 1918, and 1919 the price fluctuated between $3 and $4 per pound.

The price and market for bismuth ores and metal were both artificial, prior to the war, being fixed by a combination of English and German firms, who absolutely controlled the market and shut out competition by most drastic and inquisitorial methods. Were American production constant, domestic producers could have secured the American market. At present the A. S. & R. Co., and U. S. S. R. & M. Co., are the main producers and dealers.

The Anaconda smelter dust carries over 1% bismuth, equal to a daily production of 1,580 lbs., and this plant will probably be a factor in the market.

Uses. Metallic bismuth is employed in making low-fusing alloys or cliché metals which are used in automatic fire sprinklers, fuses for electric wiring, and solders. Some of the salts have a smooth, unctuous feel, and are used in face and toilet powders, and in medicinal preparations. It is also employed to a small extent in making optical glasses.

U. S. IMPORTS OF METALLIC BISMUTH IN POUNDS

Year	Quantity	Value	Year	Quantity	Value
1904	185,905	$339,058	1912	182,840	$316,440
1905	148,589	318,007	1913	117,747	213,257
1906	254,733	318,452	1914	90,505	165,208
1907	259,881	325,015	1915	34,237	72,587
1908	164,793	257,397	1916	64,821	155,925
1909	183,413	286,516	1917	69,250	142,300
1910	198,174	332,668	1918	135,700	277,273
1911	172,093	311,771			

BISMUTH PRODUCERS

American Sm. & Ref. Co.	Wilson Cons. Mining Co.....Utah
U. S. Metals & Refining Co.....N. J.	Seoul Mining Co.....Korea
Anaconda Copper Mining Co..Montana	San Gregorio Mine.....Peru

Australia produced 37 tons in 1916, 30 tons coming from New South Wales deposits.

CADMIUM

The bulk of the world's supply of cadmium used to come from the zinc smelters of Upper Silesia, Germany, with some from American zinc furnaces, as follows:

WORLD'S PRODUCTION OF CADMIUM

1913.....	54,198 lbs.	$0.77	Av. price	1916.....	135,212 "	1.56	"
1914.....	91,409 "	0.89	"	1917.....	207,408 "	1.47	"
1915.....	91,415 "	1.19	"	1918.....	127,164 "	1.48	"

In addition to the above metallic output, the United States produces over 50,000 lbs. of cadmium sulphide per annum, selling for almost the same as the metal.

A recent use for cadmium is as a substitute for tin in solder.

CHROMIUM

The chromium produced in the U. S. all comes from chromite or chrome ore.

U. S. CHROMITE PRODUCTION* (Long Tons)

Year	Quantity	Value	Price	Year	Quantity	Value	Price
1880.....	2,288	$27,808	$12.15	1899.....	....	.....	.....
1881.....	2,000	30,000	15.00	1900.....	140	1,400	10.00
1882.....	2,500	50,000	20.00	1901.....	368	5,790	15.73
1883.....	3,000	60,000	20.00	1902.....	315	4,567	14.50
1884.....	2,000	35,000	17.50	1903.....	150	2,250	15.00
1885.....	2,700	40,000	14.81	1904.....	123	1,845	15.00
1886.....	2,000	30,000	15.00	1905.....	22	375	17.05
1887.....	3,000	40,000	13.33	1906.....	107	1,800	16.82
1888.....	1,500	20,000	13.33	1907.....	290	5,640	19.45
1889.....	2,000	30,000	15.00	1908.....	359	7,230	20.14
1890.....	3,599	53,985	15.00	1909.....	598	8,300	13.88
1891.....	1,372	20,580	15.00	1910.....	205	2,729	13.31
1892.....	1,500	25,000	16.67	1911.....	120	1,629	13.58
1893.....	1,450	21,750	15.00	1912.....	201	2,753	13.70
1894.....	3,680	53,231	14.46	1913.....	255	2,854	11.19
1895.....	1,740	16,795	9.65	1914.....	591	8,715	14.75
1896.....	786	6,667	8.48	1915.....	3,281	36,744	11.20
1897.....	....	.....	.....	1916.....	47,035	726,243	15.44
1898.....	....	.....	.....	1917.....	43,725	1,049,400	24.00
* U. S. Geol. Survey.				1918.....	82,350	3,937,991	47.82

Chromic-iron ore is sold on the basis of 40% chromic oxide and 80% silica. Production is almost entirely from California and Oregon. The output during 1916 was 13 times greater than in 1915.

Occurrence. The chief producing areas are the belts of serpentine in the Sierra Nevada and Coast ranges, the foothill regions being the important producers. Most of the orebodies are small and lenticular in shape, containing only from 1 to 200 tons ore. Others are very irregular. An interesting occurrence is the disseminated ore such as near Red Bluff. This has to be concentrated.

Preliminary Report No. 3, Sept., 1917, entitled 'Manganese and Chromium, issued by the California State Mining Bureau, San Francisco, gives the names of all the chrome mines in that State.

Use. Chromic iron ore is used in the manufacture of ferrochrome and steel for high-speed tools, armor plate and projectiles, bichromates of soda and potash, chromic acid, chrome alum and chrome tannage, and refractory brick.

COBALT

No cobalt is produced from domestic ores. That used in making high-priced steels and stellite is generally reduced from the imported oxide. (Stellite is an alloy, 75% cobalt and 25% chromium, valuable for making high-speed steels and non-tarnishable cutlery.) Experimental work has shown that cobalt may be substituted for nickel in plating. Canadian production, mainly from Cobalt, Ont., is as follows:

Year	Metallic Cobalt	Cobalt Oxide	Total Metal
1914, pounds	242,572	899,027	871,891
1915, "	211,610	379,219	477,063
1916 , "	215,215	670,760	841,859
1917,* "	295,866	276,769	.....

From Preliminary Reports, Mineral Resources of Canada. * 9 months.

COBALT PRODUCERS

Beaver Mt. Mining Co. (Idle)..Alaska
Canadian Sm. & Refining Co..Ontario
Cobalt Comet Mines Co.....Ontario
Coniagas Mines Ltd.....Ontario
Coniagas Red. Co., Ltd.....Ontario
Deloro Mining & Red. Co....Ontario
Independence Mining Co. (Small quantities) .....Wyoming
Metals Chemical Co.....Ontario
Mine La Motte Co.....Missouri
Nipissing Mining Co., Ltd....Ontario
Peterson Lake S. C. M. Co....Ontario
Pittsburgh & Lorrain Synd...Ontario

COPPER

The Copper industry shared the very great War prosperity of the country early in 1917, but the fixation of the price by the government, September 21, 1917, at 23½ cts., did not give the industry the same ratio of profit granted other industries, and the raise to 26 cts. on July 2, 1918, was so tardy a recognition of this condition that the entire advance was taken up in advanced freight, smelter and labor costs.

A report by the Federal Trade Commission on the cost of producing copper, presents a very interesting summary of costs. This commission, whose methods have been called arbitrary and un-American, made a notable step in the standardization of production and cost.

It was ascertained, as a result of standardization, that the average cost of 85 companies for the year 1918 was 16.167 cents per pound. The range extended from below 12 cents, where two companies turned out over 122,000,000 pounds jointly, to over 34 cents above which level five small concerns produced approximately 7,000,000 pounds.

Several small Michigan companies which came into being during the regime of high prices were the highest cost properties, as five of them, contributing in all 6,975,960 pounds, had an average cost of 34.614 cents a pound, thereby showing a big loss from the fixed prices of 23½ and 26 cents.

The analysis or sub-division of the items making up the average cost is as follows:

	Cents per Pound	% of Total Cost
Mining	6.94	42.97
Depletion of ore	.72	4.45
Purchases of ore	.51	3.19
Transportation of ore	.83	5.18
Reduction of ore	5.89	36.44

	Cents per Pound	% of Total Cost
Trans. to refinery	.85	5.28
Refining	1.02	6.36
Administrative	.89	5.56
Selling expense	.18	1.16
Credits for precious metals	1.71	10.59
Total	16.17	.....

The above averages are reckoned against an output of 2,258,234,125 pounds of copper by 85 producers. The costs by producing districts are as follows:

Arizona & New Mexico	15.175c
Utah, Nevada and California	16.801
Montana, Idaho & Washington	17.245
Michigan	17.622
Other United States	19.910
Mexico, Cuba & South America	15.648
Canada and Alaska	16.263

Another highly interesting analysis is that showing amounts expended directly for labor, materials, etc. In this table we have:

	Cents per Pound	% of Total
Labor	5.30	32.83
Materials and supplies	3.76	23.28
Overhead	2.14	13.27
Depreciation	.94	5.85
Depletion	.72	4.45
Tolls	4.99	30.91
Credits	1.71	10.59

The largest companies as a rule were the cheapest producers. The average of the porphyry group for 1918 was 14.886 cents.

The allocation of production of copper in 1918 according to cost per pound may be found in the following compilation of the Federal Trade Commission:

Range of Cost	Cos.	Production	% of Total
Cost less than 12 cents	2	122,245,051	5.41
Cost between 12 and 13 cents	4	208,571,191	9.24
" " 13 " 14 "	4	314,553,177	13.93
" " 14 " 15 "	4	359,617,743	15.92
" " 15 " 16 "	2	98,307,293	4.35
" " 16 " 17 "	8	460,528,645	20.39
" " 17 " 18 "	9	255,399,696	11.32
" " 18 " 19 "	3	72,373,388	3.20
" " 19 " 20 "	5	28,491,436	1.26
" " 20 " 21 "	5	36,871,193	1.63
" " 21 " 22 "	9	135,538,602	6.00
" " 22 " 23 "	3	60,861,465	2.70
" " 23 " 24 "	5	44,919,772	1.99
" " 24 " 25 "	1	6,230,694	.28
" " 25 " 26 "	3	7,605,224	.34
Cost over 26 cents	18	46,119,555	2.04
Total all companies	85	2,258,234,125	100.00

The above figures include companies that buy and sell ores so that a duplication approximating 63,700,000 pounds is involved. Of the 85 companies used in the above tabulation 75 are in the United States; one in Alaska, and the remaining nine in Canada, Cuba, Mexico and South America.

Up to the year 1917, few companies reported depletion as a cost; whereas practically all companies now include such a charge based on the re-valuation of their mineral land. This is one of the largest single factors accounting for the large increase in the cost of producing copper in the last year or two.

Depreciation appeared on the books of mining companies at about the same time as depletion and for the same reason. Unfortunately the rates are not based on the life and residual value of particular assets; but are more often

arbitrary amounts based sometimes on what will be allowed as deductions on tax reports and sometimes on the best judgment and opinion of officers or directors.

The commission did not attempt to equalize depreciation for the various companies, usually accepting the depreciation charges as made by the company. In some instances, however, the cost of shafts, tunnels, openings, and underground equipment charged to cost in prior years has been set up on the books and depreciation again charged into cost. The commission did not allow depreciation of this nature, the amounts in any case being but small.

PRODUCTION OF COPPER IN THE UNITED STATES IN 1913-1918

(Smelter output, in pounds fine, U. S. G. S. figures.)

	1913	1914	1915	1916	1917	1918
Alaska	23,423,070	24,985,847	70,695,286	113,823,064	84,759,086	67,081,648
Arizona	404,278,809	382,449,922	432,467,690	694,847,307	719,035,514	769,521,729
California	32,492,265	29,784,173	37,658,444	43,400,876	44,933,846	44,150,761
Colorado	9,052,104	7,316,066	7,272,178	9,536,193	10,054,951	7,591,570
Georgia	.....	.....	.....	803,694	930,691	397,078
Idaho	8,711,490	5,875,205	6,217,728	7,248,799	6,446,224	5,836,795
Maryland	.....	12,248	15,426	126,965	291,501	.....
Michigan	155,715,286	158,009,748	238,956,410	269,794,531	268,508,091	231,096,158
Missouri	576,204	53,519	306,406	377,575	407,141	232,073
Montana	285,719,918	236,805,845	268,263,040	352,139,768	276,225,977	326,426,761
Nevada	85,209,536	60,122,904	67,757,322	100,816,724	115,028,161	106,266,603
New Jersey	.....	.....	.....	4,119	.....	.....
New Mexico	50,196,881	64,204,703	62,817,234	79,863,435	107,593,615	96,559,580
North Carolina	180	19,712	33,383	5,961	125,004	79,200
Oregon	77,812	5,599	797,471	2,433,567	1,105,097	2,630,499
Pennsylvania	245,337	422,741	.....	904	115,000	34,500
South Carolina	.....	.....	.....	.....	210,000	.....
Tennessee	19,489,654	18,661,112	18,205,308	14,556,278	16,093,757	15,053,568
Texas	39,008	34,272	38,971	86,463	2,061,129	13,851
Utah	148,057,450	160,589,660	175,177,695	232,335,950	227,840,447	230,964,908
Vermont	5,771	.....	23,995	324,400	102,522	896,630
Virginia	46,961	17,753	50,008	1,066,143	146,912	1,248
Washington	732,742	683,602	903,661	2,473,481	2,051,416	2,330,568
Wyoming	362,235	17,082	351,871	1,784,351	2,019,767	866,698
Undistributed	51,385	65,479	.....	.....	.....	.....
Total	1,224,484,098	1,150,137,192	1,388,009,527	1,927,850,548	1,886,120,721	1,908,533,595
From imported ores and mattes, etc.	390,583,684	383,644,202	246,194,921	331,536,767	542,425,450	523,851,695
Secondary metal	37,222,759	31,926,980	59,574,690	104,423,807	79,116,896	43,692,111
Grand total	1,652,290,541	1,565,708,374	1,693,779,138	2,363,811,122	2,507,663,067	2,476,077,401
Average price, cents per pound	15.5	13.3	17.5	24.6	27.3	24.7

In considering the copper production of America it is worth while remembering that a very large part of the silver production of the United States and a respectable part of the gold output come from our copper mines. In the last year, several copper companies have also become zinc producers. The new metallurgy has made the recovery of the latter metal profitable in ores formerly worthless because of the presence of zinc. Thus the copper mines around Kennett, Calif., yielded 315,549 tons copper ore in 1915 with a value of $17.97 per ton, made up as follows: gold, $1.51 per ton; silver, $1.26 per ton; copper, $11.96 per ton; zinc, $3.24 per ton. A perusal of statements of several companies at Butte, in another part of this volume will show the advance made along this line.

HIGH, LOW AND AVERAGE PRICES OF COPPER

Year	Highest Price	Lowest Price		Average
1860 Prices per cts. per lb.	24.000	January	19.750	December 22.875
1861	27.000	December	17.500	July 22.250
1862	32.875	November	20.750	May 21.875
1863	38.750	December	29.000	July 33.875
1864 Highest	55.000	July	39.000	January 47.000
1865	50.500	January	28.000	July 39.250
1866	42.000	January	26.500	November 34.250

HIGH, LOW AND AVERAGE PRICES OF COPPER—*Continued*

Year	Highest Price	Lowest Price		Average
1867	29.250	January 21.500	December	25.375
1868	24.500	December 21.500	January	23.000
1869	27.000	February 21.500	December	24.250
1870	23.375	November 19.000	March	21.188
1871	27.000	December 21.250	April	24.125
1872	44.000	April 27.125	January	35.563
1873	35.000	January 21.000	November	28.000
1874	25.000	January 19.000	August	22.000
1875	23.875	September 21.500	January	22.688
1876	23.250	January 18.750	August	21.000
1877	20.500	February 17.500	December	19.000
1878	17.625	January 15.500	October	16.563
1879	21.750	November 15.500	January	18.625
1880	25.000	January 17.875	June	21.438
1881	20,375	December 16.000	July	18.188
1882	20.375	January 17.875	April	19.125
1883	18.125	January 14.875	November	16.500
1884	15.000	December 11.000	December	13.000
1885	11.875	February 9.800	May	10.838
1886	12.125	December 10.000	May	11.063
1887	17.750	December 9.950	May	13.850
1888	17.600	November 15.850	January	16.775
1889	17,500	January 11.000	September	13.490
1890	17.250	July 14.000	March	15.600
1891	15.000	January 10.250	December	12.760
1892	12.375	December 10.500	February	11.560
1893	12.500	January 9.600	August	10.750
1894 Lowest	10.250	January 9.000	June	9.250
1895	12 250	August 9.375	April	10.730
1896	12.000	June 9.750	January	10.980
1897	12.000	January 10.750	November	11.360
1898	13.250	December 11.000	January	12.050
1899	19.375	April 13.250	January	17.760
1900	17.250	April 16.000	February	16.650
1901	17.000	January 13.000	December	16.720
1902	13.500	February 11.000	January	12.160
1903	15.375	March 12.000	December	13.720
1904	15.375	November 12.250	February	13.010
1905	18.875	December 15.000	May	15.890
1906	24.000	December 17.875	February	19.616
1907	26.250	March 12.500	October	20.004
1908	14.750	December 12.500	February	13.500
1909	14.750	January 12.500	March	13.480
1910	14.125	January 12.500	July	13.125
1911	14.250	December 12.250	June	12.779
1912	18.000	October 14.250	January	16.695
1913	17.250	October 14.500	July	16.695
1914	14.491	February 11.739	November	13.602*
1915	20.133	December 13.641	January	17.275
1916	33.075	December 24.100	January	28.170
1917	36.000	23.500		29.180
1918	26.000	23.000		24.680
1919	23.500	14.750		18.905

*9 months. No quotations in Aug., Sept., Oct., 1914.

The following table (from the Eng. & Mng. Journal) gives the essential figures of the Copper Industry for the past twelve years. The column headed "Pounds reported" represents the sales of the eight largest producers aggregating 40% of the United States production, so that the prices given may be considered as representative of the entire industry.

Production, Sale and Price of Copper for 12 Years

Year	Total Production	Pounds Reported	Average Realized, Cents	Quotational Average, Cents
1905	219,000,000	82,372,955	15.597	15.699
1906	224,071,000	113,411,645	19.146	19.616
1907	220,317,041	66,316,025	18.043	20.661
1908	222,267,444	125,949,248	13.348	13.424
1909	226,602,134	136,005,773	13.211	13.335
1910	221,400,864	126,710,763	12.960	13.039
1911	216,412,867	135,329,098	12.657	12.634
1912	1,228,333,298	552,155,308	15.841	16.341
1913	1,406,448,665	658,533,402	15.222	15.269
1914	1,342,634,206	566,687,750	13.458	13.602
1915	1,411,652,418	619,832,987	17.299	17.275
1916	2,300,000,000	1,217,014,743*	25.710	27.202

* 15 producers.

COPPER SMELTING WORKS OF NORTH AMERICA

Company	Situation of Works	Blast Fur-naces	Annual Capac-ity	Reverb. Fur. naces	Annual Capac. ity	Con-v't'rs	Ann'l Capac-ity in Ore*
American Sm. & Ref. Co.	Aguascalientes, Mex.	10	800,000	..	.....	4	†
American Sm. & Ref. Co.	Perth Amboy, N. J.	1	90,000	..	.....	3	†
American Sm. & Ref. Co.	Omaha, Neb.	..	.....	..	.....	2	†
American Sm. & Ref. Co.	El Paso, Tex.	3	300,000	3	435,000	3	†
American Sm. & Ref. Co.	Matehuala, S.L.P., Mex.	3	325,000	..	.....	..	.....
American Sm. & Ref. Co.	Hayden, Ariz.	..	.....	2	290,000	3	†
American Sm. Sec. Co.	Garfield, Utah	4	800,000	6	875,000	6	†
American Sm. Sec. Co.	Tacoma, Wash.	2	375,000	1	.....	7	†
American Sm. Sec. Co.	Velardena, Dgo., Mex.	3	250,000	..	.....	..	.....
Anaconda C. Mg. Co.	Anaconda, Mont.	3	1,750,000	9	1,750,000	7	105,000
Anaconda C. Mg. Co.	Great Falls, Mont.	2	280,000	2	330,000	2	49,000
Arizona Cop. Co.	Clifton, Ariz.	..	.....	3	360,000	3	.....
Balaklala Cons. Cop. Co.††	Coram, Calif.	3	630,000	1	52,500	2	.....
Compagnie du Boleo	Santa Rosalia, Mex.	8	650,000	..	.....	..	.....
Brit. Col. Cop. Co.	Greenwood, B. C.	3	912,500	..	.....	2	.....
Calumet & Ariz. Mining Co.	Douglas, Ariz.	2	649,500	4	486,500	6	33,500
Canadian Copper Co.	Coppercliff, Ont.	7	1,020,000	2	300,000	5	43,200
Cananea Cons. Cop. Co.	Cananea, Son.	8	868,000	2	153,000	6	35,000
Cerro de Pasco Copper Co.	La Fundicion, Peru.	4	438,000	6	.....	..	.....
Cons. Ariz. Sm. Co.	Humboldt, Ariz.	..	.....	2	150,000	2	10,000
Cons. Mg. & Smg. Co.	Trail, B. C.	5	450,000	..	.....	2‡	.....
Phelps Dodge Corporation.	Douglas, Ariz.	10	1,225,000	3	275,000	7	34,160
Detroit Copper Mng. Co.	Morenci, Ariz.	1	132,657	..	.....	3	7,578
Ducktown Sulph., C. & I. Co.	Isabella, Tenn.	2	171,500	..	.....	..	.....
East Butte Cop. Mng. Co.	Butte, Mont.	2	350,000	..	.....	3	5,000
Granby Con. M., S. & P. Co.	Grand Forks, B. C.	8	1,440,000	..	.....	4	7,000
Granby Con. M., S. & P. Co.	Anyox, B. C.	4	1,080,000	..	.....	3	28,000
International Smg. Co.	Tooele, Utah	..	.....	5	525,000	5	14,000
International Smg. Co.	Miami, Ariz.	.	.....	3	420,000	5	7,000
Mt. Lyell M. & R. Co.	Queenstown, Tasmania.	3	.....	..	.....	3	.....
Mt. Morgan G. M. Co.	Mt. Morgan, Queensland.	2	.....	..	.....	3	.....
Mammoth Cop. Mng. Co.	Kennett, Calif.	5	730,000	..	.....	2	28,500
Mason Valley Mines Co.††	Thompson, Nev.	2	800,000	..	.....	2	22,000
Mazapil Copper Co.††	Concepcion del Oro, Zac., Mex.	4	250,000	..	.....	..	.....
Mond Nickel Co.	Coniston, Ont.	3	630,000	..	.....	3	70,000
Mountain Cop. Co.	Martinez, Calif.	..	.....	3	125,000	2	**
Nevada Cons. Cop. Co.	McGill, Nev.	1	175,000	5	900,000	4	40,000
Nichols Copper Co.	Laurel Hill, N. Y.	2	94,500	..	.....	2	.....
Norfolk Smelting Co.	West Norfolk, Va.	1	140,000	..	.....	2	4,200
Old Domin. C. M. & S. Co.	Globe, Ariz.	5	562,500	..	.....	1	6,062
Orford Wks., Int. Nickel Co.	Constable Hook, N. J.	2	94,500	..	.....	3	.....
Penn Mining Co.	Campo Seco, Calif.	1	50,000	2§	96,000	..	.....
Pioneer Smelting Co.	Corwin, Ariz.	1	60,000	..	.....	..	.....
Santa Fe G. & Cop. Co.	San Pedro, N. M.	1	45,000	..	.....	..	.....
Swansea C. G. & C. M. Co.††	Bouse, Ariz.	1	190,000	..	.....	2	.....
Tennessee Copper Co.	Copperhill, Tenn.	7	1,000,000	..	.....	4	15,000
Teziutlan C. M. & S. Co.††	Teziutlan, Peubla, Mex.	2	350,000	..	.....	3	.....

COPPER SMELTING WORKS OF NORTH AMERICA—Continued

Company	Situation of Works	Blast Furnaces	Annual Capacity	Reverb. Furnaces	Annual Capacity	Con-v't'rs	Ann'l Capacity in Ore*
Cia. Metal. de Torreon	Torreon, Coah., Mex.	2	175,000	..	.....	2	.....
Tyee Copper Co.††	Ladysmith, B. C.	2	175,000	..	.....	..	.....
U. S. Metals Refining Co.	Chrome, N. J.	2	200,000	..	.....	2	†
U. S. Smelting Co.††	Midvale, Utah	6	670,000	1	40,000	4	36,000
United Verde Copper Co.	Clarkdale, Ariz.	4	720,000	3	324,000	5	54,000
United Verde Extension Mining Co.	Jerome, Ariz.	..	.....	..	.....	..	.....
Wanakah Mining Co.	Ouray, Colo.	2	105,000	..	.....	..	.....
Western Sm. & P. Co.‡	Cooke, Mont.	1	.....	..	.....	..	.....

* Raw ore smelted as flux. † Included in furnace tonnages. ‡ Under construction. §Penn. Min. Co. has 2 reverberatories, each with capacity of 48,000 tons per annum, but only one is run at a time. ** No raw ore charged. †† Not in operation, but being overhauled during 1917.

ELECTROLYTIC COPPER REFINERIES OF THE UNITED STATES

Name	Location	Capacity in Pounds† 1915	1916
Nichols Copper Co.	Laurel Hill, N. Y.	400,000,000	450,000,000
Raritan Copper Works	Perth Amboy, N. J.	400,000,000	460,000,000
Baltimore Copper Smelting & Refining Co.	Canton, Md.	354,000,000	600,000,000
American Smelting & Refining Co.	Perth Amboy, N. J.	240,000,000	240,000,000
U. S. Metals Refining Co.	Chrome, N. J.	200,000,000	250,000,000
Balbach Smelting & Refining Co.	Newark, N. J.	48,000,000	48,000,000
Anaconda Copper Mining Co. (old)	Great Falls, Mont.	65,000,000	65,000,000
Anaconda Copper Mining Co. (new)	Great Falls, Mont.	.....	180,000,000
Tacoma Smelting Co.	Tacoma, Wash.	120,000,000	130,000,000
Calumet & Hecla Mining Co.	Calumet, Mich.	65,000,000	65,000,000
Consolidated Mining & Smelting Co.	Trail, B. C.	.....	13,000,000
Tottenville Copper Co.	Tottenville, N. Y.	.....	100,000,000
Total		1,892,000,000	2,601,000,000

† All of the figures were officially furnished.
(Engineering and Mining Journal).

GRADES OF COPPER

LAKE.—Copper from the native copper mines of the Lake Superior district. The standard range of conductivity is 99.5%.

ELECTROLYTIC.—Copper refined by the electrolytic process and running 99.93% upwards for cathodes. Conductivity to 103%.

CASTING.—Copper analyzing 99 to 99.75% made from ore and scrap. Used for casting purposes.

BEST SELECTED.—British copper averaging 99.75% fine. Largely used in the British brass trades.

TOUGH.—British copper largely used for casting, rolling, and drawing. Runs about 99.25%.

CHILE BARS.—Copper smelted in Chile, running 95 to 99% pure, and in some cases carrying bullion.

STANDARD.—Practically anything running from 96% upwards dealt in on London Metal Exchange.

MATTE.—A semi-metallic compound made from ores and usually running from 25 to 55% copper; an intermediate product between the ore and the finished copper.

DESCRIPTION OF COPPER

WIRE BARS.—About 3 to 4″ square and 3 to 7′ long. Average weight 135 to 175 lbs. Used for wire drawing.

INGOTS.—Average weight about 18 to 20 lb. Notched. Used for casting.

INGOT BARS.—Notched bars for casting. Weight about 55 to 60 lb.

CAKES.—Weight 100 lbs. and upward. Used for rolling.

ANODES.—About 2 by 3′, and 1½″ thick, weighing 250 lb. Crude copper used by electrolytic refiners.

CATHODES.—About 2′ by 3′ but thicker at the top than the bottom. Refined copper from the electrolytic tanks which is run down to wire bars, etc.—From *American Metal Market.*

BRANDS OF COPPER IN UNITED STATES

Lake Superior

	Refined at:	Branded
Adventure	Hancock, Mich	Adv. C. Co.
Atlantic	Houghton, Mich	A.
Calumet & Hecla	Hubbell, Mich	C. & H. M. Co.
Centennial	Hancock, Mich	C. C. M. Co.
Copper Range	Houghton, Mich	C. R.
Franklin	Hancock, Mich	F. M. Co.
Isle Royale	Dollar Bay, Mich	I. R. C. Co.
Mass	Hancock, Mich	Mass.
Michigan	Houghton, Mich	M. C.
Mohawk	Houghton, Mich	M. M.
Osceola	Dollar Bay, Mich	T. O.
Quincy	Hancock, Mich	Q. M. Co.
Tamarack	Dollar Bay, Mich	T. O.
Victoria	Hubbell, Mich	V. C.
Winona	Hubbell, Mich	W. A.
Wolverine	Houghton, Mich	W.

Electrolytic

	Refined at:	Branded
American S. & R. Co.	Perth Amboy, N. J.	P. A.
Balbach S. & R. Co.	Newark, N. J.	Bb.
Baltimore Copper Works	Baltimore, Md.	B. E. R.
Boston & Montana Co.	Great Falls, Mont.	B. & M.
Chicago Copper Ref. Co.	Blue Island, Ill.	C. C. R.
Copper Queen	Laurel Hill, L. I.	C. * Q.
Miami	Laurel Hill, L. I.	A. L. S.
Nichols Copper Co.	Laurel Hill, L. I.	L. N. S.
Orford Copper Co.	Chrome, N. J.	O. E. C.
Raritan Copper Works	Perth Amboy, N. J.	N. E. C.
U. S. Metals Ref. Co.	Chrome, N. J.	D. R. W.
United Metals Selling Co.	Laurel Hill, L. I.	R. M. C.

Casting

	Refined at:	Branded
Balbach S. & R. Co.	Newark, N. J.	N. B. C.
Boston & Montana Co.	Great Falls, Mont.	M. A.
Chicago Copper Ref. Co.	Blue Island, Ill.	C. C. R.
Duquesne Reduction Co.	Pittsburgh, Pa.	D. E. C.
Nichols Copper Co.	Laurel Hill, L. I.	C. N. C.
Phelps, Dodge Corporation	Laurel Hill, L. I.	P. D.
Tottenville Copper Co.	Tottenville, N. Y.	C. T. C.
U. S. Metals Ref. Co.	Chrome, N. J.	D. S.
White & Bro., Inc.	Philadelphia, Pa.	W. B.

Above table from *American Metal Market.*

PRODUCTION TABLES

PRODUCTION OF COPPER IN THE UNITED STATES SINCE 1845

Year	Production Pounds	Increase Pounds	Increase Per Cent.	Average Annual Increase, by Decades Pounds	Average Annual Increase, by Decades Per Cent.
1845	224,000	.....	....		
1846	336,000	112,000	50.1		
1847	672,000	336,000	100.0		
1848	1,120,000	448,000	67.0	246,400	50.0
1849	1,568,000	448,000	47.0		
1850	1,456,000	—112,000	—7.1		
1851	2,016,000	560,000	38.4		
1852	2,464,000	448,000	22.2		
1853	4,480,000	2,016,000	81.8		
1854	5,040,000	560,000	12.5		
1855	6,720,000	1,730,000	33.3		
1856	8,960,000	2,240,000	33.3	1,472,200	28.5
1857	10,752,000	1,792,000	20.0		
1858	12,320,000	1,568,000	14.6		
1859	14,112,000	1,792,000	14.5		
1860	16,128,000	2,016,000	14.3		
1861	16,800,000	672,000	4.1		
1862	21,160,000	4,360,000	26.0		
1863	19,040,000	—2,120,000	—10.0		
1864	17,920,000	—1,120,000	—5.9		
1865	19,040,000	1,120,000	6.3		
1866	19,936,000	896,000	4.7	1,209,600	6.2
1867	22,400,000	2,464,000	12.3		
1868	25,984,000	3,584,000	16.0		
1869	28,000,000	2,016,000	7.7		
1870	28,224,000	224,000	.8		
1871	29,120,000	896,000	3.2		
1872	28,000,000	—1,120,000	—3.8		
1873	34,720,000	6,720,000	24.0		
1874	39,200,000	4,480,000	12.9		
1875	40,320,000	1,120,000	2.9		
1876	42,560,000	2,240,000	5.6	3,225,600	8.2
1877	47,040,000	4,480,000	10.0		
1878	48,160,000	1,120,000	2.4		
1879	51,520,000	3,360,000	7.0		
1880	60,480,000	8,960,000	17.4		
1881	71,680,000	11,200,000	18.5		
1882	90,646,232	18,966,232	26.5		
1883	115,526,053	24,879,821	27.4		
1884	144,946,653	29,420,600	25.5		
1885	165,875,766	20,929,113	14.4		
1886	156,735,381	—9,140,385	—5.5	18,928,949	14.8
1887	180,920,524	24,185,143	15.4		
1888	226,361,466	45,440,942	25.0		
1889	226,775,962	414,496	.2		
1890	259,763,092	32,987,130	14.5		

PRODUCTION OF COPPER IN THE UNITED STATES SINCE 1845—Continued.

Year	Production Pounds	Increase Pounds	Increase Per Cent.	Average Annual Increase, by Decades Pounds	Average Annual Increase, by Decades Per Cent.
1891	284,121,764	24,358,672	9.4		
1892	344,998,679	60,876,915	21.4		
1893	329,354,398	—15,644,281	—4.5		
1894	354,188,374	24,833,976	7.5		
1895	380,613,404	26,425,030	7.4		
1896	460,061,430	79,448,026	20.9	34,635,407	9.4
1897	494,078,274	34,016,844	7.4		
1898	526,512,987	32,434,713	6.6		
1899	568,666,921	42,153,934	8.0		
1900	606,117,166	37,450,245	6.6		
1901	602,072,519	—4,044,647	—.7		
1902	659,508,644	57,436,125	9.5		
1903	698,044,517	38,535,873	5.8		
1904	812,537,267	114,492,750	16.4		
1905	888,784,267	76,247,000	11.0		
1906	917,805,682	15,897,839	1.7	47,404,234	6.1
1907	868,996,491	—48,809,191	—5.3		
1908	942,570,721	73,074,230	8.4		
1909	1,092,951,624	150,380,903	15.9		
1910	1,080,159,509	—12,792,115	—1.2		
1911	1,097,232,749	17,073,240	1.6	.....	....
1912	1,243,268,720	146,035,971	13.3	.....	....
1913	1,224,484,098	—18,784,622	1.5	.....	....
1914	1,150,137,192	—74,346,906	6.1	.....	....
1915	1,388,009,527	237,872,335	20.7	.....	....
1916	1,927,850,548	539,741,021	28.0	.....	....
1917	1,886,120,721	—41,729,827	—2.21	.....	....
1918	1,908,533,595	22,412,874	1.17	.....	....
1919*	1,278,000,000	630,533,595	...	.....	....
Total	28,396,128,493	.....	....	.....	....

* Estimated.

WORLD'S PRODUCTION OF COPPER

(In Metric Tons)

Country	1912	1913	1914	1915	1916	1917	1918
United States	563,260	555,990	525,529	646,212	881,237	842,013	852,675
Mexico	73,617	58,323	36,337	30,969	55,128	46,752	74,336
Cuba	4,393	3,381	6,251	8,336	7,816	10,150	12,142
Canada	34,213	34,880	34,027	47,202	47,985	49,826	51,860
Australasia	47,772	47,325	37,592	32,512	35,000	37,498	33,303
Peru	26,483	25,487	23,647	32,410	41,625	44,899	44,094
Chile	39,204	39,434	40,876	47,142	64,636	81,786	84,493
Bolivia	4,681	3,658	1,306	3,000	4,000	3,937	3,937
Japan	62,486	73,152	72,938	75,415	81,280	109,498	94,286
Russia	33,550	34,316	31,933	34,918	31,500	15,747	4,922
Germany	24,303	25,308	30,480	34,918	45,000	44,289	39,268
Africa	16,632	22,870	24,135	27,327	34,572	44,424	30,614
Spain and Portugal	59,873	54,696	37,099	46,200	42,000	41,336	40,352
Other countries	29,555	27,158	25,176	25,000	25,000	24,605	24,605
Totals	1,020,022	1,005,978	923,888	1,082,059	1,396,779	1,396,760	1,390,991

WORLD'S COPPER PRODUCTION FOR NINETEENTH CENTURY AND AFTER

(Long Tons)

Decade	Average Price of Rough Copper	Cents per Pound	World's Production of each Decade	Increase of Production over Previous Decades	Average Annual Production for each Decade	Increase of Average Annual Production
1801 to 1810.....	£160	30.31	91,000	.....	9,100	.....
1811 to 1820.....	130	28.14	96,000	5,000	9,600	500
1821 to 1830.....	101	21.87	135,000	39,000	13,500	3,900
1831 to 1840.....	94	20.35	218,400	83,400	21,840	8,340
1841 to 1850.....	83	17.97	291,000	72,600	29,100	7,260
1851 to 1860.....	111	24.03	506,999	215,999	50,699	21,599
1861 to 1870.....	87	18.84	900,000	393,001	90,000	39,300
1871 to 1880.....	79	17.10	1,189,000	289,000	118,900	28,900
1881 to 1890.....	60	12.99	2,373,398	1,084,398	237,339	108,439
1891 to 1900.....	52	11.26	3,708,901	1,335,503	370,890	133,550
Totals & Averages	£ 96	....	9,507,298	.....	95,073	361,790
1901 to 1910.....	65.55	14.76	6,968,000	5,632,497	696,800	563,250
1911 to 1916.....	74.56	17.01	6,277,320	.....	.....	.....

U. S. COPPER SMELTERS' PRODUCTION. (In Pounds)

	N. American Ore	Foreign Ore	Scrap	To Foreign Refineries	Crude Imported	Total Crude
1916.....	1,928,000,000	73,391,517	37,380,759	38,423,577	171,391,347	2,431,068,910
1915.....	1,612,450,828	44,749,105	29,827,203	39,734,120	140,415,341	1,787,708,357
1914.....	1,327,488,479	50,101,308	20,894,559	36,765,920	131,125,076	1,492,843,502
1913.....	1,438,565,881	55,803,202	22,427,889	36,682,605	169,315,869	1,649,430,236
1912.....	1,489,176,562	53,701,307	11,949,348	45,735,673	144,480,144	1,653,471,688

Above statistics from *Engineering and Mining Journal.*

The following table, listing the largest copper consumers in the United States, compiled by the Boston News Bureau, is of value.

	Monthly lb.	Per annum lb.
American Brass Co.....	25,000,000	300,000,000
Buffalo Brass Co.....	12,000,000	144,000,000
Chase Rolling Mills.....	12,000,000	144,000,000
National Conduit & Cable Co.....	10,000,000	120,000,000
Detroit Copper & Brass Co.....	8,000,000	96,000,000
Scoville Manufacturing Co.....	8,000,000	96,000,000
Roebling Sons Co.....	6,000,000	72,000,000
Standard Underground Cable Co.....	6,000,000	72,000,000
Bridgeport Brass Co.....	6,000,000	72,000,000
Rome Brass & Copper Co.....	6,000,000	72,000,000
American Electrical Works & Phillips Insulating....	6,000,000	72,000,000
Waclark Manufacturing Co.....	4,000,000	48,000,000
Baltimore Copper Smelting & Rolling Co.....	4,000,000	48,000,000
Seymour Mfg. Co.....	3,500,000	42,000,000
American Steel & Wire Co.....	2,500,000	30,000,000
Michigan Brass Co.....	2,000,000	24,000,000
Plume & Atwood.....	1,500,000	18,000,000
Bristol Brass Co.....	1,250,000	15,000,000
Baltimore Tube Works.....	1,000,000	12,000,000
Taunton-New Bedford Copper Co.....	1,000,000	12,000,000
Randolph Clowse.....	1,000,000	12,000,000
C. G. Hussey Co.....	1,000,000	12,000,000
Stamford Rolling Mills.....	1,000,000	12,000,000
Hendricks Brothers.....	750,000	9,000,000
Miscellaneous	6,500,000	78,000,000
Total.....	136,000,000	1,632,000,000

AMERICAN COPPER IMPORTS (In Pounds)

The following table, showing imports of copper, in various forms, into the United States, is summarized from the official figures of the United States Government. The Government statisticians have seen fit to vary the methods employed in presenting these figures, from time to time, but the present plan of giving contents in fine copper of imported ore and matte is preferable to the old plan of giving actual weight of imported ore and matte:

Year	Copper Contents Ore and Matte	Raw Copper	Old Copper	Total Fine Copper
1890	3,448,237	5,189	284,789	3,960,053
1891	8,391,554	2,556	134,407	11,472,436
1892	7,669,978	22,097	71,485	8,066,647
1893	7,256,015	554,348	59,375	11,045,297
1894	4,804,614	606,415	160,592	11,445,441
1895	5,300,000	7,979,322	1,336,901	14,616,223
1896	5,900,000	9,074,379	2,422,554	17,396,933
1897	12,000,000	12,646,552	1,780,390	28,923,098
1898	19,750,000	5,892,944	1,986,133	73,916,467
1899	23,800,000	64,282,583	6,678,145	95,722,340
1900	36,380,000	62,404,489	3,354,756	105,176,808
1901	64,000,000	71,001,713	2,818,757	137,826,406
1902	40,000,000	112,420,253	2,119,031	194,501,757
1903	32,000,000	133,472,398	3,235,597	168,707,995
1904	38,947,772	142,344,433	4,000,000	181,292,205
1905	50,105,300	156,358,243	4,561,142	210,724,685
1906	49,034,891	176,558,390	6,487,226	225,843,281
1907	59,718,787	192,901,267	.....	252,620,054
1908	56,481,343	162,224,144	.....	218,705,487
1909	81,087,393	240,713,722	.....	321,801,115
1910	85,224,975	259,210,796	.....	344,435,771
1911	68,626,778	265,980,760	.....	334,607 538
1912	104,871,703	305,369,592	.....	410,240,295
1913	108;710,105	300,068,849	.....	408,778,954
1914	104,801,324	201,549,503	.....	306,350,827
1915	114,331,441	201,367,008	.....	315,698,449
1916	174,787,854	287,548,126	.....	462,335,980
1917	.....	.....	.....	556,420,297
1918	.....	.....	.....	575,805,115

GOLD

GOLD PRODUCTION OF THE UNITED STATES IN OUNCES

Year	Quantity	Value	Year	Quantity	Value
1880	1,741,500	$36,000,000	1901	3,805,500	$78,666,700
1881	1,678,612	34,700,000	1902	3,870,000	80,000,000
1882	1,572,187	32,500,000	1903	3,560,000	73,591,700
1883	1,451,250	30,000,000	1904	3,892,480	80,464,700
1884	1,489,950	30,800,000	1905	4,265,742	88,180,700
1885	1,538,373	31,801,000	1906	4,565,333	94,373,800
1886	1,686,788	34,869,000	1907	4,374,827	90,435,700
1887	1,603,049	33,136,000	1908	4,574,340	94,560,000
1888	1,604,478	33,167,500	1909	4,821,701	99,673,400
1889	1,594,775	32,967,000	1910	4,657,018	96,269,100
1890	1,588,877	32,845,000	1911	4,687,053	96,890,000
1891	1,604,840	33,175,000	1912	4,520,717	93,451,500
1892	1,597,098	33,015,000	1913	4,299,783	88,884,400
1893	1,739,323	35,955,000	1914	4,572,976	94,531,800
1894	1,910,813	39,500,000	1915	4,887,604	101,035,700

GOLD PRODUCTION OF THE UNITED STATES IN OUNCES—*Con.*

Year	Quantity	Value	Year	Quantity	Value
1895.....	2,254,760	46,610,000	1916.....	4,465,807	92,316,400
1896.....	2,568,132	53,088,000	1917.....	4,051,440	83,750,700
1897.....	2,774,935	57,363,000	1918.....	3,313,373	68,493,500
1898.....	3,118,398	64,463,000	1919.....	2,829,395	58,488,800
1899.....	3,437,210	71,053,400			
1900.....	3,829,987	79,171,000	Total.	122,400,334	$2,440,247,500

The following table, compiled by the Bureau of the Mint, shows the American production of gold during 1918:

State or Territory	Fine ounces	Value
Alaska	440,622	$9,108,500
Alabama	36	700
Arizona	278,647	5,760,200
California	832,389	17,207,000
Colorado	621,791	12,853,500
Georgia	169	3,500
Idaho	30,764	636,000
Illinois	.....	.....
Maryland	.....	.....
Michigan	.....	.....
Missouri	10	200
Montana	153,375	3,170,600
Nevada	322,276	6,662,000
New Mexico	30,871	638,200
North Carolina	38	800
Oregon	60,951	1,260,000
Philippine Islands	44,202	913,700
South Dakota	328,305	6,786,700
Tennessee	263	5,400
Texas	5	100
Utah	152,018	3,142,500
Vermont	47	800
Virginia	20	400
Washington	16,556	342,300
Wyoming	18	400
Total	3,313,373	$68,493,500

The above total may be compared with previous years in the table preceding this one.

WORLD'S PRODUCTION OF GOLD (U. S. G. S.)

1860..$134,083,000	1875..$ 97,500,000	1890..$118,848,700	1905....$380,288,700
1861.. 122,989,000	1876.. 103,700,000	1891.. 130,650,000	1906.... 402,503,000
1862.. 122,989,000	1877.. 113,947,200	1892.. 146,651,500	1907.... 412,966,600
1863.. 122,989,000	1878.. 119,092,800	1893.. 157,494,800	1908.... 442,476,900
1864.. 122,989,000	1879.. 108,778,800	1894.. 181,175,600	1909.... 454,059,100
1865.. 122,989,000	1880.. 106,436,800	1895.. 198,763,600	1910.... 455,239,100
1866.. 129,614,000	1881.. 103,023,100	1896.. 202,251,600	1911.... 461,939,700
1867.. 129,614,000	1882.. 101,996,600	1897.. 236,083,700	1912.... 466,136,100
1868.. 129,614,000	1883.. 95,392,000	1898.. 286,879,700	1913.... 454,942,211
1869.. 129,614,000	1884.. 101,729,600	1899.. 306,724,100	1914.... 453,000,000
1870.. 129,614,000	1885.. 108,435,600	1900.. 254,576,300	1915.... 478,500,000
1871.. 115,577,000	1886.. 106,163,900	1901.. 260,992,900	1916.... 454,000,000
1872.. 115,577,000	1887.. 105,774,900	1902.. 296,737,600	1917.... 424,000,000
1873.. 96,200,000	1888.. 110,196,900	1903.. 327,702,700	1918.... 373,000,000
1874.. 90,750,000	1889.. 123,489,200	1904.. 347,377,200	
			Tot. .$12,986,820,811

IRIDIUM—See Platinum.

IRIDOSMINE (osmiridium)—See Platinum.

IRON

The United States produced more pig iron than the remainder of the world combined in 1918; while in a normal year, say 1913, the domestic output is 40% of the total. From 1820 to 1865, production increased irregularly from 20,000 to 1,000,000 tons per annum; from 1866 to 1898 it gained from 1,205,663 to 11,773,934 tons per annum, after which were the following yields:

Year	Tons	Year	Tons
1899	13,620,703	1910	27,303,567
1900	13,789,242	1911	33,649,547
1901	15,878,354	1912	29,726,937
1902	17,821,307	1913	30,966,301
1903	18,009,252	1914	23,332,244
1904	16,497,033	1915	29,916,213
1905	22,992,380	1916	39,434,797
1906	25,307,191	1917	38,612,546
1907	25,781,361	1918	38,230,440
1908	15,936,018	1919	29,700,000
1909	25,795,471		

Pig iron production is generally considered a good barometer of a country's prosperity, as the above table will show.

Prices of Bessemer pig iron at Pittsburg ranged from $18.96 to $9.98 per ton from 1886 to 1897, then:

Year	Per ton	Year	Per ton
1898	$10.31	1909	$16.53
1899	18.89	1910	16.20
1900	18.84	1911	14.81
1901	15.73	1912	15.09
1902	20.07	1913	16.19
1903	18.64	1914	13.98
1904	13.66	1915	14.87
1905	15.48	1916	22.93
1906	18.48	1917	42.63
1907	21.74	1918	35.48
1908	16.14	1919	29.91

Steel production of the United States, including all grades, is as follows for 13 years:

Year	Tons	Year	Tons
1904	13,859,887	1912	31,251,303
1905	20,023,947	1913	31,300,874
1906	23,398,136	1914	23,513,030
1907	23,361,946	1915	32,151,036
1908	14,023,247	1916	42,773,680
1909	26,094,919	1917	45,060,607
1911	23,676,106	1918	44,462,432

The U. S. Steel Corporation produced 42% of the pig iron and 44% of the steel made in 1918.

Iron production of the world was 4,401,415 tons in 1850; 26,994,904 tons in 1890; 40,181,865 tons in 1910; then:

Year	Tons	Year	Tons
1911	63,210,720	1915	64,515,928
1912	73,529,929	1916*	72,000,000
1913	79,395,472	1917*	70,583,000
1914	62,844,609		

* Estimated.

The principal producing countries are as under:

METRIC TONS

Country	1910	1911	1912	1913	1914	1915	1916
Australia	.....	.....	.....	.....	.....	.....	*200,000
Austria	2,010,000	2,095,000	2,312,689	2,369,864	2,020,000	1,960,000	.....
Belgium	1,852,090	2,046,280	2,301,290	2,484,690	1,560,000	.....	.....
Canada	726,471	832,376	920,636	1,024,424	710,481	828,920	1,060,787
France	4,032,459	4,426,469	4,871,992	5,311,316	5,025,000	4,750,000	.....
Germany	14,793,325	15,280,527	17,852,571	19,291,920	14,389,547	11,790,199	.....
Italy	215,000	302,931	379,987	426,775	385,114	377,510	454,923
Russia	3,042,046	3,521,000	4,197,638	4,548,376	4,261,008	3,696,560	.....
Spain	367,000	408,667	403,243	424,773	435,000	419,000	.....
Sweden	604,300	633,800	701,900	735,000	635,100	767,600	.....
United Kingdom.	10,380,723	9,718,638	8,751,464	10,481,917	9,005,898	8,793,659	9,047,983
United States...	27,636,687	27,027,941	30,202,568	31,482,406	23,721,115	30,414,817	40,092,043
Others	525,000	535,000	540,000	550,050	495,000	480,000	.....

* Present rate.

Iron-ore production of the United States from 1810 to the end of the 1919 season approximated 1,400,000,000 long tons. By 1886 the year's output was 10,000,000 tons, then a gradual increase to 19,433,716 in 1898, followed by considerable gains to 28,887,479 in 1901. From then the figures were as follows:

Year	Tons	Year	Tons
1902	35,554,135	1911	43,786,552
1903	35,019,308	1912	55,150,147
1904	27,644,330	1913	61,980,437
1905	42,526,133	1914	41,439,761
1906	47,749,728	1915	55,526,490
1907	51,720,619	1916	77,870,553
1908	35,983,336	1917	75,573,207
1909	51,294,271	1918	72,021,202
1910	57,014,906	1919*	60,000,000

* Estimated.

The Lake Superior region (Michigan, Minnesota, and Wisconsin) contributes 80% of the American total output of iron ore, followed by Alabama with 10%. The U. S. Steel Corporation mines about 60% of the country's iron ore, through its subsidiary, the Oliver Iron Mining Co., whose operations, with other iron companies, are described elsewhere in this volume.

Prices of Mesabi ore were $2.50 per ton for Bessemer and $1.75 for non-Bessemer at Lake Erie docks, in 1894. Up to 1903 prices rose irregularly to $4 and $3.50 per ton, after which were the following:

Year	Bessemer	Non-Bessemer	Year	Bessemer	Non-Bessemer
1904	$2.75	$2.35	1912	$3.50	$2.85
1905	3.50	3.00	1913	4.15	3.40
1906	4.00	3.50	1914	3.50	2.85
1907	4.75	4.00	1915	3.45	2.80
1908	4.25	3.50	1916	4.20	3.55
1909	4.25	3.50	1917	5.70	5.05
1910	4.75	4.00	1918	6.08	5.43
1911	4.25	3.50			

LEAD STATISTICS

The lead production of the United States comes largely from three states, Missouri, Idaho and Utah.

The great bulk of Missouri's output comes from the south-eastern part of the State, where a half-dozen companies work on 3 to 4% disseminated ore. The characteristic of this district is that lead alone, without zinc, is produced. Idaho's production comes from the lead-silver-zinc ores of the Coeur d'Alene district, which in some years leads all others. Utah's production comes mainly from the silver-lead ores of Park City, Alta Cottonwood, and Bingham, and the mixed ores of the Tintic district.

Next to the United States, the important lead-producing countries of the world are Spain and Australia.

The vital figures of the industry are given in the following tables:

U. S. LEAD PRODUCTION (SHORT TONS), PRICE AND VALUE

Year	Desilverized Lead	Soft Lead	Total Production	From domestic ores and base bullion	From foreign ores	From foreign bullion	Price at New York	Value
1720-1868..	.....	755,400	755,400	755,400	.....	.....	....	$79,829,200
1869.....	.....	17,500	17,500	17,500	.....	.....	$0.065	2,275,000
1870.....	.....	17,830	17,830	17,830	.....	.....	.063	2,246,580
1871.....	970	19,000	19,970	19,790	.....	.....	.061	2,436,340
1872.....	5,220	20,500	25,720	25,720	.....	.....	.063	3,240,720
1873.....	19,559	22,381	41,940	41,940	.....	.....	.063	5,284,440
1874.....	27,674	23,556	51,230	51,230	.....	.....	.060	6,147,600
1875.....	33,859	24,731	58,590	58,590	.....	.....	.059	6,913,620
1876.....	36,519	26,421	62,940	62,940	.....	.....	.061	7,678,680
1877.....	49,228	31,152	80,380	80,380	.....	.....	.055	8,841,800
1878.....	62,360	26,770	89,130	89,130	.....	.....	.036	6,417,360
1879.....	62,710	28,130	90,840	90,840	.....	.....	.041	7,448,880
1880.....	68,035	27,690	95,725	95,725	.....	.....	.050	9,572,500
1881.....	83,725	30,770	114,495	114,495	.....	.....	.048	10,991,520
1882.....	100,765	29,015	129,780	129,780	.....	.....	.049	12,718,440
1883.....	118,497	21,800	140,297	140,297	.....	.....	.043	12,065,452
1884.....	116,365	19,932	136,297	136,297	.....	.....	.037	10,085,978
1885.....	104,217	21,975	126,192	126,192	.....	.....	.040	10,095,360
1886.....	111,389	20,800	132,189	127,189	5,000	.....	.046	12,161,388
1887.....	131,482	25,148	156,630	141,630	15,000	.....	.045	14,096,700
1888.....	146,925	29,090	176,015	147,379	28,636	.....	.044	15,489,320
1889.....	149,099	29,258	178,357	151,787	26,570	.....	.039	13,911,846
1890.....	126,493	31,351	157,844	139,720	18,124	.....	.045	14,205,960
1891.....	166,966	31,397	198,363	174,511	23,852	.....	.043	17,059,218
1892.....	176,545	31,678	208,223	168,266	39,957	.....	.041	17,074,286
1893.....	191,807	32,513	224,320	158,969	65,351	.....	.037	16,599,680
1894.....	175,964	37,686	213,650	153,911	59,739	.....	.033	14,100,900
1895.....	195,932	39,890	235,822	159,649	76,173	.....	.032	15,092,608
1896.....	213,950	43,537	257,487	179,749	77,738	Lowest	.030	15,449,220
1897.....	238,615	43,553	282,169	198,498	83,671	.....	.036	20,316,168
1898.....	259,369	42,779	302,148	202,203	99,945	.....	.038	22,963,248
1899.....	257,481	40,566	298,047	202,121	95,926	.....	.045	26,824,230
1900.....	319,752	48,021	367,773	260,918	106,855	.....	.044	32,364,024
1901.....	313,134	57,898	371,032	258,610	112,422	.....	.043	30,908,752
1902.....	293,842	74,050	367,892	267,286	100,606	.....	.041	30,167,144
1903.....	285,495	83,444	368,939	280,615	88,324	.....	.042	30,990,876
1904.....	304,283	89,169	393,452	297,602	95,850	.....	.043	33,836,872

U. S. LEAD PRODUCTION (SHORT TONS), PRICE AND VALUE—*Con.*

Year	Desilverized Lead	Soft Lead	Total Production	From domestic ores and base bullion	From foreign ores	From foreign bullion	Price at New York	Value
1905.....	302,852	85,455	388,307	307,514	80,793	.....	.047	36,500,858
1906.....	313,886	90,860	404,746	336,200	28,803	39,743	.057	46,141,044
1907.....	313,588	99,801	413,389	352,381	24,041	36,967	.053	43,819,234
1908.....	295,552	101,012	396,564	311,666	11,509	73,389	.042	33,311,376
1909.....	329,751	117,158	446,909	352,839	21,754	72,316	.043	38,434,174
1910.....	328,954	141,318	470,272	375,402	18,065	76,805	.044	41,383,936
1911.....	331,032	155,947	486,979	391,995	10,764	84,220	.045	43,828,110
1912.....	339,646	141,248	480,894	392,517	11,572	76,805	.045	43,280,460
1913.....	330,593	131,867	462,460	411,878	13,223	37,356	.044	40,696,480
1914.....	383,903	158,219	542,122	512,794	7,639	21,689	.039	42,285,516
1915.....	388,594	161,461	550,055	507,026	9,853	33,176	.047	51,705,000
1916.....	406,119	165,015	571,134	558,200	7,157	11,598	.068	78,816,000
1917.....	459,947	188,503	610,769	548,450	15,872	46,447	.087	94,333,000
1918.....	329,724	209,962	639,694	539,686	15,052	84,956	.075	76,635,000

LEAD PRICES IN NEW YORK

Yearly highest, lowest and average prices of pig lead in New York.

Year	High	Low	Average	Year	High	Low	Average
1886.....	4.95	4.00	4.63	1904.....	4.60	4.10	4.32
1887.....	5.15	4.15	4.50	1905.....	6.25	4.45	4.70½
1888.....	5.25	3.60	4.42	1906.....	6.35	5.35	5.66
1889.....	4.10	3.62½	3.93	1907.....	6.35	3.50	5.35
1890.....	5.25	3.77½	4.48	1908.....	4.60	3.65	4.23½
1891.....	4.62½	4.05	4.35	1909.....	4.75	3.95	4.30
1892.....	4.22½	3.72½	4.09	1910.....	4.75	4.37½	4.49
1893.....	4.15	3.22½	3.73	1911.....	4.60	4.25	4.46
1894.....	3.65	3.02½	3.29	1912.....	5.15	4.00	4.48½
1895.....	3.55	3.02½	3.23	1913.....	4.85	4.00	4.40
1896 Lowest..	3.25	2.67½	2.98	1914.....	4.15	3.50	3.87
1897.....	4.40	3.00	3.58	1915.....	7.62½	3.70	4.67½
1898.....	4.12½	3.55	3.78	1916.....	7.67	5.80	6.80
1899.....	4.77½	3.92½	4.47	1917.....	12.25	5.50	8.71
1900.....	4.75	3.75	4.41½	1918.....	8.05	6.25	7.46
1901.....	4.37½	4.00	4.36	1919.....	7.50	5.00	5.81
1902.....	4.15	4.00	4.10				
1903.....	4.70	4.10	4.26	Average price for 32 years.....			4.19

Lead Smelters and Refineries in North America in 1917

UNITED STATES

Arizona:

Mowry—Consolidated Mines, Smelter & Transportation Co. (Idle.)

California:

Keeler—Four Metals Mining & Smelting Co. (Idle.)

Needles—U. S. Sm. Ref. & Mng. Co. (Idle.)

Selby—Selby Smelting Works. Refinery also. American Smelters Securities Co., controlled by A. S. & R. Co.

Colorado:
Denver—Globe plant, American Smelting & Refining Co. (Idle.)
Durango—Durango plant, American Smelting & Refining Co.
Georgetown—Western Metals Co. Malm dry chlorination process.
Leadville—Arkansas Valley plant, American Smelting & Refining Co.
Pueblo—Pueblo plant, American Smelting & Refining Co.
Salida—The Ohio & Colorado Smelting & Refining Co.

Idaho:
Kellogg—Bunker Hill & Sullivan Mining & Concentrating Co.
Clayton—Red Bird Smelting Co.
Enaville—North Fork Smelting & Mining Co. (Idle.)
Ponderay—Idaho Smelting & Refining Co. (Idle.)
Sea Foam—Greyhound Mining & Milling Co. (Idle.)

Illinois:
Aurora—Aurora Metal Co. Secondary metals, but some ore also.
Chicago—Goldsmith Bros.' Smelting & Refining Co. Secondary lead, but some ore.
Chicago—Great Western Smelting & Refining Co. Secondary lead, but some ore.
Chicago—National plant, American Smelting & Refining Co. Refinery only; smelter dismantled at end of 1914.
Collinsville—St. Louis Smelting & Refining Co. Refinery also. Nat'l Lead Co.
Federal—Federal Lead Co. Am. Smelters Sec. Co.
Granite City—Hoyt Metal Co. Smelts secondary lead, but also some ore.

Indiana:
East Chicago—International Lead Refining Co. Refinery only. Intern'l Sm. & Ref. Co.
East Chicago—U. S. Reduction Co. Smelts secondary lead and some ore.
Grasselli—United States Metals Refining Co. Refinery only. Betts electrolytic process.

Iowa:
Dubuque—J. W. Watters. Not operated for some years.

Kansas:
Galena—Galena Smelting & Manufacturing Co. Controlled by Eagle-Picher Lead Co.

Missouri:
Desloge—Desloge Consolidated Lead Co.
Granby—Granby Mining & Smelting Co.
Herculaneum—St. Joseph Lead Co.
Joplin—Eagle-Picher Lead Co.
Valle Mines—Valle Mining Co. Not operated for some years.
Webb City—Webb City Smelting & Manufacturing Co. Controlled by Eagle-Picher Lead Co.

Montana:
Cooke—Western Smelting & Power Co. (Idle.)
East Helena—East Helena plant, American Smelting & Refining Co.
Helena—Northwestern Metals Co. Dry chlorination process. (Idle 1915.)

Nebraska:
Omaha—Omaha & Grant Smelting Co. Refinery only. Betts electrolytic process. Am Sm. & Ref. Co.

Nevada.
Nelson—Santa Barbara Searchlight Mining Co. (Idle.)
Spruce—Black Forest Mines & Smelting Co. (Idle.)

New Jersey:
Newark—Balbach Smelting & Refining Co. Refinery also.
Perth Amboy—Perth Amboy plant, American Smelting & Refining Co. Refinery also.

New Mexico:
Deming—National Mining & Smelting Co. (Idle.)
Pennsylvania:
Carnegie—Pennsylvania Smelting Co. Refinery also.
Texas:
El Paso-Kansas City Consolidated Smelting & Refining Co. (Am. Sm. Ref. Co.)
Utah:
Midvale—United States Smelting Co. (Subsid. U. S. Sm., Ref & Mng. Co.)
Murray—Murray plant, American Smelting & Refining Co.
Silver City—Tintic Smelting Co. (Idle several years.)
Tooele—International Smelting Co.
Washington:
Keller—Keller & Indiana Consolidated Smelting Co. (Idle several years.)
Northport—Northport Smelting & Refining Co.
Wisconsin:
Dodgeville—Blue Mounds Mining & Smelting Co. (Idle.)
Waukesha—Northern Smelting Co. (Idle.)

CANADA

British Columbia:
Trail—Consolidated Mining & Smelting Co. of Canada, Ltd. Refinery also. Betts electrolytic process.
Ontario:
Kingston—North American Smelting Co., Ltd.

MEXICO

Aguascalientes:
Aguascalientes—American Smelting & Refining Co.
Chihuahua.
Chihuahua—American Smelting & Refining Co.
Uruachic—Uruachic Mining & Smelting Co., Ltd.
Coahuila:
Saltillo—Mazapil Copper Co., Ltd.
Torreon—Compañia Metalurgica de Torreon.
Durango:
Asarco (Velardena)—American Smelters Securities Co.
Mapimi —Compañia Minera de Penoles. (Am. Metal Co.)
Guerrero:
Campo Morado—Reforma Mining & Milling Co. (Idle.)
Nuevo Leon:
Monterey—American Smelting & Refining Co.
Monterey—Compañia Minera, Fundidora y Afinidora, S. A. Refinery also.
San Luis Potosi: Plant wrecked by revolutionists, 1914.
Matehuala—American Smelters Securities Co. (National Metallurgical Co.)
San Luis Potosi—Compañia Metalurgica Mexicana.
Sonora:
Guaymas—Pacific Smelting & Refining Co. (Mexican-American Smelting & Refining Co., Ltd.) (Idle and never operated.)
Ures—Yaqui Smelting & Refining Co., S. A. Refinery also. (Idle.)
Zacatecas:
Chalchihuites—National Smelting Co. (Idle.)

MANGANESE.

Manganese ore, to be saleable, must contain 35% or more manganese, and for ferro-manganese or ferro, 4% or better, with less than 8% silica, and not over 0.2% phosphorus. As 90% of the manganese ore used in the United States goes into ferro, the demand is chiefly for high-grade ore. For dry batteries, the ore must contain a minimum of 50% manganese, present as the dioxide, and less than 1% iron or ½% copper, nickel or cobalt.

MANGANESE ORE PRODUCTION OF THE UNITED STATES

	Long tons		Long tons		Long tons
1838-1879	43,860	1893	7,718	1907	5,604
1880	5,761	1894	6,308	1908	6,144
1881	4,895	1895	9,547	1909	1,544
1882	4,532	1896	10,088	1910	2,258
1883	6,155	1897	11,108	1911	2,457
1884	10,180	1898	15,957	1912	1,664
1885	23,258	1899	9,935	1913	4,048
1886	30,193	1900	11,771	1914	2,635
1887	34,524	1901	11,995	1915	9,709
1888	29,198	1902	7,477	1916	27,000
1889	24,197	1903	2,825	1916	31,474
1890	19,287	1904	3,146	1917	129,405
1891	22,452	1905	4,118	1918	305,869
1892	13,613	1906	6,921		
				Total	920,830

The above does not include manganiferous-iron, manganiferous-silver, or manganiferous-residuum ores. Minnesota produces over 1,000,000 tons of the first-class mentioned, and Colorado over 100,000 tons of the second-class.

MOLYBDENUM

The amount of molybdenum produced in the U. S. never exceeded a few tons a year until 1915, but from thence onward the output increased rapidly, as shown below:

Year.	Sales lb.	Value.	Price per lb.
1914	1,297	$1,297	$1.00
1915	181,769	114,866	0.63
1916	206,740	205,000	0.98
1917	350,200	495,350	1.41
1918	861,637	1,257,000	1.46

The price during 1919 has varied from 60 cents to $1 per pound.

In U. S. Bureau of Mines, Bulletin 111, by F. W. Horton, the American deposits are fully described. Six Western States contain large low-grade deposits that can be concentrated.

Uses: Molybdenum has rather limited uses and while it can be used instead of tungsten in high speed steels and in the manufacture of ordinance, such use was practically prohibited in the U. S. by the Halcomb patent. The metal is also used in electric resistance furnaces, as supports for filaments in electric light bulbs, and Roentgen ray tubes and in alloys such as stellite. The salts have a limited use in chemical technology.

As noted above the use of molybdenum by American steel manufacturers has been greatly retarded if not prohibited by the Halcomb patent, issued in 1903, and held by the Crucible Steel Co. This controls the manufacture of the best grades of molybdenum-steel, using quantities of 6 to 15% molybdenum, less than 1.2% carbon and 2% silicon; the patent also controls the use of chromium in practicable amounts in conjunction with steels of

the composition specified. France and Germany make large quantities of molybdenum steel. The results in those countries make it certain that when the Halcomb patent expires, the use of molybdenum in America will be quickly extended and its production receive a sudden stimulus. The metal is more abundant than tungsten.

Ore Buyers:

The following firms are users and buyers of molybdenite: J. T. Baker Chemical Co., Phillipsburg, N. J.; Baker & Adamson Chemical Co., Easton, Pa.; Foote Mineral Co., 107 N. 19th St., Philadelphia, Pa.; Metal and Thermit Co., 120 Broadway, New York; Primos Chemical Co., Primos, Pa.; S. Schaaf-Regelman, 21 State St., New York; Henry E. Wood & Co., 1734 Arapahoe St., Denver, Colo., York Metal & Alloys Co., York, Pa.; Electro Metallurgical Co., Niagara Falls, N. Y.; General Electric Co., Schenectady, N. Y.; Imperial Munitions Board, Ottawa, Ont.; International Molybdenum Co., Orillia and Renfrew, Ont.; and the Tivani Steel Co., Belleville, Ontario.

NICKEL

Nickel ore, as such is not mined in the United States, though nickel is saved as a by-product in electrolytic refining of copper, and marketed both in the form of sulphate and as the metal; it collects in the electrolyte slime and is obtained from there.

Nickel occurs in small amounts in many copper ores, being found in blister copper (in pounds per hundred tons), from the following smelters. Anaconda, Mont., 22; Great Falls, Mont., 68; Garfield, Utah, 40; Steptoe, Nev., 64; Omaha, Neb., 644; Mountain, Cal., 172; Tacoma, Wash., 770; Aguascalientes, Mex., 132; Cerro de Pasco, Peru, 32; Mount Lyell, Tasmania, 166.

The world's supply comes mainly from Ontario and is imported into the United States, in the form of copper nickel matte, or as Monel metal from the International Nickel Co.'s smelter at Copper Cliff, Ont., from ores mined at Sudbury, Ont. The refineries are at Constable Hook, Bayonne N. J., and Port Colborne, Ont. A much smaller quantity of rich matte has also been imported from Belgium and refined at New Brunswick, N. J., by the United States Nickel Co. The British-American Nickel Corporation had its reduction works and refinery near Sudbury, Ont.

Canada also produces nickel from the silver ores of the Cobalt distrist and those of the Alexo mine at Temiskaming.

Use: large amounts of nickel are used in the manufacture of armor plate which requires 3 to 4% nickel; it is used in bridge and structural steel; in automobile manufacture, in axles, steering gear, etc.; in the manufacture of German silver, and is a constituent of Monel metal, the converter product of the Sudbury ores which carries 67% nickel, 28% copper, and 5% other metals. Coinage also consumes a large amount of the metal.

NICKEL PRODUCTION OF CANADA (ONTARIO) IN TONS (2,000 POUNDS)

	Ore mined	Ore smelted	Bess. matte	Copper in matte	Nickel in matte	Value of matte
1911.....	611,511	610,834	32,607	8,966	17,049	$4,945,592
1912.....	737,584	725,065	41,925	11,116	22,421	6,303,102
1913.....	784,697	823,403	47,150	12,938	24,838	7,076,945
1914.....	1,000,364	947,053	46,396	14,448	22,759	7,189,031
1915.....	1,364,048	1,272,283	67,703	19,608	34,039	10,352,344
1916.....	1,566,333	1,521,689	80,010	22,450	41,298	*14,000,000

* Estimated.

NICKEL PRODUCERS

American Smelting & Refining Co.
Athabasca Mining Co.....Canada
Baltimore Copper Smelting & Rolling Co (Refinery)..Maryland
Beaver Mt. Mining Co (Idle) Alaska
British American Nickel Corp. Canada
Canadian Copper Co.....Ontario
Canadian Smelting & Refining Co.....Ontario
Cobalt Comet Mines, Ltd..Ontario
Coniagas Mines, Ltd.....Ontario
Coniagas Reduction Co., Ltd. Ontario
Deloro Mining & Reduction Co.....Ontario
Hecla Consolidated Mines Co. (Idle).....Wyoming
Independence Mining Co. (small quantities).....Wyoming
International Nickel Co. U. S. and Canada
Metals Chemical Co.....Ontario
Missouri Metals Co.....Missouri
Mond Nickel Co.....Ontario
Nipissing Mining Co., Ltd.Ontario

PALLADIUM—See Platinum.

PLATINUM

The United States production of platinum is very small; Russia and Colombia are the largest producers. The domestic output of crude metal was 390 oz. in 1910; 628 in 1911; 721 in 1912; 483 in 1913; 570 in 1914; 742 in 1915; 750 in 1916; and 605 oz. in 1917. Prices for the corresponding years were: $32.70 per oz.; $43.12; $45.55; $44.88; $45.14; $49.63; $83.40; $102.82 and $105.95 in 1918. During 1919 the price remained around $105, until August, when it rose, and by November it had stood at $130 for several weeks.

Use: One of the most important uses of platinum is as a catalyzer in the manufacture of fuming sulphuric trioxide; in this use it is technically known as "contact mass," some of which contains as much as 7 to 8% of platinum. The loss in good practice is small. Platinum dishes and utensils are a necessity in chemical laboratories. Its use in the electric industry and in dentistry is becoming less each year, nichrome replacing it in electrical appliances. The increased use of silica-ware is also reducing the consumption of platinum in concentration of sulphuric acid and for other purposes. The consumption of platinum in jewelry is increasing fast, especially during the last 5 years.

PLATINUM IMPORTS

	Quantity, Troy, oz.	Value	Retorts, etc.	Total
1905	93,912	$1,985,107	$188,156	$2,173,263
1906	137,928	3,601,120	187,639	3,788,759
1907	74,292	2,508,991	175,651	2,684,642
1908	50,844	1,095,754	134,119	1,229,873
1909	118,853	2,557,596	416,352	2,973,948
1910	118,280	3,320,699	333,965	3,654,664
1911 Ore or crude	34,412	1,278,239	142,718	4,866,207
1911 Unmanufactured, etc.	88,339	3,445,250		
1912 Ore or crude	45,280	1,781,585	169,119	4,503,682
1912 Unmanufactured, etc.	59,526	2,552,978		
1913 Ore or crude	48,942	1,863,406	90,694	5,040,210
1913 Unmanufactured, etc.	69,551	3,086,110		
1914 Ore or crude..... Unmanufactured, etc	72,032	.....	.....	2,934,080
1915	61,438	2,341,476	.....	.....
1916	53,484	3,138,396	18,923	5,202,120
1917	26,146	2,095,390	4,170	2,415,155
1918	45,833	4,144,740	9,129	4,952,522

The embargo placed upon the export of platinum from Russia at the beginning of the war and the revolution were the cause of the greatly reduced imports since 1914.

THE PLATINUM METALS

Iridium. The price of iridium remains much higher than that of platinum. It is a frequent mistake of the platinum miner to speak of iridosmine as "iridium." Iridosmine is an alloy of osmium and iridium, with osmium varying from 17 to 49%. There is practically no market for osmium, except the use as pen points; iridosmine is valuable for the iridium content only. The extraction of osmium is both very costly and dangerous, on account of the poisonous character of the osmium vapor. By Oct., 1919, the price had soared to $290 per ounce.

Palladium: The marketable supply increased on account of the greater care taken by the copper refineries in extracting it from the electrolytic slimes in which it occurs with gold, silver, etc., particularly in the slime of Canadian matte, and the base bullion from Australia and elsewhere. The use of palladium as a catalyzer is well known, and is largely used as an alloy for platinum, as it renders the platinum lighter and of a more brilliant white. By Oct., 1919, the price had risen to $120 per ounce.

Osmium: The supply of this metal of the platinum group exceeds the demand, tungsten having replaced it in electric light bulbs, and its use in medicine and in silk dyeing being slight.

PYRITE

Pyrite mining is an important industry at several localities in the United States, its sole use being for sulphuric acid manufacture. The market is limited by transportation costs and by the competition of the copper and zinc smelting plants, at which such acid is made, the principal ones being at Anaconda, Montana; Garfield, Utah; Douglas, Arizona; Trail, B. C.; Ducktown, Tenn., and Hillsboro, Danville, Peru, La Salle, Springfield and East St. Louis, all in Illinois; Langeloth and Donora, Penn.; Argentine, Kansas, and Clarksburg, and Moundville, W. Va. The bulk of the pyrite consumed in America still comes from Spain. Domestic pyrites and pyrrhotite deposits have been exploited of late, also the utilization of "coal brasses."

Production in Long Tons

1882..	12,000	$72,000	1895..	99,549	$322,845	1908..222,598	857,113
1883..	25,000	137,500	1896..	115,483	320,163		1,028,157
1884..	35,000	175,000	1897..	143,201	391,541	1910..241,612	977,978
1885..	49,000	220,500	1898..	193,364	593,801	1911..301,458	1,164,871
1886..	55,000	220,000	1899..	174,734	543,249	1912..350,928	1,334,259
1887..	52,000	210,000	1900..	204,615	749,991	1913..341,338	1,286,084
1888..	54,331	167,658	1911.	*244,691	1,257,579	1914..336,662	1,283,346
1889..	93,705	202,119	1902.	*207,874	947,089	1915..304,124	1,674,933
1890..	99,854	273,745	1903.	*233,127	1,109,818	1916..423,556	1,965,702
1891..	196,536	338,880	1904..	207,081	814,808	1917..462,662	2,485,435
1892..	109,788	305,191	1905..	253,000	938,492	1918..455,432	2,903,786
1893..	75,777	256,552	1906..	261,422	931,305		
1894..	105,940	363,134	1907..	247,387	794,949		

* Includes production of natural sulphur.

IMPORTS OF PYRITE, CARRYING LESS THAN 3½% COPPER

1910.....	803,551	long tons	1915.....	964,634	long tons
1911.....	1,006,310	" "	1916.....	1,244,662	" "
1912.....	970,785	" "	1917.....	967,340	" "
1913.....	850,592	" "	1918.....	496,792	" "
1914.....	1,026,617	" "			

QUICKSILVER

Most of the domestic supply of quicksilver comes from California and Nevada, Texas producing the remainder, as Arizona has as yet only a small output. In recent years much of the Californian output has been from old mines, whose richest ore was extracted long ago, and which are now difficult to operate profitably, except when the price is high.

Beside the new supply each year there is also recovered an annual output of old quicksilver in the clean-up of old amalgamation mills, and from other sources; this supply has but little effect on the market. Austria, Italy, and Spain furnish 5/6 of the world's supply.

Quicksilver is used mainly in the manufacture of fulminate of mercury for explosive caps, of scientific and electric apparatus, of drugs and in the recovery of precious metals; the latter use is gradually diminishing. It is also used in manufacturing paints for protective coatings.

The primary domestic market for quicksilver is San Francisco; the price is averaged from the market quotations published in the *Mining and Scientific Press.* Prices are given in dollars per flask of 75 lb.

Production and prices in this country have been as under:

Year	Flasks	Average Price
1914	16,548	$49.05
1915	21,033	85.79
1916	29,932	125.89
1917	36,159	106.34
1918	32,883	123.46
1919 (3 months)	5,960	86.44

During Aug., Sept., and Oct., 1919, the price was very erratic, jumping up to $105 per flask, then settling back to $80, rising to $100 in December. The average for the year was $91.26.

QUICKSILVER MINES

Alpine ..... California
Chisos Mining Co..... Texas
Colquitt-Tigner Quicksilver... Texas
Goldbanks ..... Nevada
Guadalupe ..... California
Kings Quicksilver Mining Co., Ltd ..... California
L. & N. Group..... Arizona
Mercury Mining Co..... Nevada
Nevada Cinnabar Co..... Nevada
New Alamaden Quicksilver Mines ..... California
New Idria Quicksilver Mining Co., ... California
Oceanic Mine..... California
Patriquin Quicksilver Mine.... Calif.
Quicksilver Invmt Co..... Calif.
Quicksilver Mining Co... California
Ruby King Copper Co..... California
St. Johns Mines Co..... California

RADIUM—(See Uranium, Vanadium.)

Radium, uranium, and vanadium are closely connected in occurrence and always found together in an ore. Colorado and Utah contain the largest known radium-bearing deposits of the world, but Europe has been the chief market for the ore, which accounts for the greatly reduced output for 1915.

PRODUCTION FROM CARNOTITE ORES

Year	Uranium oxide tons	Radium, grams	Vanadium, tons
1918	105.5	21.7	276
1917	....	....	....
1916	....	8 to 10	....
1915	23.4	6	635
1914	87.2	22.3	435
1913	41	10.5	....
1912	26	6.7	....

Carnotite is a complex ore consisting essentially of vanadium oxide or with potassium as double silicate, and associated with or loosely combined with uranium oxide. A ton of ordinary carnotite ore assaying about 2½% uranium oxide contains only 12.5 milligrams radium, or one part out of a hundred million, recoverable radium. The following firms are producers of radium:

Standard Chemical Co., Pittsburgh, Pa.
W. L. Cummings Chemical Co., Lansdowne, Pa.
Radium Company of America, Sellersville, Pa.
Radium Co. of Colorado, Box 1316, Denver, Colo.
Carnotite Reduction Co., 2600 Iglehart Court, Chicago, Ill.
Pittsburgh Radium Co., Denver, Colo.
Chemical Products Co., Denver, Colo.

RADIUM MINES

National Radium Mines Co. (Uranium and Vanadium)..Utah
National Radium Products Co.....Colorado
Penna. Mining, Power & Reduction Co. (Ore contains uranium and vanadium)....Colo.
Radium Mines Co. (Vanadinite not found in commercial quantities) .....Arizona
Rare Metals Co. (Operates a custom mill).....Colorado
Government mines in Bohemia Austria

SELENIUM

The commercial supply of selenium is obtained from the slime or mud resulting from the electrolytic refining of blister copper.

SELENIUM RECOVERED FROM 100 TONS OF BLISTER COPPER.

Smelter supplying blister copper:	Selenium pounds	Smelter supplying blister copper:	Selenium pounds
Garfield, Utah.....	56	Tacoma, Washington.....	42
Steptoe, Nevada.....	110.1	Aguascalientes, Mexico...	170
Omaha, Nebraska.....	26.0	Cerro de Pasco, Peru....	13.7
Mountain, California.....	36	Mount Lyell, Tasmania...	42

Eilers, A., Notes on the occurrence of some of the rarer metals in blister copper: Am. Inst., Min. Eng. Trans., vol. 47, pp. 217-218, 1914.

SILVER

Average monthly prices of silver per ounce, as published by The American Metal Market:

	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919
January	52.37	53.79	56.22	62.93	57.56	48.89½	56.77	75.14	88.72	101.12
February	51.53	52.22	59.04	61.64	57.50½	48.48	56.75	77.54	85.79	101.12
March	51.45	52.74	58.37	57.87	58.07	50.24	57.93	74.13	88.11	101.12
April	53.22	53.33	59.23	59.49	58.52	50.25	64.41	72.51	95.35	101.12
May	53.87	53.31	60.88	60.36	58.18	49.91½	74.27	74.61	99.50	107.23
June	53.46	53.04	61.29	58.99	56.47	49.03	65.02	76.44	99.50	110.50
July	54.15	52.63	60.66	58.72	54.68	47.52	62.94	78.92	99.62	106.36
August	52.91	52.17	61.61	59.29	54.34	47.18	66.08	85.40	100.31	111.35
September	53.30	53.43	63.08	60.64	53.29	48.68	68.51	100.73	101.12	113.92
October	55.49	53.34	63.47	60.79	50.65	49.38½	67.85	87.38	101.12	119.10
November	55.64	55.72	62.79	58.99	49.10	51.71	71.00	85.97	101.12	127.57
December	54.43	54.90	63.37	57.76	49.38	54.97	75.76	85.94	101.12	131.97
Average	53.49	53.30	60.83	59.79½	54.81	49.69	65.66	81.40	96.77	111.11

The silver output of this country during 1918, as compiled by the Bureau of the Mint, is as follows:

State or Territory	Fine ounces	Value
Alaska	796,836	$796,836
Alabama	2	2
Arizona	6,771,490	6,771,490
California	1.555,417	1,555,417
Colorado	6,982,313	6,982,313
Georgia	41	41
Idaho	10,188,056	10,188,056
Illinois	8,939	8,939
Maryland	164	164
Michigan	491,939	491,939
Missouri	40,948	40,948
Montana	15,341,793	15,341,793
Nevada	10,113,405	10,113,405
New Mexico	763,758	763,758
North Carolina	9	9
Oregon	150,207	150,207
Philippine Islands	12,597	12,597
South Dakota	165,865	165,865
Tennessee	131,931	131,931
Texas	612,436	612,436
Utah	13,439,811	13,439,811
Vermont	5,117	5,117
Virginia	2,967	2,967
Washington	302,446	302,446
Wyoming	719	719
Totals	67,879,206	$67,879,206

* $1 per oz., the price paid by the Government.

The output in 1919 was 55,285,196 oz., valued at $61,966,412.

SILVER PRODUCTION OF THE UNITED STATES, IN OUNCES.

Year	Quantity	Commercial Value	Year	Quantity	Commercial Value
1880....	30,318,700	$34,717,000	1901....	55,214,000	$33,128,400
1881....	33,257,800	37,657,500	1902....	55,500,000	29,415,000
1882....	36,196,900	41,105,900	1903....	54,300,000	29,322,000
1883....	35,732,800	39,618,400	1904....	57,682,800	33,456,000
1884....	37,743,800	41,921,300	1905....	56,101,600	34,222,000
1885....	39,909,400	42,503,500	1906....	56,517,900	38,256,400
1886....	39,694,000	39,482,400	1907....	56,514,700	37,299,700
1887....	41,721,600	40,887,200	1908....	52,440,800	28,050,600
1888....	45,792,700	43,045,100	1909....	54,721,500	28,455,200
1889....	50,094,500	46,838,400	1910....	57,137,900	30,854,500
1890....	54,516,300	57,242,100	1911....	60,399,400	32,615,700
1891....	58,330,000	57,630,000	1912....	63,766,800	39,197,500
1892....	63,500,000	55,662,500	1913....	66,801,500	40,348,100
1893....	60,000,000	46,800,000	1914....	72,455,100	40,067,700
1894....	49,500,000	31,422,100	1915....	74,961,075	37,397,300
1895....	55,727,000	36,445,500	1916....	74,414,802	48,953,000
1896....	58,834,800	39,654,600	1917....	71,740,362	59,078,100
1897....	53,860,000	32,316,000	1918....	67,879,206	67,879,206
1898....	54,438,000	32,118,400	1919....	55,285,196	61,966,412
1899....	54,764,500	32,858,700			
1900....	57,647,000	35,741,100	Total.	2,175,414,441	$1,615,630,518

AMERICAN SILVER-LEAD SMELTING WORKS

Company—	Place	Furnaces	Annual Capacity*
American Smelting and Refining Co....	Chicago†	1	36,000
American Smelting and Refining Co....	Denver	7	510,000
American Smelting and Refining Co....	Durango	4	210,000
American Smelting and Refining Co....	East Helena.....	4	306,000
American Smelting and Refining Co....	El Paso.....	6	380,000
American Smelting and Refining Co....	Leadville	10	510,000
American Smelting and Refining Co....	Murray	8	657,000
American Smelting and Refining Co....	Omaha†	2	82,000
American Smelting and Refining Co....	Perth Amboy†.....	4	170,000
American Smelting and Refining Co....	Pueblo	7	380,000
Bunker Hill & Sullivan M. & C. Co.....	Kellogg, Idaho.....	3	200,000
International Smelting Co.....	Tooele, Utah.....	5	525,000
Needles Smelting Co.....	Needles, Cal.‡.....	2	70,000
Northport Smelting and Refining Co...	Northport, Wash...	3	300,000
Ohio & Colorado Smelting Co.....	Salida, Colo.....	4	345,000
Pennsylvania Smelting Co.....	Carnegie, Pa.....	2	60,000
Selby Smelting Works.....	Selby	3	210,000
United States Smelting Co.....	Midvale, Utah.....	6	500,000
Totals, United States.....		78	4,951,000
American Smelting and Refining Co....	Monterey	10	584,000
American Smelting and Refining Co....	Aguascalientes	1	40,000
American Smelters Securities Co.....	Chihuahua	7	400,000
Compañia Metalurgica Mexicana.....	Velardeña	3	150,000
Compañia Metalurgica de Torreon.....	San Luis Potosi....	10	250,000
	Torreon	8	360,000
Compañia Minera de Penoles.....	Mapimi‡	6	325,000
Totals, Mexico.....		45	2,109,000
Consolidated Mining and Smelting Co..	Trail, B. C.....	4	140,000

* Tons of charge. † Smelt chiefly refinery between-products. ‡ Not operated in 1914 and 1915. § Plant being remodeled.

SILVER PRODUCTION OF THE WORLD

(Report of the Director U. S. Mint)

	Quantity	Value		Quantity	Value
1882.....	86,472,091	$98,232,300	1901.....	173,011,283	$103,806,700
1883.....	89,175,023	98,984,300	1902.....	162,763,483	86,264,700
1884.....	81,567,801	90,785,000	1903.....	167,689,322	90,552,200
1885.....	91,609,959	97,518,800	1904.....	164,195,266	95,233,300
1886.....	93,297,290	92,793,500	1905.....	172,317,688	105,113,700
1887.....	96,123,586	94,031,000	1906.....	165,054,497	111,721,100
1888.....	108,827,606	102,185,900	1907.....	184,206,984	121,577,100
1889.....	120,213,611	112,414,100	1908.....	203,131,404	108,655,100
1890.....	126,095,062	131,937,000	1909.....	212,149,023	110,364,400
1891.....	137,170,000	135,500,200	1910.....	221,715,763	119,727,000
1892.....	153,151,762	133,404,400	1911.....	226,192,923	122,143,800
1893.....	165,472,621	129,119,900	1912.....	224,310,654	137,883,800
1894.....	164,610,394	104,493,000	1913.....	223,907,845	135,246,400
1895.....	167,500,960	109,545,600	1914.....	211,339,749	116,849,900
1896.....	157,061,370	105,859,300	1915.....	179,753,987	93,292,315
1897.....	160,421,082	96,252,700	1916.....	175,933,000	115,763,914
1898.....	169,055,253	99,742,600	1917.....	168,000,000	132,700,000
1899.....	168,337,452	101,002,600	1918.....	180,000,000	174,000,000
1900.....	173,591,364	107,626,400	1919.....	170,000,000	190,000,000

TIN

Very little tin is produced in this country, and the most of it comes from Alaska, which yielded 68 tons metal during 1918. In 1914 South Dakota furnished a few hundred pounds of stream tin, and there are promises of a revival in lode mining in that State. Workable deposits exist near Deeth, Nevada; El Paso, Texas; and on Irish Creek, Virginia. Practically all the tin used in the United States is brought from the Straits Settlements and Bolivia, the latter ranking second to the former as a tin producer.

UNITED STATES TIN PRODUCTION (U. S. GEOL. SURVEY)

Year	Tons Concentrates	Percent Tin	Value
1918	130	60	$118,000
1917	141	60	111,000
1916	232	66	122,000
1916	200	66	.....
1914	157.5	66	66,560
1913	84	60	36,970
1912	147	60	124,800

Secondary tin recovered in the United States:

Year	Tons	Value
1917	19,400	$23,920,200
1916	17,400	15,131,040
1915	13,650	10,544,180
1914	12,447	8,887,158

The United States is the largest user (50% of the world's output) of tin among the countries of the world, and hence a large importer of the metal. The U. S. Steel Corporation is the greatest single user of the metal.

Tin Prices in New York

Extreme fluctuations and yearly average prices of Pig Tin in New York:

Year	Highest	Lowest	Aver.	Year	Highest	Lowest	Aver.
1885	23.50	16.10	19.50	1902	30.62½	22.60	26.95
1886	23.25	20.45	21.55	1903	30.80	24.95	28.19
1887	37.25	21.90	24.85	1904	30.12½	25.75	28.08
1888	37.25	16.90	26.20	1905	36.45	28.65	31.55
1889	22.25	19.50	20.93	1906	50.00	35.65	39.82
1890	25.10	19.50	21.42	1907	44.10	26.00	38.43
1891	22.00	19.50	20.25	1908	32.37½	26.45	29.54
1892	22.15	19.40	20.60	1909	34.12½	27.30	29.76
1893	21.25	18.15	20.14	1910	38.75	31.75	34.27
1894	20.45	13.45	18.08	1911	48.50	37.60	42.68
1895	15.15	13.00	14.06	1912	51.05	42.05	46.43
1896	13.70	12.62½	13.24	1913	51.00	36.75	44.32
1897	14.12½	13.00	13.60	1914	65.00	28.50	35.70
1898	19.00	13.70	15.64	1915	57.00	32.00	38.66
1899	33.12½	19.87½	27.19	1916	56.00	37.50	43.48
1900	35.00	25.20	30.00	1917	86.00	42.50	61.65
1901	33.50	23.12½	26.94	1918	110.00	70.00	86.80
From The American Metal Market.				1919	71.00	52.12	62.14
				Average price for 39 years			30.48

During 1919, owing to Government restriction, the price of tin was held at around 72 cents, but by October it had dropped to 55 cents.

TITANIUM

Titanium is obtained from the two minerals; rutile, titanic oxide 60% titanium; and ilmenite or titanic iron, $FeOTiO_2$, with 31.6% titanium. The

supply of rutile comes from Virginia, being mined by the American Rutile Co. at Roseland, Nelson county. Its output in 1914 was 94 tons of rutile, containing 95% oxide, and 89 tons of ilmenite, with 55% oxide.

Rutile is used for making ferro-titanium, used in cast iron and steel, in electrodes for arc lamps, in dyeing leather and wool and in chemicals. A little ilmenite has been used in making ferro-titanium and arc lamp electrodes.

TUNGSTEN

Prior to 1914, the domestic output of this valuable mineral, used mainly in tool-steel and incandescent lamps, varied from 1,100 to 1,800 tons of concentrate per annum, since when the yield has been as below:

Year	Tons	Per unit	Total value
1910	1,821	$7.62	$832,992
1911	1,139	5.97	407,985
1912	1,330	6.28	502,158
1913	1,537	7.30	672,118
1914	900	7.31	435,000
1915	2,332	29.33	4,100,000
1916	5,923	33.97	12,074,000
1917	6,144	18.40	6,783,000
1918	5,041	22.48	6,802,000

URANIUM

As uranium is the source of radium, the production of uranium ore has already been given under radium. Uranium ores occur in many places in the United States, but are found in greatest abundance in the Paradox Valley region of Colorado and Utah.

VANADIUM

Vanadium occurs with uranium in carnotite, the mineral of greatest commercial importance. When vanadium is 14% and uranium but 3% the mineral is a dark olive green; when the uranium content is 20%, the mineral is a beautiful yellow. The ore is usually low-grade, 2 to 4%, but of widespread occurrence, the sandstone looking as if dusted with sulphur.

The Vanadium Corporation of America is said to control 92% of the world's vanadium supply. The demand is for vanadium steel, used in airplane construction, in automobiles, for military helmets, and wherever extreme strength and lightness are required. American production in 1918 was 276 tons of vanadium from 18,860 tons of ores.

The three principal producers in the United States are:

Primos Chemical Co., Primos, Pa. Mines at Vanadium, San Miguel County, Colo.

Standard Chemical Co., Pittsburgh, Pa. Mines in Colorado.

Vanadium Corporation of America, Pittsburgh, Pa. Minas-ragra, Peru.

VANADIUM MINES

Vanadium Corporation.....Peru
Primos Chemical Co..Colorado (etc.)
Shattuck-Arizona Copper Co.Arizona
Standard Chemical Co....Colorado-Utah

ZINC (Spelter)

This is one of the important metals mined in the United States, this country containing several of the largest mines in the world.

Spelter Prices in New York

Highest, lowest and average yearly prices of spelter in New York:

Year	Highest	Lowest	Average	Year	Highest	Lowest	Average
1885.....	4.62½c	4.00c	4.34c	1903.....	6.25	4.70	5.62
1886.....	4.60	4.25	4.40	1904.....	6.12½	4.75	5.17
1887.....	5.62½	4.40	4.62½	1905.....	6.65	5.30	6.00
1888.....	5.50	4.50	4.91	1906.....	6.85	6.00	6.27½
1889.....	5.40	4.62½	5.02	1907.....	7.25	4.35	6.20½
1890.....	6.17½	5.00	5.55	1908.....	5.17½	4.35	4.74
1891.....	6.00	4.65	5.02	1909.....	6.50	4.75	5.52
1892.....	4.90	4.35	4.63	1910.....	6.35	5.25	5.66
1893.....	4.50	3.55	4.08	1911.....	7.00	5.50	5.91
1894.....	4.00	3.25	3.52	1912.....	7.65	6.45	7.11
1895.....	4.35	3.10	3.63	1913.....	7.35	5.10	5.80
1896.....	4.25	3.60	3.94	1914.....	6.20	4.75	5.30
1897.....	4.35	3.75	4.12	1915.....27.50		5.70	14.44
1898.....	5.30	3.87½	4.57	1916.....21.17		8.37½	13.75
1899.....	7.00	4.45	5.75	1917.....11.05		7.67½	9.11
1900.....	4.80	4.10	4.40	1918..... 9.85		6.82½	8.31
1901.....	4.50	3.90	4.08½	1919..... 9.00		6.00	7.04
1902.....	5.62½	4.10	4.90				

Average price for 32 years, 5.88 cents.
From American Metal Market.

Annual Production of Spelter in the United States from Domestic and Foreign Ores, in Short Tons.*

Year	From Foreign Ore	From Domestic Ore	Total	Year	From Foreign Ore	From Domestic Ore	Total
1873.....	.....	7,343	7,343	1899.....	.....	129,051	129,051
1875.....	.....	15,833	15,833	1900.....	.....	123,886	123,886
1880(Census)	.....	23,239	23,239	1901.....	.....	140,822	140,822
1882.....	.....	33,765	33,765	1902.....	.....	156,927	156,927
1883.....	.....	36,872	36,872	1903.....	.....	159,219	159,219
1884.....	.....	38,544	38,544	1904.....	.....	186,702	186,702
1885.....	.....	40,688	40,688	1905.....	.....	203,849	203,849
1886.....	.....	42,641	42,641	1906.....	25,076	199,694	224,770
1887.....	.....	50,340	50,340	1907.....	26,115	223,745	249,860
1888.....	.....	55,903	55,903	1908.....	19,675	190,749	210,424
1889.....	.....	58,860	58,860	1909.....	25,535	230,225	255,760
1890.....	.....	63,683	63,683	1910.....	16,705	252,479	269,184
1891.....	.....	80,873	80,873	1911.....	14,905	271,621	286,526
1892.....	.....	87,260	87,260	1912.....	14,899	323,907	338,806
1893.....	.....	78,832	78,832	1913.....	9,424	337,252	346,676
1894.....	.....	75,328	75,328	1914.....	9,631	343,418	353,049
1895.....	.....	89,686	89,686	1915.....	31,384	458,135	489,519
1896.....	.....	81,499	81,499	1916.....	104,005	563,451	667,456
1897.....	.....	99,980	99,980	1917.....	84,976	584,597	669,573
1898.....	.....	115,399	115,399	1918.....	25,522	492,405	517,927

* U. S. Geological Survey.

MINES OF THE UNITED STATES

CHAPTER IV

THE MINING COMPANIES AND MINES OF THE UNITED STATES

Those of other countries are in separate chapters. See alphabetical index in front of book.

The descriptions of the active and most of the inactive mining corporations, and operating mines of the various States are arranged by States and often grouped by counties and towns. The arrangement permits ready identification of companies whose exact title may often be difficult to recall and it enables the reader to tell what companies are operating near each mining center.

The descriptions of foreign mining companies are grouped under the name of each country, arranged alphabetically by countries and by companies.

UNITED STATES

A complete index in the front of the book makes quick reference possible if the name of the company is known.

The companies given under this general heading, operate properties in so many districts that the descriptions cannot be properly given under any one state. References are, however, given in the appropriate places to the local holdings.

ALUMINUM COMPANY OF AMERICA.

Offices: Oliver Bldg., Pittsburgh, Pa., and 120 Broadway, New York.

Officers: Arthur V. Davis, pres.; G. R. Gibbons, v. p.-sec.-asst. treas.; R. E. Withers, treas.-asst. sec., Pittsburgh, Pa.; with D. L. Gillespie, Roy A. Hunt, Alvah K. Lawrie, A. W. Mellon, George V. Clapp and R. B. Mellon, directors.

Inc. 1888 in Pa., as the Pittsburgh Reduction Co.; name changed to present title, Jan. 1, 1907. Cap. authorized, $20,000,000; $100 par; outstanding, $19,000,000. Debentures, $12,000,000, 6% serial gold notes dated March 1, 1919, and maturing $4,000,000 annually from March 1, 1921 to 1923 inclusive. These notes are a direct obligation of the company. Dividends: 1906, 3⅓%; 1907, 11%; 1908, 1%; 1909, 2%; 1910-1913, 4% yearly; 1914, 6%; 1915, 6½%; 1916, 8%; 1917, 8%; 1918, 10%.

Controls the St. Lawrence River Power Co., the Northern Aluminum Co., the St. Lawrence Transmission Co. and the **Tallassee Power Co.** On Nov. 1, 1915, acquired control of the **Southern Aluminum Co.,** with its unfinished hydro-electric and aluminum manufacturing plants near Whitney, N. C. This company was controlled by French interests until the outbreak of the European war in 1914. The plants were to have cost upward of $10,000,000. The

Aluminum Co. of America formed the Tallassee Power Co., capital $1,000,000 to complete both plants.

Company owns extensive bauxite deposits in Saline Co., Ark., from which it secures most of its aluminum ore. About 6 tons of ore yields one ton of metal. Equipment at the property consists of crushing and drying machinery. The bauxite is shipped to a refining plant at East St. Louis, Ill., where the impurities are removed. There are also reduction works at Niagara Falls and Massena, N. Y., where there is a wire and cable mill, and at Maryville, Tenn. The company has a general fabricating plant at New Kensington, Pa., also a plant for the manufacture of aluminum bronze powder and aluminum foil.

The Northern Aluminum Co. is a Canadian corporation, which has a reduction plant and wire mill at Shawinigan Falls, Que., and a fabricating plant at Toronto, Ont.

Production: about 80% of the total aluminum product of the U. S., which, in 1918, was about 122,000,000 lbs. Annual capacity of all plants estimated at 175,000,000 lbs.

AMALGAMATED COPPER CO.

Company dissolved in 1916. Fully described in previous issues of this book. Vols. XI and XII.

AMERICAN FINANCE & SECURITIES CO. (THE)

Involuntary petition in bankruptcy filed June 22, 1915. Adjudicated bankrupt, May 15, 1916. Henry J. West, Camden, N. J., trustee. See Mines Handbook, Vol. XII.

AMERICAN METAL CO., LTD (THE)

Offices: 61 Broadway, New York; Oliver Bldg., Pittsburgh, Pa.; Boatmens Bank Bldg., St. Louis, Mo.; Foster Bldg., Denver, Colo.

Officers: Berthold Hochschild, New York, Chairman of the Board; C. M. Loeb, pres.; Otto Sussman, Henry Bruére, Julius Loeb, Ludwig Vogelstein, and Harold K. Hochschild, v. p's.; Julian Beaty, treas.; Julius Goldman, sec., with Henry V. Putzel, S. Roos and M. Schott, directors.

Trustees: Henry Morgenthau, Berthold Hochschild, J. F. Guffey, F. L. Crocker, C. B. de Camp, J. P. Grier, and Ludwig Vogelstein.

Inc. 1887 in New York, as refiners, exporters, importers, and dealers in metals and chemicals. Cap., $25,000,000; $100 par; 70,000 issued. The capital in 1891 was $200,000.

For an analysis of the ramifications and connections of this company, reference should be made to the report made by the Alien Property Custodian in April, 1919. This includes the partnerships with Aron Hirsch & Sohn; Beer, Sondheimer & Co.; The Metallgesellschaft and Vogelstein & Co., the last-named being absorbed by American Metal Co. in December, 1919, thereby controlling the U. S. Metals Refining Co., which see below.

When the Alien Property Custodian seized the 34,644 shares of German-owned stock, these shares and all but 200 of the American held shares were put into a five-year voting trust. This voting trust does not include 16,736 shares belonging to H. R. Merton & Co.. The German-owned shares sold at public auction for $5,750,904, were bought by a syndicate, by which Ludwig Vogelstein acquired a 20% interest of 14,000 shares, making him the largest individual stockholder. The Cerro de Pasco Copper Corporation owns 4,500 shares; L. T. Haggin, 1,000; J. Horace Harding, 1,000; H. C. Frick, est., 1,000; C. D. Barney, 1,200, and E. H. Clark, 1,500 shares.

The American Metal Co. owns the following companies: American Zinc & Chemical Co., Langeloth, Pa.; Bartlesville Zinc Co., Bartlesville and Blackwell, Oklahoma; Clarkesburg Clinkering Co., Bridgeport, West Virginia; Chanute Spelter Co., Cherokee county, Kansas; Metallurgical Co. of America, American Metal Transport Co. American Metal Co. has large interests in the following: Ohio & Colorado Smelting & Refining Co., Salida, Colorado; Balbach Smelting & Refining Co., Newark, New Jersey; Nichols Copper Co., Laurel Hill, Long Island, N. Y.; South American Metal Co. (The), Chile; Fundicion de Guayacan, Guayacan, Chile; Compania de Minerales y Metales, Mexico; Providencia Mines, Zacatecas, Mexico; Parrena Mining Co., Coahuila, Mexico; Cia. Mineral Paloma y Cabrillas, S. A. Higueras, Coahuila, Mexico; Compania Minera Penoles, Durango, Mexico; Compania Metallurgica de Torreon, Torreon, Mexico; Fundidora y Afinadora Monterrey, S. A., Monterrey, Mexico.

The corporation, through its subsidiaries and allied companies, owns or controls the following products, the average annual quantities produced being as indicated below:

Electrolytic copper, pounds	100,000,000	to	125,000,000
Zinc (spelter), all grades, tons	75,000	"	100,000
Lead, bonded (Mexican), tons	60,000	"	75,000
Lead, domestic, tons	12,000	"	15,000
Sulphuric acid, tons	80,000	"	100,000
White arsenic, tons	4,000	"	6,000
Coal in Pennsylvania, tons	350,000	"	400,000
Coal in Mexico, tons	500,000	"	600,000
Silver, ounces	12,000,000	"	15,000,000
Zinc oxide (Polar and Arctic brands), tons	7,000	"	10,000
Zinc-dust (American extra pure and Zenith brands), tons	3,000	"	4,000
Antimonial lead, tons	1,000	"	1,500
Molybdenum concentrate, tons	500	"	1,000

In addition to its own production of metals, the company buys and sells metals in the open market and also contracts to take the entire output of various mines, smelters and refineries in the United States, Canada, Mexico and South America.

The company has contracts with large mines in North America calling for their entire production, totaling 159,000,000 lbs. of copper per annum. Copper received during 1918 from these and others amounted to 141,398,982 lbs. Refineries in which the company has an interest, treated this metal. The entire yearly turnover of the company, in copper, is 250,000,000 lbs.

Contracts with zinc mines called for 546,919,000 lbs. of ore during the year ended June 30, 1917. This was treated at the company's smelters. In 2 years, ended June 30, 1917, the zinc ore purchased amounted to 1,700,000,000 lbs., plus 585,000,000 lbs. of spelter bought in the open market.

The lead turnover in 1917 was 168,000,000 lbs.

The growth of the company is indicated by the following statistics:

Total sales and net earnings of the corporation, after deducting all expenses, profit-sharing, taxes, fixed charges, etc., during the past 10 years, have been as follows (year ending July 1):

	Capital Stock Outstanding	Total Sales	Net Earnings		Capital Stock Outstanding	Total Sales	Net Earnings
1909	$3,120,000	$64,274,040	$ 854,719	1915	3,500,000	$68,468,179	$2,498,639
1910	3,500,000	84,402,083	685,334	1916	3,500,000	153,796,848	7,638,336
1911	3,500,000	68,519,484	842,780	1916(a)	3,500,000	82,615,281	4,899,750
1912	3,500,000	57,060,048	1,365,816	1917(a)	7,000,000	149,216,409	2,892,387
1913	3,500,000	79,243,602	1,001,895	1918(a)	7,000,000	106,166,089	832,157
1914	3,500,000	68,835,488	1,088,770	1919(b)	7,000,000	29,268,252	330,004

(a) Half year ending Dec. 31.
(b) Half year ending June 30.

The company's operations have hitherto been kept closely guarded, but a more liberal policy is apparently now to be followed. The company is really one of the few big metal companies of the world, and its operations are matters of great public importance. Such information concerning its subsidiaries as is obtainable is given under their respective titles.

United States Metals Refining Co.

Formerly owned by U. S. S. R. & M. Co., but control secured by American Metal Co. in Dec., 1919.

Officers: Ludwig Vogelstein, pres.; F. Y. Roberston, v. p. and gen. mgr.; Otto Sussman, v. p.; J. B. Beatty, sec.-treas., with J. A. Schloss, E. H.

Clark, and A. G. Todd, directors. R. E. Empey, controller and asst. treas.; E. H. Probst, asst. sec.

Staff: R. W. Deacon, gen. supt.; B. B. Hood, asst. supt.; F. R. Pyne, asst. plant supt.; C. L. Colbert, smelter supt.; M. A. Koechert, production supt.; W. C. Smith, met.; L. V. Reese, chief eng.; H. D. Greenwood, chief chemist; Sidney Rolle, supt. of dept. of indus. relations; W. W. Conner, power supt.; C. E. Smith, purch. agt.; Jacob Roth, chief clerk; J. C. Clark, supt. of silver refinery; H. W. Thorn, supt. of yards; H. M. Green, supt. of tank-house; August Marks, supt. of casting dept.; Harry Moorecraft, supt. of weighing and sampling.

Inc. in New Jersey. **Cap.,** 20,000 pfd. shares and 20,000 com. shares, both $100 par value. 15,500 shares of each kind are issued, of which the U. S. S. R. & M. Co. owns 10,433 pfd. and 10,800 com.

Works: The U. S. M. R. Co. owns electrolytic copper refinery, having a capacity of refining 240,000,000 lb. of copper annually, a copper smelter, consisting of two blast-furnaces, with an annual capacity of smelting 200,000 tons of charge. The copper smelter purchased its ores under long contracts with mines in Canada, Spain, Cuba, and the western coast of South America; and consequently, is assured a long life, as it is not dependent on any one mine. The refinery enters into long time contracts for the refining of other copper besides that produced by the U. S. S. R. & M. Co. These two plants are located on 159 acres of ground at Chrome, N. J. This property is at tide-water, permitting ocean-going steamers to discharge direct into the plant, and is also connected with the Central Railroad of New Jersey.

The smelter has two 42x186″ blast furnaces, 3 converter stands using 84x120″ basic-lined converters, two 60x6′ rotary kilns for sintering fine material, and one Dwight-Lloyd sintering machine. The smelter is further equipped with a 500′ steamship dock, with berth for 2 steamers, the most modern type of Fairbanks scales, having a sensitiveness of 10 lb. on a load of 200,000 lbs., and a very complete automatic sampling mill equipped with Brunton samplers.

The refinery has two 225-ton and two 175-ton anode furnaces and three 225-ton wire-bar furnaces, equipped with charging cranes, casting wheels, waste heat boilers and the most modern devices for mechanical handling. The tank house has 1,228 tanks arranged on the Walker system. The weighing is done on tandem Fairbanks scales, sensitive to 1 lb. in 15,000 lbs.

The power house is steam-driven and arranged for highest economy with economizer and superheater equipment, 3 compound condensing units and 2 triple expansion units, using exhaust steam turbines for the third expansion. Current is generated at the rate of 11,000 amperes. Three circuits are carried in the tank house with a voltage of 115 volts each, 1 power unit being carried in reserve.

The anode slimes are refined by the usual processes, the doré bullion produced being parted electrolytically. Some of the rarer elements are recovered as by-products.

A new $100,000 laboratory with the most modern equipment was completed in 1917.

The new laboratory at Chrome is described in the "Eng. & Min. Jour." of March 9, 1918.

The company also owns a lead refining plant, with an annual capacity of 72,000,000 lb. of lead. This plant is at East Chicago, Indiana, on 70 acres of land. Wm. Thum, supt. It is connected with the following railways: Indiana Harbor Belt, Pennsylvania, and Baltimore & Ohio Terminal. It utilizes the Betts electrolytic lead refining process, by which the purest quality of lead is produced. The process also permits the recovery of bismuth and other by-products in the bullion.

The plants of the United States Metals Refining Co. are strictly modern in design and equipment and are noted for the technical excellence of their practice and the purity of their commercial products.

AMERICAN SMELTING & REFINING CO.

Gen. Offices: 120 Broadway, New York; Corporate office: 15 Exchange Place, Jersey City, N. J.; City of Mexico office: Edificio 'La Mutua' Despacho No. 200, Mexico, D. F. Valparaiso office: Casilla 12, Valparaiso, Chile.

General Officers: Simon Guggenheim, pres.; Jos. Clendenin, J. K. MacGowan and F. H. Brownell, v. p.'s; Isaac Guggenheim, treas.; F. W. Hills, compt.; L. A. Chapin, asst. treas; W E. Merriss, sec.; R. P. Reese, aud.

Directors. L. Newhouse, chairman; Simon Guggenheim, Jos. Clendenin, Chas. Earl, Leopold Frederick, Isaac Guggenheim, F. W. Hills, Wm. Loeb, Jr., John K. MacGowan, W. S. McCornick, W. S. Morse, Walter T. Page, H. A. Prosser, E. B. Schley, John N. Steele, C. W. Whitley, F. H. Brownell, C. A. H. de Saulles, Roger W. Straus, W. M. Drury, L. G. Eakins, H. A. Guess, W. E. Merriss, F. R. Raiff, and H. R. Wagner.

Executive Committee: Simon Guggenheim, chairman; Jos. Clendenin, Chas. Earl, F. W. Hills, Wm. Loeb, Jr., J. K. MacGowan, W. S. Morse, E. L. Newhouse, H. A. Prosser, F. H. Brownell, H. A. Guess and H. R. Wagner.

Finance Committee: F. H. Brownell, chairman; Simon Guggenheim, and E. L. Newhouse.

Legal Committee: J. N. Steele, cons. counsel; F. H. Brownell, gen. counsel; F. R. Foraker and Charles Earl, associates counsel.

Operating Officials: Wm. Loeb, Jr., managing director labor and welfare dept.; E. R. Reets, purch. agt.; F. R. Raiff, traffic mgr.; G. H. Cole, asst. traffic mgr.; E. L. Carpenter, fuel agt.; C. W. Whitley, gen. mgr. Utah dept.; C. A. H. de Saulles, gen. mgr. Colo. dept.; H. A. Guess, managing director mng. dept.; W. M. Drury, mgr. mng. dept.; C. L. Baker, gen. mgr. Mex. dept.; R. T. White, gen. mgr. Chile; Kuno Doerr, gen. mgr. S. W. dept.; Samuel Metzger, mgr. ins. dept.; E. A. Behr, sales agt. lead dept.; H. M. Brush, asst. mgr. copper sales dept.

Foreign representatives: W. A. Price and Geo. T. Ewart, fin. agts., El Paso, Texas; R. E. Mora, gen. rep., and J. A. Hendry, asst. treas. for Mexico.

On January 15, 1919, Daniel, Murry, and S. R. Guggenheim retired from the directorate, after 18 years' active participation in the company's varied operations. Since 1901, when they became connected with the company, the annual turn-over increased from $82,000,000 to $390,000,000, and the profit and loss account from $2,900,000 to $27,000,000.

Inc. April 4, 1899, in New Jersey. **Cap.**, $115,000,000. with $65,000,000 common and $50,000,000 cumulative 7% preferred stock, $100 par. Original capitalization was $54,600,000, increased to $100,000,000 and again increased Jan., 1911, by $15,000,000 common stock authorized to exchange for 6% debenture bonds of American Smelters Securities Co. at any time before Aug., 1918, that bonds may sell at par. Annual meeting, first Wednesday in April. Has about 11,000 shareholders.

Transfer agt., Ralph M. Leonard, New York; registrar, Chase National Bank, New York.

The A. S. & R. Co. owns all the common stock of the American Smelters Securities Co. and, $30,000,000, 80% of pfd. B and 35% of pfd. A. This was acquired by giving its 1st mtge. 5% bonds in exchange for the series B, 5% preferred stock of the Securities Co., par for par. The 5% cumulative-preferred stock, series B, of the Securities Co. is guaranteed by the Smelting Co., both as to interest and principal, and is, therefore, an obligation of the Smelting Co., prior to its preferred stock.

Consolidated Income Account

	1919*	1918	1917
Net earnings, smelters, etc.....	$5,285,698	$13,234,711	$24,125,685
Net earnings, mining properties.....	428,081	2,686,840	4,069,243
Other income, net.....	307,905	2,390,017	3,407,688
Gross income.....	$6,021,684	$18,311,568	$31,602,616

Charges Against Gross Income

Administ., research, exam., exp.	$522,691	$1,305,934	$1,482,458
Corporate taxes	412,355	1,252,356	3,849,971
Interest, amort., discount bonds	796,793	1,616,109	1,234,248
Deprec., deplet., ore res.	2,140,686	5,439,631	4,954,482
Appropriation, bonus, pension	.....	250,000	600,000
Miscellaneous	.....	740,038	985,831
Total charges	$3,872,524	$10,604,068	$13,106,990
Net income	$2,149,160	$7,707,500	$18,495,626
Dividends on pfd. stock	2,124,664	4,247,774	4,712,666
Balance	$24,496	$3,459,726	$13,782,960
Dividends on com. stock	1,219,960	3,354,890	4,269,860
Balance transferred to surplus†	$1,195,464	$104,834	$9,513,100
Previous surplus	27,060,229	26,955,394	23,442,295
Total surplus	$25,864,765	$27,060,228	$32,955,395
Special appropriations	.....	.....	6,000,000
Profit and loss surplus	$25,864,765	$27,060,228	$26,955,395

* Half year. † Deficit. For previous years, see Vol. XIII.

Consolidated General Balance Sheet

ASSETS

Year	Property	Investments	Net Value Metal Stocks	Working Assets	Current Assets	Special Funds	Total
1919*.....	$132,674,323	$1,558,057	$46,433,509	$8,884,410	$19,538,398	$1,368,623	$210,457,320
1918.....	133,245,835	1,742,604	40,921,155	9,070,477	35,530,676	1,369,338	221,886,085
1917.....	136,797,476	1,057,313	36,339,500	8,009,234	32,280,808	1,373,423	221,857,754
1916.....	141,165,684	827,277	27,477,650	4,601,312	42,430,207	823,003	217,325,133
1915.....	141,442,998	639,667	23,618,862	3,312,877	31,147,388	1,654,559	201,816,351

Current assets and special funds are mostly cash; working assets are mostly supplies. *Half year.

LIABILITIES

Year	Pfd. Stock Outstanding	Com. Stock Outstanding	Bonds Outstanding	Current Liabilities	Res. and Sus. Accounts	P. and L. Surplus	Total
1919*.....	$62,926,500	$60,998,000	$32,210,300	$20,398,016	$8,059,740	$25,804,765	$210,457,320
1918.....	63,175,000	60,998,000	31,961,700	30,654,731	8,036,324	27,060,228	221,886,085
1917.....	63,674,800	60,998,000	31,881,400	27,694,865	10,653,294	26,955,395	221,857,754
1916.....	96,458,800	54,299,000	6,699,000	27,468,288	8,957,750	23,442,295	217,325,133
1916.....	96,649,800	50,108,000	12,612,500	16,750;117	6,135,497	19,560,339	201,816,351

Current liabilities are mostly accounts payable, and dividends payable. *Half year.

Statement for the half-year ended June 30, 1919, shows the following position: Net income, $2,149,160, after paying depreciation, ore depletion, and bond interest. Preferred shares received, $2,124,664, and common, $1,219,960, the period ending with a deficit of $1,195,464 owing to cessation or reduction of output due to lack of demand for metals. Profits from Mexico increased. Current assets totaled $19,538,398, and current liabilities, $20,398,016.

Dividends—Common Shares:

Year	%	Year	%	Year	%
1919 (to Dec. 15)	4	1914	4	1909	4
1918	6	1913	4	1908	5
1917	7	1912	4	1907	7½
1916	6½	1911	4	1906	7
1915	4	1910	4	1905	5½
				1904	5

Preferred shares received 7% per annum from Oct., 1899, up to the current year. In 1900, an additional ⅞ of 1% was paid to cover the period of April 11 to 30, 1899.

Volume of Business

RECEIPTS

	1918	1917	1916
Balance from previous year:			
Cash, loans, Liberty bonds	$18,320,968	$19,941,492	$18,642,460
Sales of metals	360,060,487	405,616,167	330,297,952
From mining profits	10,117,969	8,788,455	5,661,198
From manufactured products	14,006,145	22,785,294	16,304,914
Miscellaneous	2,390,017	3,407,688	2,818,082
Bankers' accep., special funds, dec. net current assets, etc	5,426,537	3,382,698	3,035,690
Total cash to be accounted for	$410,322,123	$463,921,794	$376,760,296

PAYMENTS

For ore and bullion purchased, expenses, taxes	$376,970,009	$426,017,668	$335,851,619
Expended on property, net	4,887,990	6,586,274	8,175,743
For investments acquired, etc., net	325,569	857,282	1,041,686
For A. S. C. Co. pfd. stock bought, net	129,400	672,207	2,615,922
A. S. & R. bonds purchased, interest, etc.	1,915,469	2,484,868	.....
Dividends paid	7,602,664	8,982,525	9,133,834
Balance at end of year:			
Cash and Liberty bonds	18,491,022	18,320,967	19,941,492
Total	$410,322,123	$463,921,791	$376,760,296

Operating Statistics

	1918	1917	1916	1915
Men employed, excluding Mexico	21,765	24,698	21,073	15,556
Total wages and salaries, excluding Mexico	$25,516,467	$24,497,836	$17,047,944	$11,392,503
Average per 8-hour day	$3.91	$3.31	$2.70	$2.44
Bullion refined, tons	680,099	706,875	677,460	579,080
Charge smelted, tons	5,658,232	5,918,924	4,789,474	4,153,092
Coal used, tons	765,124	787,890	724,595	604,204
Coke used, tons	545,063	592,765	454,468	401,511
Fuel-oil used, bbls	1,659,337	1,560,535	1,107,285	829,304
Gas used, cubic ft	2,372,000,103	3,032,908,373	2,130,460,328	1,071,593,000
Ore mined, tons	2,525,280	2,318,925	1,638,566	1,578,611
Coal mined, tons	168,140	259,499	224,807	235,222
Coke produced, tons	171,245	186,107	140,961	120,660

Metal Products

Gold, oz	1,994,015	2,496,693	2,662,011	2,672,702
Silver, oz	72,572,506	69,841,061	71,868,451	76,117,453
Platinum and palladium, oz	1,516	1,597	868	693
Lead, tons	260,192	275,266	279,144	296,986
Copper, lb	868,540,000	916,974,000	789,438,000	551,798,000
Spelter, lb	41,238,000	52,522,000	47,807,547	36,154,000
Nickel, lb	626,085	682,715	1,224,328	1,120,556
Tin, lb	19,868,000	12,130,000	3,262,000	.....
Sulphuric acid, lb	87,338,000	66,174,000	25,842,000	34,124,000
Arsenic, lb	7,837,063	9,132,000	9,090,000	7,269,000

Metal Products—*Continued*

Copper sulphate, lb.....	5,164,000	7,598,000	13,046,000	8,366,000
By-product metals, lb...	1,870,662	4,131,709	5,671,827	2,229,887
Copper and brass mfd., lb.		39,767,274	31,597,489	8,763,480
Test lead and litharge sold, lb.....	.....	426,472	417,898	355,229
Loaded cartridges sold, number	.....	14,180,000	15,338,000	12,898,000
Sheet lead, pipe, etc., sold, lb.....	.....	13,678,245	21,713,331	9,638,205
Mixed metals sold, lb...	.....	5,188,045	2,831,617	2,566,255

The business of the company is so varied that it almost defies analysis, save by a certified accountant. It mines gold, silver, copper, lead, zinc ores and coal. It smelts its own ores of all these metals, and also most of the ore produced by the lesser mines of America. It refines not only these five metals, but manufactures them into copper sheets, rods, tubes, etc., at Baltimore; makes white lead, sheet lead, etc., at Selby; zinc white, etc., at its zinc smelters; sulphuric acid at Perth Amboy, N. J., and Garfield, Utah, and coke at its mines. It refines and sells bismuth, cadmium, arsenic, nickel and platinum, palladium and selenium largely from the slime of its electrolytic refineries, and makes blue vitriol; also smelts tin ore and concentrate from Bolivia.

It owns and operates over 30 mines in Mexico and a number of railways under the title of the Mine Lines of Mexico, and the Mexican Union R. R., and owns and operates the following smelting plants, etc.

Lead Smelting

Plant—	Location	Manager	Supt.	Furnaces	(c) Tons
Globe.....	Denver, Colo.....	L. G. Eakins.....	F. Roeser.....	7	1,600
Pueblo.....	Pueblo, Colo.....	L. G. Eakins.....	G. A. Marsh.....	7	1,300
Durango.....	Durango, Colo.....	F. C. Gilbert.....	M. H. Kaufman...	3	550
Ark. Valley.....	Leadville, Colo.....	W. B. McDonald.....	B. Hogarty.....	10	1,700
Murray.....	Murray, Utah.....	C. W. Whitley.....	W. W. Norton....	8	1,900
Helena.....	Helena, Mont.....	C. W. Adams.....	R. L. Strobel.....	4	900
Perth Amboy.....	Maurer, N. J.....	H. H. Alexander.....	G. G. Griswold...	4	600
Omaha.....	Omaha, Neb.....	Walter T. Page.....	W. P. Olds.....	3	750
El Paso.....	El Paso, Tex.....	Kuno Doerr.....	J. Heggie.....	6	1,200
Monterey.....	Monterey, Mex.....	C. L. Baker.....	J. R. Enlow.....	10	1,600
Chilhuahua.....	Chihuahua, Mex.....	C. L. Baker.....		5	900
Selby.....	Selby, Calif.....	F. B. Braden.....	E. N. Englehardt.	4	800
Federal.....	Federal, Ill.....	Rudolph Porter.....	O. Ohnsorg.....	3	270
Velardena.....	Asarco, Mex.....	C. L. Baker.....	L. B. Harrison....	3	450

Copper Smelting

Perth Amboy.....	Maurer, N. J.....	H. H. Alexander.	J. F. Austin.....	1	300
El Paso.....	El Paso, Tex.....	Kuno Doerr.....	J. Heggie.....	2(a) / 3(b)	1,900
Aguas Cal's.....	Aguas Cal's Mex.....	C. L. Baker.....	A. McL. Hamilton	8	2,000
Matehuala.....	Matehuala, Mex.....	C. L. Baker.....	C. A. Grabill.....	3	600
Hayden.....	Hayden, Ariz.....	H. E. Eye.....	J. J. Ormsbee....	2	900
Tacoma.....	Tacoma, Wash.....	H. Y. Walker.....	W. V. Morse.....	2	1,590
Garfield.....	Garfield, Utah.....	C. W. Whitley.....	R. F. McElveny..	4(a) / 6(b)	5,200
Sasco.....	Silverbell, Ariz.....	R. B. Green.....			
Velardena.....	Asarco, Mex.....	C. L. Baker.....	L. B. Harrison..	3	750

(a) Blast furnaces. (b) Reverberatory furnaces. (c) Daily capacity.

Zinc Smelters

Blende.....	Blende, Colo.....	C. A. H. DeSaulles...	J. D. Thomas....	8	100
Sand Spgs.....	Sand Spgs., Okla.....	C. A. H. DeSaulles...	F. P. Lannon.....	10	130
Henryette.....	Henryette, Okla.....	C. A. H. DeSaulles...	F. P. Lannon.....	..	...

Tin Smelters

		Yearly Cap.
Perth Amboy	Maurer, N. J.	18,000 tons

Refining Plants

Plant—		Yearly Capacity Gold Oz.	Silver Oz.	Lead Tons	Copper Tons
Omaha	Omaha, Neb. W. T. Page, mgr.; E. B. Lefferts, supt.	500,000	36,000,000	180,000	.....
Perth Amboy	Maurer, N. J. H. H. Alexander, mgr.; G. Griswold, supt.	500,000	48,000,000	108,000	120,000
Selby	Selby, Calif. E. B. Braden, v. p.; E. N. Engelhardt, supt.	2,400,000	18,000,000	36,000	.....
Federal	Federal, Ill. Rudolph Porter, mgr.; O. Ohnsorg, supt.	.....	.....	60,000	.....
Baltimore	Baltimore, Md. W. H. Pierce, mgr.; C. N. Sapping-, ton, supt.	300,000	30,000,000	.....	240,000
Tacoma	Tacoma, Wash. H. Y. Walker, mgr.; G. A. Kerr, supt. supt.	.....	.....	.....	72,000

The smelting and refining capacity of the company is equal to 1,150,000,000 lb. of electrolytic copper per annum.

The Mining Properties of the company are under the general charge of W. M. Drury, general manager; R. F. Manahan, assistant. The operating mines are as follows:

Imperial mine, Julius Kruttschnitt, mgr., Ed. Thornton, supt., Silverbell, Arizona; Blue Hill mine, Douglas, Hancock county, Maine; George Copper mine, Portland Canal division, British Columbia, bonded in 1919 for $100,000; Silver Lake mine, L. R. Clapp, supt., Silver Lake, Colo.; Premier (Bush) Silver mine, near Stewart, British Columbia, in which 1,000,000 tons of $30 ore is exposed. A 40% interest was acquired in Oct., 1919.

The Imperial was acquired early in 1918, after being operated by the A. S. & R. Co. under lease from the trustee in bankruptcy of the Imperial Copper Co.

Production: 1918, 120, 320 tons ore, 2.8% copper,; 1917, 123,729 tons ore, 3.0% copper; 1916, 73,729 tons ore, 3.0% copper. For full description of property, see Vol. XIII of this book.

The Douglas mine was acquired in 1917. It contains 60,000 tons of ore, low in copper, but high in sulphur. Concentrate is sent to Perth Amboy, N. J.

The Revenue, near Ouray, Colorado, held under option, was abandoned in November, 1919. It has yielded $16,000,000 in silver and lead.

The Mexican mines owned or controlled by the company can produce 2,500,000 tons of ore per annum. In August, 1919, they were operating at 80% capacity.

Mexican Properties of the A. S. & R. Co.

State	Unit	Mine
Chihuahua	Sta. Eulalia (W. J. Deavitt, supt.)	Mina Vieja, Sin Nombre, Velardena, San Antonio, Santo Domingo.
	Magistral	Orizaba, La Union, etc.
	Calera	Prieta and Buena Vista.
	Dolores (E. E. Reyer, supt.,)	Jibosa.
	Cordero	La Luz and Parcionera.
	Parral	Guadalupe.
	Sta. Barbara (W. P. Schumacher, supt.)	Tecolotes and Montezuma, San Diego and Alfarena.
	Veta Grande	Veta Grande, Veta Colorado, etc.

Mexican Properties of the A. S. & R. Co.—*Continued*

State	Unit	Mine
Coahuila	Sierra Mojada (W. B. Gates, supt.)	San Jose, Trinidad, Volcan Dolores.
Durango	Velardena (R. E. Adams, supt.)	San Lorenzo, Sta. Maria, Copper Queen, Sta. Juana.
Aguascalientes	Asientos	Sta. Francisca.
Michoacan	Anganaueo (A. W. Edelen, supt.)	San Cristobal, Carmen, etc.
San Luis Potosi	Charcas (S. F. Shaw, supt.)	Tiro General.
	Matehuala	Dolores.
Zacatecas	Bonanza	Bonanza.

American Smelters Securities Co.'s properties are all included in the above; the same applies to the National Metallurgical Co., the Tacoma Smelter, the Baltimore Copper S. & R. Co., the Selby Smelting Works, the Federal Lead Co., and the Garfield Smelting Co.

The Federal Smelter is supplied with ores principally from the company's mining operations in southeast Missouri. At present the output of ore is, roughly speaking, 1,500,000 tons per annum, which is concentrated into approximately 75,000 tons of concentrates, containing about 60,000 tons of lead. About $750,000 has been spent in enlarging the milling and smelting works, and extending the development of mines of the company in Missouri. The production of pig lead has been increased from 42,000 tons at the beginning of 1916 to 66,000 tons per annum.

The installation of an electrolytic zinc plant at the Murray, Utah, smelter, and construction of a 200-ton sulphuric acid plant, using the chamber process, at Garfield, Utah, show that the company is still in the fore in its metallurgical practice.

None of the Mexican smelters were operated during 1916. In the first half of 1917, the Aguascalientes, Matehuala, and Monterrey plants were started, continuing through 1918. Four of the five were in blast early in 1919, and were sufficient to smelt the product of the mines listed above, excepting copper ores at Chihuahua. By August, 1919, all smelters were in blast.

The company, during 1916, entered the mining and smelting business in Chile and bought the Caldera smelter including many mines—imperfectly developed—and the stock of the Carrizal smelter.

The tin plant has a capacity of 18,000 tons of pig tin per annum.

The American Smelting & Refining Co. is the largest general smelting and metallurgical enterprise in the world. The company will continue to expand and prosper because of its superior metallurgical and business ability, backed by large and modern works and adequate capital.

In 1917 the company suffered from the entire lack of economic law, as the value of its metal products were fixed by the Government, while the cost of labor and supplies mounted high, the latter from 50 to 150% above normal. In 1918, the company obtained no direct advantage from the increased value of the metals, and, on account of the complexities of the ore and metal markets, a conservative program had to be maintained, so that dividends were not increased beyond 6%. The high costs of smelting and refining have been discouraging, but these items have lately been lowered; and although pre-war costs may never be realized again, the directors expect that pre-war profits per ton of ore smelted will be obtained as soon as normal business is resumed.

The company is keen on safety and welfare work among employees. The accident rate for 1918 was 28% less than in 1917.

The company is a dominating factor in the lead business of the United States, handling nearly 50% of the domestic output of primary lead. The company practically makes the price of lead, the St. Joseph Lead Co. being the only other concern that makes an independent price. The company's policy is to make exclusive contracts for the smelting of lead ores. In April, 1918, a bitter dispute over smelting contracts with the Bunker Hill & Sullivan company

was settled out of court, after the B. H. & S. company had erected a smelter at Kellogg, Idaho. The contract between these companies was for a period of 25 years, from 1905, but provided fixed terms for only the first 5 years, covering such of the B. H. & S. output as contained between 30 and 75% lead. The agreement did not require the B. H. & S. to put its ore through a mill, and as the ore from the mine averaged less than 15%, it was possible to contend that none of the ore came within the limits specified. The B. H. & S. actually did concentrate most of its ore, and at times nearly a third of its total output was a concentrate carrying over 75% lead. These, and other points, coupled with competition of the B. H. & S. and A. S. & R. for local ores, treatment rates, etc., lead to final cancellation of the contract.

The A. S. & R. Co. also smelts a great deal of custom copper ores in various States, but many mine-owners protest against its methods of payment, especially when the market is erratic.

American Smelters Securities Co. United States & Mexico.

Office: 120 Broadway, New York.

Inc. March 25, 1905, in New Jersey, and name changed to present title, May, 1905. Cap., $77,000,000, shares $100 par, in $17,000,000 Series A cumulative 6% pfd. stock; outstanding, July 1, 1919, $15,814,000; $30,000,000 series B cum., 5% pfd. stock and $30,000,000 com. stock. Series A has preference as to dividends, and both preference series have equal rights as to assets, both having priority rights to assets and dividends over common stock. A sinking fund, started July 1, 1914, provides for the calling each year of the original $17,000,000 preferred A shares outstanding, and an additional sum equal to 6% of the aggregate amount of the issues previously retired. Financial statement is consolidated with that of the A. S. & R. Co.

Company owns, in fee, mines in different districts in Mexico, and copper and lead smelting and refining plants in the United States. It also owns all or a controlling part of the stock of a large number of subsidiary companies.

AMERICAN ZINC, LEAD & SMELTING CO.

General Offices. 55 Congress St., Boston, Mass. Sales office: 120 Broadway, New York. Operating office: 1012 Pierce Bldg., St. Louis, Mo. Corporate office: 85 Exchange St., Portland, Maine, H. P. Sweetser, clerk.

Officers: C. W. Baker, chairman of directors; W. A. Ogg, pres.; L. A. Coolidge, C. A. Hight, P. E. Coyle, W. F. Rossman, J. N. Houser, and H. A. Wentworth, v. p.'s; F. W. Batchelder, sec-treas.; M. A. Donovan, asst. sec.-treas.; H. L. Smith, comptroller; H. I. Young, mgr. Missouri mines; C. D. Strachan, supt. Tennessee mines; A. W. Dodd, mgr. of sales.

Directors: term expires 1919, L. A. Coolidge, B. P. Bole, C. A. Hight, F. H. Goff, and H. S. Kimball. Term expires 1920—E. P. Brown, E. A. Clark, G. L. Stone, and W. A. Ogg. Term expires 1921—C. W. Baker, W. H. Coolidge, J. N. Lovell, F. W. Batchelder, and C. D. Spalding. Transfer agents: the company, at 55 Congress St., Boston, Mass., and Guaranty Trust Co., New York. Registrars: First National Bank, Boston, Mass., and Bankers Trust Co., New York.

Inc. Jan. 26, 1899, in Maine. **Cap.** $500,000; $25 par; increased on April 22, 1889, to $2,500,000; on October 16, 1906, decreased to $1,250,000; on December 18, 1906, increased to $3,750,000; on April 10, 1912, increased to $7,500,000; outstanding December 31, 1915, $4,828,000. At the annual meeting in April, 1916, the authorized capital stock consisting of $7,500,000, divided into 300,000 shares of the par value of $25, was classified as follows: 100,000 of the authorized shares unissued and in the treasury at that date were classified as pfd. stock, and the remaining 200,000 shares were classified as common stock, so that the present authorized capital consists of 100,000 shares of pfd. stock and 200,000 shares of common stock, of which 96,560 and 193,120, respectively are outstanding. Stock is listed on Boston and New York Stock Exchanges. Annual meeting, second Wednesday in April.

Earnings

	1918	1917	1916
Price of spelter, cents	7.89	8.73	12.63
Net profits from operations—			
Sale of zinc and lead ores and metals, oxide, acid, and royalties	$857,193	$1,694,551	$9,161,211
Miscellaneous profit	54,223	85,613	146,757
	.....	$1,780,164	.....
Deduct settlement with Minerals Separation	.....	250,000	.....
Total profits	$911,416	$1,530,164	$9,307,968
Surplus at end of previous year	4,546,943	4,792,906	5,855,641
Total	$5,458,359	$6,323,070	$15,163,609
Less dividends on:			
Preferred shares	482,637	483,237	2,670,649
Common shares	.....	386,240	.....
Applied on Granby purchase	.....	.....	3,282,644
Paid to Granby Company	.....	.....	2,300,000
Depletion and deprec. reserves	554,000	859,094	2,006,000
Surplus at end of year	$4,421,722	$4,594,497	$4,904,316

Consolidated balance sheet:

Assets

Year	Property	Investments	Advances to Subsidiaries	Current	Deferred Charges	Sinking Fund	Total
1918	$11,552,060	$2,206,393	$.....	$5,112,156	$ 159,798	$ 27.350	$19,057,757
1917	11,993,732	2,477,896	.....	5,748,092	141,660	.....	20,361,380
1916	12,310,404	1,679,569	300,000	6,230,781	71,087	.....	20,591,841

Liabilities

Year	Cap. Stock	Bonds	Reserve Funds	Current	Net Surplus	Total
1918	$7,242,000	$1,782,500	$4,889,038	$ 722,507	$4,421,721	$19,057,757
1917	7,242,000	1,900,000	5,203,413	1,421,469	4,594,497	20,361,380
1916	7,242,000	2,000,000	4,603,864	1,841,661	4,904,316	20,591,841

Dividends: $2 in 1899, $1 in 1900, $1.25 in 1907, $1.50 in 1910, $2 in 1911 and 1912, and $1 in 1913. In June, 1916, a stock dividend was declared, each share of com. stock issued received one-half share of pfd. stock, equivalent at par to $12.50. In 1917 the com. shares received $2. The pfd. stock is entitled to cumulative dividends of $6 per annum. In the event of any liquidation or dissolution of the company, holders of the pfd. stock are entitled to be paid $100 per share and accrued dividends. During 1916, $3 per share was paid on the pfd., $6 in 1917, $6 in 1918, $4.50 in 1919; and $1 in 1920, on Feb. 2.

The A. Z. L. & S. Co. is an operating and holding company, owning the following: American Zinc Co. of Tenn., American Zinc Co. of Ill., American Ballast Co., American Zinc Ore Separating Co., and 649,774 shares of 925,000 shares issued of the Wisconsin Zinc Co. These Companies are listed under their own title but are described below.

For the first quarter of 1919 the company made a loss of $651, against a profit of $18,278 in the last period of 1918, while the second quarter resulted in a loss of $13,950. The third quarter showed a loss of $6,300, which was converted into a profit of $367,568 by the sale of Carson Hill stock.

The American Pipeline Co., another subsidiary, was sold in 1917 with its lands, wells, pipelines, etc., to the Cities Service Co. of Kansas, for $870,000 of its 6% cum. pfd. stock.

In 1916 company purchased all the assets of the Granby Mining & Smelting Co., consisting of about 30,000 acres of mineral lands in the Joplin district, Missouri, 10,000 acres of coal lands in Illinois, a zinc smelter at East St. Louis, Ill., a zinc smelter at Neodesha, Kan., and a lead smelter at Granby, Mo. All of the above are described below.

In August, 1919, company sold at a profit of $430,000 the 28,000 shares of Carson Hill Gold Mining Co. it held, having received this as a bonus for the loan of $600,000 made to the Carson Hill for its development. The latter paid off the loan in October.

Property: in the Joplin district, Mo., the company owns 32,160 acres of mineral land. The principal operations are at the Davey mines on the 655-acre Davey property, the Vogey mine on a 40-acre tract in the Porto Rico district, the Klondike, Mascot, and Golden Rule mines near Granby, Mo., a 600-ton custom mill near Granby, Mo., and the B. & H. mine near Joplin. There are 4 mines in the Davey group, 2 worked out and 2 producing.

The company had 3 smelters in the gas belt at Caney, Dearing, and Neodesha, Kan., but on account of exhaustion of the gas supply, the last two mentioned were dismantled during 1918. At Caney there are 6,080, at Dearing there were 4,480, and at Neodesha, 3,760 retorts; combined yearly capacity was 150,000 tons of concentrates. The company also leases from the Owen Zinc Co. at Caney, Kan., two blocks of furnaces, and in 1916 added one furnace block, making a total of 1920 retorts. The life of these smelters depends upon the fuel-supply of natural gas, now obtained from the Oklahoma-Kansas field.

The company owns a lead smelter with a yearly capacity of 10,000 tons of ore at Granby, Mo.

American Zinc Co. of Tennessee

O. C. Burrell, mgr., Mascot, Tenn.

Inc. Feb. 24, 1911, in Maine. **Cap.** $10,000; $1 par, all owned and issued by A. Z. L. & S. Co.

Principal mining operations of the Tennessee Co. are at Mascot, Knox county, where the company owns 2,400 acres, and in Jefferson county, adjoining Knox on the east, where company owns 400 acres of land.

Orebodies of the Mascot mines occur in the Knox dolomite, dip 15° to 30° south and strike north of east, in lenses of varying sizes and in well-defined brecciated areas which lie in certain recognized zones or bedding planes. The ore is a light colored sphalerite. The zinc formation may be followed for many miles from Knoxville, in an easterly direction. In 1910 the company obtained an option on the Holston property, started drilling and proved up a large tonnage of pay ore. A 3-compartment shaft, mine No. 1, was sunk in 1911 and the orebody developed in 1912. The main orebody is developed on the 280′ level, and, as exposed, is 1,300′ long, 700′ to 880′ wide, and 30′ to 40′ thick. Limits of the orebody have not been reached. In 1913, a 4-compartment shaft, mine No. 2, was sunk 2,000′ east of No. 1, and a second orebody developed with length of 1,500′, thickness of 40′ to 125′, width of 300′ and limits not yet reached. Average grade of ore as shown by drill records is 5% to 5½% zinc. Greatest depth of workings, 800′, is at mine No. 2. A tramway connects No. 2 mine with No. 1 mill. Development has shown the ore to be continuous between No. 1 and No. 2 orebodies. Further drilling 3,000′ east of eastern limits of mine No. 2 has indicated a third orebody; this will not be developed until some future time.

Mining methods at the Mascot mines are described by H. A. Coy and H. B. Henegar in the Sept., 1917, Bulletin of American Institute of Mining Engineers. Costs totaled 70c per ton.

From the east to west the ore development as now shown is 7,900′ in length. There has been blocked out 4,000,000 to 5,000,000 tons of ore, which will average 4% zinc.

In May, 1913, mill No. 1, with 1,000 tons daily capacity, was completed. Additions to this mill were finished in July, 1915, bringing its daily capacity up to 2,200 tons. It is now treating over 2,400 tons daily. On the Roseberry property adjoining the Holston on the west, Mascot No. 3 mill has been completed having a daily capacity of 700 tons. Mill equipment at Mascot consists of crushers, rolls, jigs and tables, followed by flotation treatment of slime and fine sand. Mascot No. 1 mill was enlarged by addition of 55 tables, jigs, etc.

Power is obtained from the Tennessee Power Co.

Mascot concentrates average about 60% zinc and are of high quality, in fact,

the lowest lead and iron of any produced in quantity in the U. S., the spelter produced therefrom commands a substantial premium per pound over Prime Western quotations.

The company has developed the town of Mascot, owning 350 houses, a company store, and hotel.

Mossy Creek mine at Jefferson City was opened during 1916, and ore is being shipped to Mascot No. 1 mill for treatment.

A modern plant was built near No. 1 mill during 1916 to prepare agricultural limestone, asphalt-filler and fertilizer, from tailings from the Mascot concentrating mills.

Wisconsin Zinc Co.

A. M. Plumb, mgr., Platteville, Wis.

Inc. June 27, 1908, in Maine. **Cap.**, $1,000,000; $1 par, issued 925,000 shares, owned by A. Z. L. & S. Co., 649,774 shares.

Property: in S. W. part of the State. The ore deposits exist in the forms of flats and pitches, the flats being horizontal deposits along the bedding planes of the rocks, while the pitches are dipping crevices. The chief deposits lie in the lower part of the Galena limestone at a depth of 100′ to 200′ and vary in length from 1,000′ to 5,000′, in width from 30′ to 300′, and in height from 12′ to 60′. The ores consist of the sulphides of zinc, lead and iron, the latter in the form of marcasite.

The principal operations in the Wisconsin field are as follows:

Champion property, 434 acres, on which there has been developed an orebody 1,500′ long, 800′ wide, and 40′ high. A mill of 500 tons daily capacity is in operation.

Winskell mine, operated on leased land, 10% of gross output going to the land owners. A mill of 450 tons daily capacity is in operation. Total production to end of 1914 was 31,089 tons zinc concentrates, averaging 36.51% zinc, and 1,073 tons lead concentrates, averaging 76.28% lead.

The life of the Champion property, with its surrounding leases, as estimated at present, is from 5 to 10 years.

Longhorn property, operated on leased land at 10% royalty, has ore reserves of 175,000 tons high grade ore. The 350-ton mill is in operation.

The Thompson mine, operated on leased land at 10% royalty, has ore reserves of 200,000 tons high grade ore; equipped with 350-ton mill.

Company owns a number of other leases in the district on which valuable ore reserves have been proved by drilling. The Copeland property will be developed by shaft and equipped with mill in the near future.

The life of the Champion property, with its surrounding leases, as estimated at present, is from 5 to 10 years.

The policy of the company is to maintain a drilling campaign for new orebodies, with the purpose of keeping 5 to 10 years' production in sight.

The low grade of concentrates in the Wisconsin district necessitates treatment by means of part roast and magnetic separation. The company has a plant for this purpose, equipped with a 7-hearth roaster of the Skinner type near the Champion property. This plant has 200 tons daily capacity, producing a finished concentrate assaying 58 to 60% zinc.

American Zinc Co. of Illinois.

Inc. Aug. 15, 1911, in Maine. **Cap.** $10,000; $1 par, all issued and owned by the Am. Z. L. & Sm. Co.

Property: at Hillsboro, Ill., consists of 600 acres, on which has been built a modern smelter plant of 4,800 retorts furnace capacity, capable of distilling 48,000 tons of concentrates per year; 3 Hegeler muffle-kilns, pottery, machine-shop, warehouse, ore storage bins and sulphuric acid plant producing 45,000 tons of 60° acid annually; also a zinc-oxide plant of 24 furnaces, enlarged during 1918.

East St. Louis property consists of 143 acres, on which is a modern smelter plant of 5,600 retorts capacity, capable of treating 54,000 tons of concentrates

annually; Hegeler and De Spirlet roasting kiln, pottery, sulphuric acid plant, oxide plant of 8 furnaces, with auxiliary buildings. Sulphuric acid plant produced 50,000 tons 60° sulphuric acid annually, but was enlarged in 1918.

American Zinc Ore Separating Co.

Inc. Oct. 13, 1908, in Maine. **Cap.** $25,000; $5 par; all issued and owned by A. Z. L. & S. Co. This company owns certain patents for the separating of zinc ores by the Huff electrostatic methods. Its business is to lease machines constructed under these patents on a royalty basis.

American Ballast Co.

Mascot, Tenn. **Inc.** Nov. 9, 1911. **Cap.** $2,000; $1 par; 5 shares issued and owned by A. Z. & L. S. Co. The company disposes of mill tailings of the Mascot mill of the American Zinc Co. of Tenn. Table and flotation tailings are sold for fertilizing purposes; other tailings are sold for railroad ballast, road construction, etc.

Granby Mining & Smelting Co. of Missouri

Granby, Newton Co., Mo. **Inc.** in 1864. In June, 1916, net quick assets exceeded $2,750,000, of which nearly $1,000,000 was in cash; current liabilities, less than $300,000. Reported in June that company had declared a dividend of $2,000,000 in the form of 10-year, 5% bonds, secured by mortgage of its real estate, and the company subject to this mortgage, had been taken over by the Granby Co. of Maine, to be then taken over by the American Zinc, Lead & Smelting Co. Purchase price, $8,000,000. The $2,000,000 bond issue has been taken as part payment; and it is proposed to furnish $2,000,000 additional by an issue of 40,000 shares of common stock of the A. Z. L. & S. Co., to be offered stockholders at $50, stock to be underwritten without commission; remaining $4,000,000 to be paid for out of earnings. Value and earning capacities of properties based on a 5-ct. spelter market.

Property: owns in fee simple about 30,000 acres of land in the zinc district of southwestern Missouri. For nearly 50 years its revenue has come from royalties paid by lessees operating on these lands. It has developed a large tonnage of rich ore near Granby. Company has been a dividend payer almost from its inception, and has, out of earnings, acquired 10,000 acres of coal land in Illinois; built a new coal zinc smelter and sulphuric acid plant in East St. Louis; bought and improved a gas zinc smelter at Neodesha, Kansas, and acquired a small lead smelter at Granby. All the sulphuric acid output has been sold up to and through 1920.

The ore, sulphides of lead and zinc, occurs in bands between the barren zones of flint that comprise the Grand Falls chert. It is from this formation that the term 'sheet-ground mines' is derived, and in it the ore is generally uniform in character and covers large areas. In the Davey mines, 124 acres have been mined out in one continuous chamber. Ore faces are from 14 to 20′ in height.

Development is by means of 6 vertical 2-compartment shafts, all in the ore formation. Two shafts are used for mining purposes, and 4 for ventilation. The ore level is at 250′ depth. The ore is very low grade, zinc concentrates recovered representing 1.79% and the lead concentrates 0.67% of ore treated. Ore output has been approximately 50,000 tons ore per acre, from 15 to 20% ore being left as pillars. Reserves are about 1,500,000 tons. Timbering is not necessary. The blanket formation permits of development, in wide areas, average yearly advance on all faces in the mine is 125′.

There are two mills on the property, No. 3 mill of 1,200 tons, and No. 4 of 1,000 tons daily capacity.

The Vogey mine is similar to the Davey. Operations have been irregular, depending on price of zinc and lead concentrates. Zinc concentrates recovered represent 1.76% and lead concentrates 0.20% of rock hoisted. There is a mill on the property, with daily capacity of 1,000 tons.

The Klondike, Mascot, and Golden Rule mines are in sheet-ground formation. Recovery in zinc concentrates represents from 2 to 4% of rock hoisted. The Klondike is developed by 3 shafts and equipped with a 1,000-ton mill; the

Mascot, by 3 shafts, and a 350-ton mill; the Golden Rule by 1 shaft and a 300-ton mill; the B. & H. mine, near Joplin, by 1 shaft and a 250-ton mill. All mills are operated by electric power, with the exception of the B. & H., which has a steam plant.

There are also many mines being operated under lease on a royalty basis on the company's lands in the Granby district. An extensive drilling campaign is being carried on to determine values and possibilities on these holdings.

Operations of the smelting properties purchased from Granby M. & S. met expectations during 1919, but production and ore developments were not satisfactory.

COPPER EXPORT ASSOCIATION **U. S. A.**

Office: 60 Broadway, New York City.

Officers: Simon Guggenheim, chairman of the board; John D. Ryan, pres.; Walter Douglas, 1st v. p.; R. L. Agassiz, 2nd v. p.; C. W. Welch, sec-treas.

Directors: Murry Guggenheim, Simon Guggenheim and F. H. Brownell for A. S. & R. Co.; John D. Ryan, Cornelius F. Kelley and Benj. B. Thayer for Anaconda Copper Mng. Co. and Inspiration Cons. Copper Co.; Chas. Hayden, Chas. M. MacNeill and D. C. Jackling for Utah Copper Co., Nevada Cons. Copper Co., Ray Cons. Copper Co. and Chino Copper Co.; Walter Douglas and Jas. McLean for Phelps Dodge Corporation; R. L. Agassiz and Jas. MacNaughton for Calumet and Hecla Mng. Co.; Stephen Birch, for Kennecott Copper Corporation; Wm. A. Clark for United Verde Copper Co.; Archibald Douglas for United Verde Extension Copper Co.; Gordon R. Campbell for Calumet & Arizona Mng. Co.

Selling Committee: Jos. Clendenin, A. S. & R.; T. Wolfson, U. Metals Selling Co.; C. A. Austin, Phelps Dodge Corpn.; F. S. Gourley, Calumet & Hecla Mng. Co., H. M. Brush, secretary; Edward Mosehauer, representative in Germany.

Inc. December, 1918, in Delaware. **Cap.** 2,500 shares, 7 per cent Pfd., par $100, also 500 shares common, no par value. Annual meeting May 13th.

The object of this corporation is to handle export sales of copper on a basis whereby orders for export copper will be allocated to members according to production and at the same price f. o. b. seaboard. All producers of copper, large or small, are invited to join on the same terms. It is stated over 80% of the U. S. production, amounting to 1,800,000,000 lb. copper during 1918, is represented by membership in this corporation.

The members own the indicated percentage in the plants named.

ANACONDA COPPER MINING CO.

Smelters:

100% Tooele smelter, International, Utah (Intern. S. & R. Co.)
100% Miami, Arizona (Intern. S. & R. Co.)
100% Washoe smelter, Anaconda, Mont.
100% Anaconda smelter, Great Falls, Mont.

Refineries:

100% Great Falls, Mont.
100% Raritan Copper Works, Perth Amboy, N. J.

Metal Selling Agencies.

100% United Metals Selling Co.

Copper Mining Companies:

100% large holdings at Butte, Mont.
4 1-3% Inspiration Copper Co. (50,900 shares).
100% Andes Copper Mng. Co., Chile.
80% Santiago Mining Co., Chile.

AMERICAN SMELTING & REFINING CO.

Smelters:

100% American Smelters Securities Co.
100% Hayden, Ariz.
100% Perth Amboy, Maurier, N. J.
100% Cons. Kansas City S. & R. Co., El Paso, Tex.
100% Garfield Sm. Co., Garfield, Utah.

100% Sasco Plant, Silverbell, Ariz.
100% Tacoma Smelting Co., Tacoma, Wash.
100% Velardena M. & S. Co., Velardena, Dgo, Mexico.
100% National Metallurgical Co., Matehuala, Mexico.
100% Aguascalientes, Mexico.
100% Caldera, Chile.
95% Soc. de Minas & Fundiciones de Carrizal, Chile.

Refineries:
Omaha, Neb.
Perth Amboy, N. J.
Selby, Calif.
Baltimore, Md.
Tacoma, Wash.

Copper Mining:
100% Velardena M. & S. Co., Velardena, Dgo. Mexico.
100% Caldera, Chile.
Chile Copper Co., Chile.
Kennecott Copper Co., Alaska (30% given A. S. & R. stockholders).
77% Neg. Minera de Jesis Maria, Mexico.
95% Soc. de Mines y Fundiciones, Carrizal, Chile.

INSPIRATION CONSOLIDATED COPPER CO.
100% Mines at Miami, Arizona.

GREENE CANANEA COPPER CO.
Smelter:
100% Cananea, Sonora, Mexico.
Copper Mining:
100% Greene Cananea (30,748 acres) Cananea, Mexico.

RAY CONSOLIDATED COPPER CO.
No interest in other companies. Ore purchased and smelted by A. S. & R. Co., at Hayden smelter.

CHINO COPPER CO.
No interest in other companies.

NEVADA CONSOLIDATED COPPER CO.
Smelter:
100% Steptoe smelter, McGill, Nevada.

UTAH COPPER CO.
Copper Mining:
100% Utah Copper.
50% Nevada Con. Copper Co.

PHELPS DODGE CORPORATION.
Smelters:
100% Copper Queen smelter, Douglas, Arizona, smelter at Morenci, Arizona.
Selling Agents:
for the various Phelps Dodge companies and smelters.
Copper Mining.
Large holdings at Bisbee, Morenci, Tombstone, Copper Basin, Arizona; Burro Mountain, N. M.; Moctezuma Copper Co., Mexico.
Directors personally control and own large holdings in Old Dominion Co.

CALUMET & HECLA MINING CO.
Smelters:
Torch Lake, Centennial Copper Co.
Refinery:
Torch Lake, Centennial Copper Co.
Copper Mining:
100% Tamarack Mining Co.
100% Laurium Mining Co.
50% Ahmeek Mining Co.
41% Allouez Mining Co.

36% Centennial Copper Mng. Co.
48% Cliff Mining Co.
50% Gratiot Mining Co.
22% Isle Royale Copper Co.
50% La Salle Copper Co.
35% Osceola Cons. Mining Co.
42% White Pine Copper Co. (common).
55% White Pine Copper Co. (preferred).

KENNECOTT COPPER CORPORATION

Copper Mining:

99% Braden Copper Co., Chile.
38% Utah Copper Co.
Alaska Dev. & Mng. Co.

A. LEWISOHN & SON: GENERAL DEVELOPMENT CO.

Copper Mining:

25% Miami Copper Co.
Controls: New Cornelia Copper Co., Ariz.; San Cayetano Mines, Ltd., Mex.; Naumkeag Copper Co., Mich.; New Planet Copper Co., Ariz.; Bagdad Copper Co., Ariz.; Tennessee Copper Co. and others.

UNITED VERDE COPPER CO.

Smelter:

Clarkdale, Ariz.

Refinery:

Clarkdale, Ariz. (converter plant).

Copper Mining:

Hull Copper Co.

UNITED VERDE EXTENSION MINING CO.

(Closely connected through stockholders with Phelps Dodge Corp'n.)

Smelter.

Verde, Ariz.

Refinery:

Verde, Arizona (converter plant).

Copper Mining:

Interest in other companies $1,614,837 (December, 1918).

U. S. SMELTING, REFINING & MINING CO.

Smelter:

100% U. S. Smelting Co., owning copper smelters at Midvale, Utah; Kennett, Calif.; Chrome, N. J.

Refinery:

At Chrome, N. J.

Copper Mining:

Minority interest in several small producers.

CALUMET & ARIZONA MINING CO.

Smelter:

100% at Douglas, Ariz.

Copper Mining:

Mines at Bisbee, Ariz.
76½% New Cornelia Copper Co.
70% Gadsden Copper Co., Jerome, Arizona (under option).

UNITED METALS SELLING CO.

Selling Agents:

Anaconda Copper Mining Co. and allied interests.

TENNESSEE COPPER CO.

Smelter.

Ducktown, Tenn. Treats own and custom ore.

Sales Agents:

Represented by A. S. & R. Co.

ARIZONA COPPER CO., LTD.

Owns and operates its own mines and smelter in Clifton-Morenci district, Arizona.

CONSOLIDATED COPPERMINES CO.

Owns and operates mines and smelter under own name near Ely, Nevada.

Copper Mining:

Controls 79% Butte & Ely Copper Co.

INTERNATIONAL SMELTING CO.

Owned by Anaconda Copper Mng. Co., which see.

NEW CORNELIA COPPER CO.

Subsidiary of Calumet & Arizona Mng. Co.

Refinery:

Electrolytic refinery, Ajo, Ariz.

NORTH BUTTE MINING CO.

Owns and operates own mines at Butte, Mont.

GENERAL DEVELOPMENT CO.

Office. 61 Broadway, New York.

Officers: Adolph Lewisohn, pres.; J. Parke Channing, v. p.-cons. engr.; Theo. L. Herrmann, sec.; Sam A. Lewisohn, treas.; preceding officers, Samuel Untermeyer, Herman Sielcken, D. M. Hyman, W. T. Rosen, A. S. Rossin, J. H. Susmann, E. H. Westlake, Arthur Lehman, B. Hochschild, F. W. Estabrook and S. S. Rosenstamm, directors.

Inc. 1906, in Delaware. **Cap.** $2,000,000, increased to $2,500,000, increased 1909 to $2,600,000, and again increased, 1913, to $3,000,000; $25 par, 120,000 issued. Equitable Trust Co. of New York, registrar. Dividends paid 1908, 1½%, 90% in 1909, 15% in 1910; 1½% in 1913; 6% in 1915; 23% in 1916; 28% in 1917, and 11% in 1918.

Company is a securities holding corporation, which owns nearly one share of Miami stock for each issued share of its own, and also owns a large block of dividend paying Kerr Lake stock, and of New Cornelia Copper. It also controls, through stock ownership the Colorado Gold Dredging Co., San Cayetano Mines, Ltd., and Naumkeag Copper Co. The increase of capitalization, 1913, was to finance the merger of the Silver Mines Exploration Co., the corporation which developed and promoted the Kerr Lake and Wettlaufer-Lorrain companies of Cobalt, Ont. Company has extensive stock interests in New Planet Copper Co., Bagdad Copper Co., with other mining interests in the United States, Canada, and Mexico.

In 1918, the San Cayetano Mines in Mexico, required $10,000 for payment of taxes and protection while General Development Co. was a creditor to the amount of $67,000, but as subscriptions to the fund of $10,000 were so small the property became subject to sale by the Mexican authorities.

The General Development Co. is a parent corporation examining, developing and financing mining properties which, when they have reached the self-supporting producing stage, are turned over to operating companies. It is a powerful factor in the copper industry, and with the wide experience and astute guidance of Adolph Lewisohn, combined with the technical skill and great ability of J. Parke Channing, its consulting engineer, promises to become increasingly important.

GOLD FIELDS AMERICAN DEVELOPMENT CO., LTD.

Offices: 233 Broadway, New York, and 8 Old Jewry, London, E. C., England.

Officers: S. Christopherson, chairman; E. S. Birkenruth, Lord Brabourne, Lord Harris, J. C. Prinsep, and H. L. Sapte, directors. Advisory committee in America: J. McDougall, Alfred de Ropp, and H. H. Webb.

Inc. March 10, 1911, in England. **Cap.** £2,500,000; £1 par; 2,000,000 issued, 1,000,000 being fully paid and 1,000,000 with 10s. called. Reports are only issued to shareholders.

Dividends: 5% paid in June, 1918.

Company acquired from Consolidated Gold Fields of South Africa, Ltd. (which see) latter's interests in America, including shares in Natomas Consolidated, Oroville Dredging, Sierra Pacific Electric, Mississippi River

Power Co., Yuba Consolidated Gold Fields, Granville Mining, Vera Cruz Mexican Oil, Trans-continental Consolidated Oil, International Petroleum Co., Foreign Mines Development, La Grange Mining, American Trona Corp., and others. The mining companies named herein will be found described under their respective titles, excepting the last named, which is essentially a chemical producer, extracting potash, borax, and other salts from the brine of Searles Lake, California. A large sum of money has been spent there in erection of extensive equipment. Reserves are enormous; at least 4,000,000 tons of potash remains. The output in 1918 was 24,00 tons of salts.

GUGGENHEIM EXPLORATION CO.

Dissolution completed in 1916. See previous volumes for past operations, also American Smelting & Refining Co., Braden Copper Co., Chile Copper Corporation, and Kennecott Copper Corporation.

INTERNATIONAL AGRICULTURAL CORPORATION

Office: 61 Broadway, New York City.

Officers: S. B. Fleming, pres.; Albert French, v. p.; J. J. Watson, Jr., v. p.-treas.; F. F. Ward, v. p.-asst. sec.; J. R. Floyd, sec.-asst. treas.; with F. P.Garvan, E. B. Sweezy, T. W. Lamont, W. Schmidtmann, D. E. Pomeroy, F. M. Weld, and A. H. Wiggin, directors.

Inc. June 14, 1909, in New York. **Cap.** authorized 7% cumulative preferred $18,000,000 and $18,000,000 common. Issued $13,055,500 pfd., $7,260,600 com., and $10,275,600 in bonds.

Results have been as follows, years ending June 30:

Year	Gross profit	Operating profit	Net profit	Surplus for year	Current assets	Current liabilities
1918.....	$4,504,583	$2,595,723	$1,944,933	$1,168,270	$10.336,947	$4,961,641
1917.....	2,851,408	1,894,003	.....	636,812	7,075,523	3,845,338
1916.....	2,793,898	2,051,303	1,034,054	1,279,832	5,201,549	1,863,274

Dividends: Pfd. shares received 7% per annum until January, 1913, but none since, and none on common shares.

Company has 15 large acidulating and fertilizer plants, mostly in the South, a large number of distributing plants, and holds 50% interest in some German potash mines.

Property: 42,226 acres of phosphate lands in Florida; also extensive areas in Tennessee. In 17,000 acres explored, reserves are estimated at 41,500,000 tons. In all properties there is supposed to be nearly 100,000,000 tons. To make this rock soluble, sulphuric acid, bought from the Tennessee Copper Co., and Ducktown Copper, Sulphur & Iron Co., is mixed with it. A contract with the former, until December 31, 1920, calls for 175,000 tons of acid a year at $4.81 per ton, also any excess at that price. During 1918, an arrangement called for 225,000 tons at $4.81, all above that to be paid up to $10 per ton.

The company is included herein, because it is carrying on extensive mining operations, and has important relations with large mining companies.

INTERNATIONAL METALS SELLING CO.

Subsidiary of the U. S. Smelting, Refining & Mining Co. and was managed by Vogelstein & Co., 42 Broadway, New York, which was absorbed in Dec., 1919, by the American Metal Co., Ltd.

INTERNATIONAL SMELTING CO.

Office: 42 Broadway, New York.

Officers: Cornelius F. Kelley, pres.; Wm. D. Thornton, 1st v. p.; L. D. Ricketts, 2nd v. p.; Albert H. Melin, treas.; with C. E. Mills, Benj. B. Thayer, and John D. Ryan, directors. David B. Hennessy, sec. J. B. Whitehill, ore purchasing agent.

Inc. in Montana. Cap. $15,000,000. Stock entirely owned by Anaconda Copper Mining Co. Company is a reorganization of the International Sm. & Ref. Co.

Company operates smelters at Tooele, Utah, and Miami, Ariz., the

Raritan Copper Works at Perth Amboy, N. J., and the smelter of the International Lead Refining Co., at East Chicago, Ind.

Miami Smelter

The Miami smelting plant, Miami, Ariz., C. E. Mills, gen. mgr.; L. R. Wallace, supt., built primarily to smelt the concentrates produced by the mills of the Inspiration Cons. Copper Co. and the Miami Copper Co., is equipped to handle custom ores. The plant is situated about a mile E. of Miami and 6 miles W. of Globe, on the Inspiration Co.'s industrial railway connecting with the Arizona Eastern R. R. at Miami.

The smelter is essentially a reverberatory plant, which on account of the high copper content of the concentrates treated has been built to minimize losses in the handling of material from one department to another, and the prevention of dust losses, as far as possible.

Material from both Miami and Inspiration mills is largely flotation concentrate hauled to the smelting plant in 60-ton steel cars especially designed to handle sticky, fine material of this nature.

Bins: concentrates are first bedded in three 3,000-ton V-bottom bins with the necessary limestone, pyrite, first-class ore and secondaries to give a proper smelting mixture. First-class ores go to receiving bins with capacity of 1,350 tons.

Crushing and Sampling Plant: 22'x40', 5-stories high, contains: 18"x30" Blake crusher; 1 set 54"x16" rolls; 3 sets 42"x16" rolls; 16" Snyder sampler; three 27" Snyder samplers; two 24"x8" rolls.

Steel storage bins of 1,500 tons capacity are provided for the storage of crushed ore and fluxing material.

Roaster and Dryer Plant: 67'x97' and 93' high, contains 5 Wedge roasting furnaces, 22'6" in diam., each having 5 regular hearths and a dryer hearth. Oil burners operating in combustion chambers supply the heat for drying. No roasting is permitted, as the sulphur content of the concentrates is so low that it is necessary to add pyrite to keep matte down to a proper grade.

Each furnace is fed from 190-ton storage bin directly over it. The gases pass directly to a header flue, and then into Cottrell treaters located above the charge floor. The Cottrell treaters in this plant practically prevent the loss of any flue dust.

Reverberatory Plant: the reverberatory building, 134'x176', contains 3 reverberatory furnaces with hearth areas of 21'x120'. The furnaces are oil fired and discharge their gases through Stirling boilers, according to the usual practice. There are seven 712-h. p. waste heat Stirling boilers.

Converter Plant: is 58'x380'x49' to the top of crane rail. Two 40-ton magnet switch controlled electric traveling cranes are provided.

The plant contains 5 converter stands of 12' electrically operated Great Falls type converters; 2 straight line casting machines with 5'6"x16'6" tilting furnaces, 1 skullbreaker, etc. Silica bins filled by belt conveyors discharge into weighing hoppers, which measure out a pre-determined charge, delivering it directly into the mouth of the converter through pivoted spout.

The gases from the converters are passed through Cottrell treaters, before being discharged into the chimney, which give a high recovery of the precious metal values contained in the gases.

Power Plant: at the smelting works is operated by the Inspiration Co., the smelting plant selling its steam to, and purchasing its power from the Inspiration company. The power plant buildings are of steel and reinforced concrete construction throughout. The main units consist of three 6,000-k. w. turbo-generators and 3 cross-compound, 15,000 cu. ft. blowing engines, switchboard, etc. Modern auxiliary apparatus is provided for condensing, automatically measuring steam and feed water, recording temperatures, pressures, etc. The boiler houses contains six 712-h. p. oil fired Stirling boilers equipped with superheater and economizer.

The plant operates at high efficiency.

Shops, Offices, Etc.: a steel shop building, equipped with traveling crane, is divided into four departments, viz., machine, blacksmith, boiler, electrical and carpenter shops, all well equipped with modern tools.

The warehouse building and general office and laboratory buildings are of reinforced concrete throughout and there are 8 reinforced concrete cottages at the smelting plant for its staff. Water for the plant is obtained from the Inspiration Co.'s water main.

On account of the high copper contents of the concentrates which the plant receives, it has a production capacity of 16,000,000 lbs. of copper per month, with spare reverberatory furnace and converter stand.

Production:

Year	Concentrate tons	Ore tons	Copper lb.	Gold oz.	Silver oz.
1918.....	332,644	45,290	173,043,136	4,256	252,437
1917.....	242,936	26,839	138,762,411	2,954	201,860
1916.....	295,075	37,891	181,518,396	2,882	257,543

Tooele Smelter

Tooele Smelter: Wm. Wraith, gen. mgr., Kearns Blk., Salt Lake City, Utah. The smelter is 6½ miles from Tooele Junction on the main line of the Los Angeles & Salt Lake Railroad, where connection is made with the Tooele Valley railroad, and plants and yards cover one-half square mile.

Crushing and sampling 5-story building, 2 complete sections using the Brunton system of sampling, contains 8 Blake type crushers, 9 to 12"x15" to 24" in size and 8 rolls, 12 to 15" wide and 26", 42", and 48" diameter. Each sampling section contains 4 Brunton sample cutters. In the copper plant ore is crushed to ⅜", conveyed from sample mill to roaster storage bins (5,000 tons capacity) by belt conveyor, thence to roaster feed hoppers by belt conveyor.

Copper Department: The McDougall roaster building contains 2 sections, each 64x162' holding 32 furnaces. These furnaces are 16' in diameter, 18' high and have 6 hearths. Roaster gases pass through a 120x140' hopper bottomed brick dust chamber 30' high above hoppers, containing two 4' banks of wires; thence through brick flue 255' long to stack. The brick stack is 350' high and 25' inside diameter at the top. The reverberatory plant receives the calcine by electric tram system. It contains 5 coal-fired furnaces, Anaconda type, 1 with 19'x90' hearth, 4 with 19'x102' hearths. Each furnace is equipped with 750-h. p. waste-heat Stirling boiler. Gases go through a brick flue 1,360' long to stack.

The converter plant has 5 electric-driven stands for 96x150" shells and a 60-ton crane. Converter shells are lined with magnesite brick. Copper is cast in steel moulds by 30-ton crane. Slag is cast in beds and broken up and sent to the lead blast furnaces. Gases from plant go through a steel flue to a 50x126' brick bag house containing 960 31x1'6" woolen bags. From the bag house the gas is discharged through a 150' stack 15' in diameter at the top.

The power house contains 2 Corliss engines direct-connected to 250-k. w. 500-v.d.c. generators; 2 vertical triple-expansion engines direct-connected to 750-kva. 2,200-v. generators; 2 converter blowing engines, 15 lbs. air; 1 steam-driven 90 lb. air compressor; 1 electric-driven 90 lb. air compressor; 2 No. 10 Roots blowers, direct-connected to tandem compound Corliss engines; one 750-k. w. Westinghouse-Parsons turbo-generator; and 2 Leblanc condensers and necessary auxiliaries. Condensing water is cooled in natural draft cooling tower. In addition to the waste-heat boilers, there are 3 hand-fired 350-h. p. Stirling boilers.

Lead Department: The lead plant contains blast furnaces, sinter plant and charge bins. There are 26 double steel bins with a capacity of 10,000 tons of ore and concentrate, receiving material from the crushing plant by belt conveyor. Fine concentrates and ores already sampled can be

dumped direct. Charges for blast furnaces and sinter machines are weighed in scale hoppers and dropped into charge cars, going direct to furnaces, but sinter charges go by car to a hopper-feeding belt conveyor delivering to sintering machines.

The sinter plant contains 10 Dwight-Lloyd machines, 42x264″, rated capacity 100 tons per day per machine. Sinter from machines goes to blast-furnace charge bins by standard railway cars.

The blast-furnace plant is a steel and concrete building with two 45x180″ and two 60x180″ furnaces whose daily capacity averages 250 tons of charge. Gases pass to brick bag house containing 1,440 bags, lead to drossing plant and the lead-copper matte to the converter plant. A slag settling furnace is being erected. The drossing plant has four 30-ton kettles and uses a Howard press.

Tooele Valley railway has 7 miles of main line; 1 locomotive, 6-wheel switching type, 57 tons weight; 1 locomotive Mogul type, 60½ tons weight; 2 locomotives, Consolidation type, 96 tons; 30 steel hopper-bottom ore cars; 3 flat cars and 4 passenger coaches.

This plant has a fully-equipped assay office and laboratory, shops, weather observation department, emergency hospital, offices, etc.

Industrial equipment consists of four 18-ton and four 12-ton electric locomotives, with necessary slag trucks, matte trucks, calcine and coal cars. All buildings are of steel and concrete construction.

The smelting practice of copper ores largely follows Anaconda methods. The sulphide fines are roasted with a certain amount of silicious ore added upon the fifth hearth of the roasters to heat the ore and keep the temperature at the right point. The ore is roasted down to 0.7% sulphur corresponding to a matte fall of 15 to 18 tons per day. The reverberatory slag, carrying 40 to 42% silica, is tapped at the back of the furnace and the matte, carrying 20 to 30% copper, conveyed in ladles to the converters. The converters, when operated only on day shift, are kept hot over night by filling them with cinders from the reverberatory furnaces. Silica is applied to the converter in lump ore, 2 boats to each 8-ton charge. The bag-house dust from the smelter fumes is removed by reversing the fan and direction of current, drawing the dust into the chamber beneath.

The Utah Metal Mining Co.'s 11,000′ tunnel, completed in 1913, gives direct connection with the Bingham mines.

Production:

Year	Copper ore tons	Lead ore tons	Copper lb.	Lead lb.	Gold oz.	Silver oz.
1918.....	262,723	297,847	21,821,657	62,034,920	36,317	5,827,135
1917.....	320,510	334,274	17,385,090	84,726,315	31,495	4,439,290
1916.....	442,756	421,197	20,041,089	117,976,091	40,009	5,549,777

Raritan Copper Works

E. C. Clark, supt., Perth Amboy, N. J. The works on New York harbor, completed 1899, and since enlarged repeatedly, is one of the largest and most modern electrolytic copper refineries in the world.

The smelting department consists of one 200-ton, one 150-ton and one 100-ton furnaces for casting anodes, and two 225-ton, one 150-ton and two 100-ton furnaces for casting wire bars, ingots and cakes.

The electrolytic refinery includes 2 tank houses with their respective power houses; power consumption being about 7,000 k. w. The department has special shears for trimming cathode sheets and Morrow loop machines for attaching copper lugs to the cathode starting-sheets.

The tank house No. 1 has 1,800 tanks and a capacity of 22,000,000 lb. per month. The general arrangement and method of operation is very similar to that in No. 2 tank room. This room is 210x582′.

No. 1 power house, which furnishes power for No. 1 tank room, contains four 1,000-k. w. Nordberg triple-expansion Corliss engines and Allis-Chalmers barometric condensers. The engines are direct-connected to

1,000-k. w. electric generators, 2 being furnished by the General Electric Co. and 2 by the Crocker-Wheeler Co.

No. 2 tank house has 3 bays running lengthwise, with two 10-ton 3-motor Whiting cranes in each bay, equipped with special devices for handling an entire tankful of anodes or cathodes at 1 load. There are 3 electric circuits running lengthwise, 1 in each bay, each circuit of 396 tanks being handled from the power house by an electric genefator. Current is 7,500 amperes, giving a current density of 20 amperes per sq. ft. The main conductor has a cross-sectional area of 12¾". There are 1,188 depositing tanks arranged in 108 nests of 11 cells each, with electrode arrangement on the Walker system.

Production:

Year	Bullion treated tons	Silver treated oz.	Copper lb.	Gold oz.	Silver oz.
1918.....	222,628	7,016,213	394,968,011	132,254	21,440,611
1917.....	209,557	5,806,924	411,933,742	137,465	19,938,375
1916.....	233,956	4,531,771	462,666,262	167,024	18,606,866

International Lead Refining Co.

Wm. Wraith, gen. mgr; G. P. Hulst, supt.

An extensive plant located at 151st St. and McCook Ave., East Chicago, Ind., with 64 acres of ground. Construction work started April 20, 1912, and plant was in operation Oct. 3, 1912. Plant comprises main refinery building, all steel and concrete, with 3 standard-gauge tracks entering the building. There are 2 crane runways running the full length of the building, with 3 traveling cranes. A change-house, of brick, is equipped with toilets, shower-baths, steel lockers, and a dining room. Bag-house is constructed of brick and concrete, divided into 4 compartments of 114 bags, 30'x18".

Equipment: consists of one 12,000-ton battery Parkes process, two 300-ton softeners, four 60-ton desilverizing kettles, one 300-ton refining furnace, and one 200-ton molding furnace. The bullion comes in on a high track, is charged into furnace with charging machine and flows by gravity through the plant. Lead is hand-molded and trucked into cars. Sampling is done in two 40-ton kettles and bullion pumped into softeners with centrifugal pump. Residues are worked up in three 30-ton reverberatory furnaces. There are two 40-ton blast furnaces, 1 for antimonial slag, and 1 for by-products and ores; 8 retort furnaces for treating zinc skim and two 5-ton cupels for treating high-grade retort metal.

Common lead is double refined by crystallization in kettles in the corroding lead plant. Refining plant is in complete operation. All furnace gases except softeners and retorts are drawn through a sheet flue 700' long and passed through the bag house.

According to Mr. Hulst (Bull. 153 Sept., 1919, A. I. M. & M. E.) the works are able to treat both oxide and sulphide ores of antimony. All silver-bearing antimony ore is heated in the residue furnace, while antimony slag, produced was low enough in silver to warrant being smelted in two 42" round blast furnaces to antimonial lead. When the domestic output of antimony ore increased in 1916, the International was ready to treat it. The two furnaces reduced from 60 to 90 tons of lead and antimonial material daily, producing 30 to 35 tons of metal carrying 13% antimony, 86.1% lead, 0.15% copper, and 0.75% arsenic.

Power is supplied by the Northern Indiana Gas & Electric Co. Two waste-heat boilers supply steam for compressors and refinery. High-pressure air is supplied by centrifugal air compressor and air for blast furnaces is supplied by a Connersville blower. A 50,000-gal. tank elevated 50', and 100,000-gal. sump tank, waste running back into sump tank and pumped into the 50,000-gal tank, the elevated tank being connected with the East Chicago Water Co.'s mains. Oil storage capacity, two 12,000-gal. oil tanks.

Production:

Year	Lead bullion treated tons	Other ore and bullion tons	Com. and corrod-lead lb.	Antimonial lead lb.	Gold oz.	Silver oz.
1918.....	31,766	34,119	113,074,263	13,018,043	36,361	7,004,176
1917.....	41,682	23,558	117,922,724	11,525,365	24,673	5,259,738
1916.....	58,769	6,148	108,009,116	15,682,151	20,580	4,468,775

The International is not burdened by old smelters acquired at exorbitant prices, but has new and up-to-date plants, capable of handling ore as cheap, if not cheaper, than any of its competitors and is a big factor in the mining world. It is in strong and competent hands, both technical and financial, and its profitable operation is assured.

INTERNATIONAL SMELTING AND REFINING CO.

Properties and assets: purchased 1914 by Anaconda Copper Mng. Co. for $10,392,709. Company dissolved and properties transferred to International Smelting Co., and described thereunder.

METALLURGICAL COMPANY OF AMERICA

Office: 61 Broadway, New York.

Officers: C. M. Loeb, pres.-gen. mgr.; B. Hochschild v. p. Julian B. Beaty, treas.; with Otto Sussman, Harold K. Hochschild and Edw. Randolph, directors; Julius Goldman, sec.

Inc. May 19, 1904, in New Jersey. **Cap.** $100,000; $100 par. Annual meeting second Tuesday in April, at Jersey City, N. J.

Company is controlled by American Metal Co., Ltd., and was organized for the purpose of carrying on experiments in metallurgy, perfecting and improving metallurgical processes, and holding all metallurgical patents in which the A. M. Co. was interested. It is now merely a department of the A. M. Co.

MINERALS SEPARATION NORTH AMERICAN CORPORATION

Offices: 61 Broadway, New York City; engineering office and testing laboratories, 220 Battery Street, San Francisco, Calif.; experimental and research laboratories, Long Island City, New York.

Officers: Dr. S. Gregory, v. p.; with Frank Altschul, Alfred A. Cook and F. Perry, directors; Chester B. Allen, sec.; chief engineer, Edward H. Nutter.

Inc. in Maryland, Dec. 1, 1916. **Cap.** $500,000 shares of no par value; all stock placed in voting trust. The voting trustees are Dr. S. Gregory and Frank Altschul.

Dividends: May 29, 1918. $1.50 out of capital assets and 50c out of current earnings; July 1, 1919, $1.50 out of capital assets and 50c out of current earnings; both distributions made in U. S. Government Liberty Loan bonds.

Company owns all United States, Canadian, Mexican and Cuban patents for flotation processes of ore concentration originally owned by Minerals Separation, Ltd., of London, England. Rights to use processes are licensed on a royalty basis, licensees being given privilege of electing any one of four different methods of royalty payments applicable to their ores, namely. (1) Flat Rate—based on payments per ton of total ore milled (this is limited to straight copper ores); (2) Unitage Rate—based on payments per unit of various metals recovered from total ore milled; (3) Percentage Rate—based on percentage of value of all metals recovered from total ore milled; (4) Poundage Rate—based on payments per pound (or per ounce, in case of precious metals) of all metals recovered from any material treated by flotation. Details of these royalty payments will be found in a 24-page booklet published by the company in 1919.

Ore treated by licensees in North America during 1915, was about 4,500,000 tons; in 1916, about 12,000,000 tons; in 1917, about 22,000,000 tons; in 1918, about 28,000,000 tons. It is estimated that during 1918 between

55,000,000 and 60,000,000 tons of ore was treated in whole or in part by flotation, of which about one-half was treated by 110 licensees of Minerals Separation, the remaining one-half by somewhat over 400 unlicensed users. Licensees of the company include Anaconda, Inspiration, Arizona Copper, New Cornelia, Greene Cananea, Consolidated Coppermines, Calumet & Hecla and affiliated companies, Phelps Dodge Corporation, Federal Mining & Smelting, American Zinc Lead & Smelting, Elm Orlu, St. Joseph Lead, Doe Run Lead, Britannia Copper (B. C.), and many others, totaling about 115 active users in 1919.

The flotation processes are now used extensively throughout the world for treating various ores of copper, zinc, lead, gold, silver, graphite and molybdenum. Their economic value for treatment of base-metal ores is firmly established. Although not universally applicable to all ores, flotation is an invaluable adjunct to almost every concentrating plant. At Calumet & Hecla it has insured the recovery of the very fine metallic copper and, combined with a special method of leaching it has practically created a large new and profitable source of copper in that company's old dumps. In several important mills, notably Inspiration, substantially all sulphide recoveries are effected by means of flotation. In other mills, the coarser minerals are roughed out by gravity concentration methods and the fines recovered by flotation. Differential flotation is finding a wider range of application in the treatment of complex sulphide ores. By means of this modification, close separations are made as between exceedingly fine lead and zinc sulphides, or between valuable copper pyrites and relatively worthless iron pyrite. The Consolidated Interstate-Callahan (Idaho) and the Sunnyside (Colorado) mills afford excellent examples of the great economic value of this development in the process.

If the various alleged infringing methods of flotation were allowed to be used unchallenged, Minerals Separation would lose large sums due as royalty for the use of its patents. Litigation over United States patents was first provoked by the installation made in 1911 by James M. Hyde (formerly an employee of Minerals Separation, Ltd.) at the mill of the Butte & Superior Mining Co. In that suit (Minerals Separation v. Hyde) the District Court at Butte, Montana, sustained U. S. Patent No. 835,120 and found infringement as to 7 claims. In 1914, the Ninth Circuit Court of Appeals, at San Francisco, reversed this decision, but on writ of certiorari the U. S. Supreme Court on Dec. 11, 1916, unanimously adjudged this basic patent for air-froth flotation valid as to 10 of its 13 claims. The remaining 3 claims, which specified the use of "a small quantity of oil," and which the court held to be invalid, have since, by disclaimer, been brought within the scope of the Supreme Court's decision.

Following this decision of the Supreme Court in the Hyde case, the Butte & Superior began using oil in minimum quantities of ½ of 1%, contending that this relieved it of liability for infringement. This issue was tried in the suit of Minerals Separation v. Butte & Superior, and on May 4, 1917, the United States District Court at Butte, Mont., found validity and infringement as to the 10 claims (3 modified by disclaimer) previously litigated. On May 13, 1918, the Ninth Circuit Court of Appeals at San Francisco partly reversed this decision, holding the patent limited to ½ of 1% of oil on the ore. The United States Supreme Court reviewed this case on writ of certiorari, and on June 2, 1919, partly reversed the decision of the Circuit Court of Appeals, holding that the patent extended to and covered the use of oils in amounts equal to any and every fraction of 1% on the ore. Pursuant to this decision, the District Court of Montana entered its decree on July 19, 1919, issued a permanent injunction against the Butte & Superior, and held it to account for all profits made by reason of its infringement. This accounting was set for October 27, 1919.

In the suit of Minerals Separation v. Miami Copper Co., before United States District Court at Wilmington, Del., three patents were involved, namely 835,120 for air-froth flotation, 962,678 for soluble frothing agents,

and 1,099,699 for the use of aromatic hydroxy compounds in cold circuit. In September, 1916, the Court found the first two patents valid and infringed, except as to one claim of 835,120, which has since been modified by disclaimer, but held the third patent to be void. On appeal to the Third Circuit Court of Appeals at Philadelphia, this decision was affirmed except as to the third patent, which was also held to be valid and infringed. Miami did not appeal from this decision, and the District Court issued a permanent injunction against that company. Accounting proceedings are now being held before a Master in Chancery, who is also trying out numerous variations of alleged infringements which the Miami company has used since being placed under injunction.

It results from these litigations that infringement of Minerals Separation's main patent, No. 835,120, cannot be avoided by any variation in the form of apparatus so long as a mineral-bearing froth is produced by the use, at any stage of the operations, of less than 1% of oil on the ore. The type of apparatus, character and extent of agitation are held to be immaterial. In addition to this, the validity of patent No. 962,678 precludes the use of soluble frothing agents in any form or amount whatsoever, except under license from Minerals Separation, as the Third Circuit Court of Appeals held that the Miami company infringed this patent when using oils that were partly soluble in water. This point is especially important because most of the effective oils used in flotation operations have soluble compounds. This seems to place Minerals Separation in an exceedingly strong position and appears to exhaust the possibilities of successfully evading its patents.

In September, 1919, Minerals Separation brought suit against Nevada Consolidated Copper Co., alleging infringement of its patents claiming damages, and seeking an injunction against further infringement. Also against Ray Hercules Copper Co. and Magma Copper Co., and a further case against Miami in November.

The above review is apropos in The Mines Handbook, inasmuch as hundreds of the companies listed herein are using flotation in some form, and their future profits depend largely on their use of flotation methods.

MINES EXPLORATION SYNDICATE

Office: Makeever Bros., mgrs., 170 Broadway, New York. Operating dept., 1553 Harvard Ave., Salt Lake City, Utah. Walter Neal, engineer.

Organized Aug., 1916, "to investigate and develop worthy mining properties." Over 200 mines were examined but only 3 taken over for development, at last accounts.

Property: Lookout mines in Montana, the Herb Lake (Rex) mines in Northern Manitoba, Can., and the Candelaria mines in Jalisco, Mex.

The Lookout group of 3 claims in Montana (location not stated) is said to show a series of veins carrying gold-silver-copper values. Average values are given as $14.52 to $26.41 per ton based on 60c silver and 25c copper. About 500′ of work is reported done on 3 tunnels, a road built and necessary buildings put up.

The Rex mine on Herb Lake, Manitoba, Canada, is developed by a 60′ shaft and vein is reported to average 48″ in width. Average assay is given as $48.60 gold. Makeever's engineer estimated that ore extracted in shaft sinking and on dump totaled $5,054, and also assumed that a stope of such ore 100′ long by 100′ high will pay for the mine, development, mill, equipment, operation and metallurgical loss. A 30-ton mill to be installed.

The Candelaria mine, Jalisco, Mex., is an old mine credited with past production of rich ore. In August, 1919, it was under development.

MINING & DEVELOPMENT CORPORATION

Address. E. O. Holter and H. P. Henderson, 60 Broadway, New York.

Officers: Edwin O. Holter, pres.; Harold Kingsmill, v. p.; Howard D. Smith, v. p.; Robert Frese, sec.-treas., with Norman B. Holter, directors.

Inc. Feb. 1918, in Maine. **Cap.** 3,000 shares of no par value.

An exploration company having varied interests in the United States,

Mexico, and South America. $300,000 is to be spent on the Richmond-Eureka Mining Co. (which see), at Eureka, Nevada.

NATIONAL LEAD CO.

Main office: 1 Exchange Place, Jersey City, N. J. Executive and transfer office: 111 Broadway, New York.

Officers: E. J. Cornish, pres.; Geo. O. Carpenter, R. P. Rowe and N. B. Gregg, v. ps.; M. D. Cole, asst. to the pres.; Chas. Davison, sec.; S. A. Miller, asst. sec.; Fred R. Fortmeyer, treas.; Chas. Simon, asst. treas.; Alexander & Green, gen. counsel; Executive committee: E. J. Cornish, chairman; E. F. Beale, R. P. Rowe, J. R. Wettstein and G. D. Dorsey.

Directors: Edward F. Beale, Geo. O. Carpenter, Fred M. Carter, R. R. Colgate, E. J. Cornish, G. D. Dorsey, Chas. E. Field, Geo. W. Fortmeyer, E. C. Goshorn, Morris B. Gregg, R. P. Rowe, W. N. Taylor, Walter Tufts, J. R. Wettstein, and G. W. Thompson.

Committees:

Manufacturing—C. P. Tolman, chairman; L. T. Beale, H. P. Cavarly, Evans McCarty and G. W. Thompson.

Sales: O. C. Harn, chairman; L. T. Beale, C. C. Foerstner, O. H. Greene and W. N. Taylor.

Metal: E. J. Cornish, chairman; S. A. Miller, secretary; W. H. Baker, L. T. Beale, W. C. Beschorman, A. F. Curtis, G. D. Dorsey, S. E. Lindsley, H. J. McBirney, Sheldon Thompson, C. F. Wells, Jr. and J. R. Wettstein.

Departments:

Advertising: O. C. Harn, manager.

Laboratory: G. W. Thompson, chief chemist and A. H. Sabin, consulting chemist.

Metal: A. B. Hall, manager.

Flaxseed. Charles T. Nolan, manager.

Insurance: I. M. Stettenheim, manager.

Traffic: W. S. Mellen, manager.

Branches of National Lead Co.:

Atlantic, R. P. Rowe, mgr, 111 Broadway, New York, N. Y. Buffalo, Sheldon Thompson, mgr., Buffalo, N. Y. Cleveland, C. C. Foerstner, mgr., Cleveland, Ohio. Cincinnati, E. C. Goshorn, mgr., Cincinnati, Ohio. Chicago, Chas. E. Field, mgr., Chicago, Ill. St. Louis, Geo. O. Carpenter, mgr., St. Louis, Mo. John T. Lewis & Bros. Co., Edward F. Beale, pres., Philadelphia, Pa. National Lead & Oil Co., of Pennsylvania, W. N. Taylor, pres, 316 Fourth Avenue, Pittsburgh, Pa. National Lead Co., of Massachusetts, Walter Tufts, treas., 131 State Street, Boston, Mass. National Lead Co., of California, Jas. B. Keister, v. p., Merchants Exchange Building, San Francisco, Cal., and National Lead Co. of Argentina, G. D. Dorsey, pres, 25 de Mayo, No. 158, Buenos Aires, Argentina.

The National Lead Co. is interested through ownership of all or part of the capital stock in the following:

Baker Castor Oil Co., F. C. Marsh, pres., New York. Bass-Hueter Paint Co., Norris B. Gregg, pres., manufacturers of mixed paints, varnishes, and paint specialties, San Francisco, Cal. Carter White Lead Co., Fred. M. Carter, pres., white lead corroders, Chicago and Omaha. Cinch Expansion Bolt & Engineering Co., Grafton D. Dorsey, pres., manufacturers of expansion bolts, New York. Heath & Milligan Manufacturing Co., Norris B. Gregg, pres., manufacturers of paints and colors, Chicago. Magnus Co., Inc., H. H. Hewitt, pres., brass founders, New York. Matheson Lead Co., W. J. Matheson, pres., white lead corroders and manufacturers of oxides of lead, Long Island City, N. Y. River Smelting & Refining Co., Edward J. Cornish, pres., smelters and refiners of zinc, St. Louis, Mo. St. Louis Smelting & Refining Co., J. A. Caselton, 2nd v. p. and sec., miners, smelters, and refiners of lead, St. Louis, Mo. United Lead Co., J. R. Wettstein, pres., manufacturers of all products of lead, smelters of drosses and residues, New York. United States Cartridge Co., Paul Butler, treas., manufacturers of metallic and sporting ammunition, Lowell, Mass. Williams Harvey & Co., Ltd., Richard F. Pearce, managing director, smelters and refiners of tin, Liverpool, England. Williams Harvey Corp., Edward J. Cornish pres., smelters and refiners of tin, New York.

Inc. Dec. 7, 1891, in New Jersey. **Cap.** $25,000,000 common and $25,000,000 preferred stock; $100 par; $20,655,400 common stock and $24,367,600 preferred stock outstanding. Listed on New York Stock Exchange. Bankers Trust Co., New York, registrar. Annual meeting, third Thursday in April. Company had 6,640 stockholders in 1916; 7,152 in 1917; and 7,286 in 1918.

Comparative General Balance Sheet:

ASSETS

Year	Plant Invest.	Other Invest's.	Stock On Hand	Other Current	Total
1918.....	$41,933,059	$10,153,095	$15,027,156	$20,263,936	$87,376,245
1917.....	25,229,672	18,753,768	8,222,782	6,517,408	58,722,630
1916.....	23,805,234	17,982,307	7,320,170	6,058,190	55,163,901
1915.....	23,785,822	17,520,916	6,267,772	5,884,460	53,458,970
1914.....	23,768,789	16,963,718	7,164,475	4,467,083	52,364,065

LIABILITIES

Year	Capital Stock	Insurance Fund	Bonds of Subs.	Reserves	Current*	Surplus	Total
1918.....	$45,023,000	$1,400,000	$9,715,000	$8,103,467	$7,874,871	$16,659,907	$87,376,245
1917.....	45,023,000	1,400,000	.....	3,293,241	664,826	8,341,564	58,722,630
1916.....	45,023,000	1,200,000	.....	700,000	2,057,788	6,183,113	55,163,901
1915.....	45,023,000	1,100,000	.....	300,000	1,298,608	5,737,362	53,458,970
1914.....	45,023,000	1,000,000	.....	.....	988,835	5,352,230	52,364,065

* Includes accounts audited but not due subsidiaries.

Comparative Income Account:

	Net Income	Dividends Pfd.	Dividends Com.	Surplus Year	P. & L. Surplus
1918.....	$4,692,815	$1,705,732	$1,342,601	$1,644,482	$16,659,907
1917.....	4,896,953	1,705,732	1,032,770	2,158,450	8,341,564
1916.....	2,977,699	1,705,732	826,216	445,751	6,183,113
1915.....	2,710,526	1,705,732	619,662	385,132	5,737,362
1914.....	2,476,293	1,705,732	619,662	150,899	5,352,230
1913.....	2,458,306	1,705,732	619,662	132,912	5,201,331

Dividends:

	1918	1917	1916	1911-15	1910	1908-9	1907	1906	1901-5	1898-00	1896-7
	%	%	%	%	%	%	%	%	%	%	%
Preferred.....	7	7	7	7	7	7	7	7	7	7	7
Common.....	6½	5	4	3	4	5	4¾	2	..	1	..

Present rate: preferred 7%, payable quarterly, March 15, etc.; common 3%, increased to 4% March, 1916, payable quarterly, March 30, etc.

NEW JERSEY ZINC CO.

Offices: 810 Broad St., Newark, N. J., 160 Front St., New York.

Officers: Edgar Palmer, pres.; A. P. Cobb, v. p.; J. E. Hayes, v. p.; A. B. Schultz, sec.; H. S. Wardner, treas.; G. T. Wolff, comptroller.

Directors: Edgar Palmer, C. W. Cox, August Heckscher, T. D. Jones, E. S. Marston, J. J. Riker, E. M. Squier, W. P. Hardenbergh and A. B. Schultz. H. G. Clopper, gen. sales mgr.; E. V. Peters, asst. gen. sales mgr.; H. Hardenbergh, gen. purch. agt.; W. J. Lee, purch. agt.; Arthur Thacher, Western mgr.

Inc. Oct. 30, 1880, in New Jersey as the New Jersey Zinc & Iron Co. Name changed 1897 to present title and capital increased from $3,000,000 to $10,000,000. Stock increased to $35,000,000 by payment of stock dividend of 250% July 7, 1915. Cap., $35,000,000; $100 par; all outstanding. Transfer office: 160 Front St., New York. Registrar: Farmers Loan & Trust Co., N. Y.

Bonded debt: the unretired balance of bonds authorized Oct. 1, 1901, due Oct. 1, 1926, First Gold, 4%. Original authorized issue, $10,000,000, of which $4,000,000 were issued, the balance to be issued only for the purchase of new property, stock of new corporations, the erection of new plants, etc. Of the $6,000,000 of unissued bonds, $3,400,000 had been retired up to Jan. 1, 1919, leaving a present authorized amount $6,600,000. The mortgage provides for the cancellation of $200,000 of unissued bonds yearly on Oct. 1, beginning 1902, the

authorized amount of bonds to be reduced accordingly, and after all such unissued bonds have been canceled, the company is required to pay to the trustee, annually, on Oct. 1, $200,000 as a sinking fund for the purchase or redemption of outstanding bonds at not exceeding par and interest.

Dividends: regular quarterly at rate of 20% per annum have been paid from 1906 to July, 1915, and quarterly at rate of 2½% in Aug. and Nov., 1915. On Feb. 10, 1916, and regularly since, quarterly at rate of 16% per annum.

Extra distributions: 10% in 1907, 5% in 1909, 10% each in 1910 and 1911, 10% each 3 times in 1912, 10% each 3 times in 1913, 10% each twice in 1914, 5% each twice in 1914, 2%, 10% and 30% in 1915, 250% stock dividend in July, 1915, 10% each 4 times and 5% 4 times in 1916, 10% in Jan., and 4% each Mar., April, June, July, and Sept.,1917; 4% July, 1918, and 2% July, 1919.

No balance sheets are available, but the following gives an idea of general results:

Year	Net Income	Dividends	Surplus
1919*.....	$6,272,682	$4,200,000	$2,072,682
1918.....	11,904,759	7,000,000	4,094,759
1917.....	19,086,601	12,600,000	6,486,601
1916.....	34,488,239	26,600,000	7,888,239

*9 months. Last quarter of 1919 returned $2,675,412 net.

Property: the famous zinc mines at Franklin, New Jersey. The different original holdings were consolidated as a result of litigation and to effect better mine operations. It was upon the economies due to a single control of the great orebody and to the discovery by J. P. Wetherill of a process for treating the manganese-zinc ores that the fortunes of the company were built. For geology of mine see Lindgren's "Ore Deposits," p. 709; also U. S. Geological Survey Folio, No. 161.

Company owns the New Jersey Zinc Co. of Pa., with operating plants at Palmerton and Freemansburgh, Pa.; operating mines near Benton and Highland, Wis. (Mineral Point Zinc Co.); many other producing properties and reduction works, including the Empire Zinc Co. of Mo., not operating any property at present, the Empire Zinc Co. of Colorado, and mines at Iola, Kansas.

The Franklin mine in New Jersey produces the high-grade ore from which the Horsehead brand of spelter is made. The reserves are unofficially reported to be in blocked out ore, sufficient for a thirty-year supply at the present rate. Custom ores are also bought for treatment. The products include oxide of zinc, spelter, sheet zinc, zinc dust, spiegeleisen, sulphuric acid, lithophone, and zinc chloride.

Production: no reports are published, but it is known that the company has a yearly smelting capacity of 160,000,000 to 170,000,000 lb. of spelter, and the 1917 production is estimated at 250,000,000 lb. of zinc, besides other products. One mine alone, the Franklin, is credited with 119,736 tons, or 16.9% of the country's total output during 1917.

During 1917 the following papers were published in the Engineering and Mining Journal: "Hoist Record at Palmer Shaft," by H. H. Hodgkinson. This shaft is 1,510′ deep at an angle of 47°, and has 4 compartments. Two 22x48″ duplex, direct acting hoists are used, with ore loading pockets at 800 and 1,150′. On July 14, 1916, one engine hoisted 3,079 tons in 10 hours. This shaft has produced 76,018 tons in one month. In the issue of Sept. 8, the company's Franklin laboratory was described by D. Jenkins. A paper prepared for the A. I. M. E. by W. R. Ingalls, in issue of Sept. 15, discusses "Zinc Burning as a Metallurgical Process," covering in part work of New Jersey Zinc. In Sept. Bulletin of the A. I. M. E., G. C. Stone discusses "Oxide of Zinc," as made by the New Jersey company. In the Oct. Bull. of the A. I. M. E. "Zinc Mining at Franklin, N. J.," was the title of a 106-page article by C. M. Haight and B. F. Tillson. Company publishes a monthly organ entitled "Zinc."

Company apparently carefully conceals its vast financial operations from a curious public, but it is well if somewhat "closely" managed, and is doing excellent educational work in spreading knowledge of the uses and properties of zinc.

PHELPS DODGE CORPORATION

Office: 99 John St., New York.

Officers: Walter Douglas, pres.; Cleveland H. Dodge, Arthur Curtiss James, v. p.'s.; with Geo. B. Agnew, Francis L. Hine, Wm. Church Osborn and E. Hayward Ferry, directors; P. G. Beckett, gen. mgr.; Geo. Notman, sec.-treas.; C. W. Parsons, asst. sec-treas.; W. K. Flora, asst. sec.; A. T. Thomson (New York), assts. to president; John Macnair, comptroller; T. H. O'Brien, mgr. dept. of indus. relations; H. Kenyon Burch, cons. eng.; Gerald Sherman, cons. min. eng.

James Douglas, through whose efforts and foresight the company attained its present importance as a metal producer, died in 1918, a loss to the entire mining profession.

Phelps Dodge Corporation assumed all the assets and liabilities on April 1, 1917, of Phelps, Dodge & Co., Inc., and continued the business of the former company with the same board of directors and official staff.

Phelps, Dodge & Co., Inc., was the holding company for its subsidiary companies. Under the new plan the name of the Copper Queen Cons. Mining Co. was changed to the Phelps Dodge Corporation, its capital stock increased, and the properties of the Detroit Copper Mining Co., the Burro Mountain Copper Co., and the Stag Cañon Fuel Co. were transferred to it, also stocks of the Moctezuma Copper Co., Bunker Hill Mines Co., and the Phelps Dodge Mercantile Co., together with the remaining assets of Phelps, Dodge & Co., Inc. This gives direct ownership and operation by a single company. The former companies are known as branches, with the exception of the Moctezuma Copper Co. and the Bunker Hill Mines Co.

Phelps, Dodge & Co., Inc., was organized as the successor of the firm of Phelps, Dodge & Co., which had a history of nearly a century, its founder, Wm. Earle Dodge, having been one of the great pioneer merchants of America and a noted philanthropist.

Inc. Aug. 10, 1885, in New York. **Cap.** $2,000,000; $10 par; increased to $50,000,000 in March, 1917; $100 par; $45,000,000 of which is now outstanding, having been exchanged share for share for stock of Phelps, Dodge & Co., incorporated, Dec. 14, 1908, in New York. The capital stock was issued for the purchase of the entire stock of the Copper Queen Consolidated Mining Co., at $135 for each $10 share, $27,000,000; Moctezuma Copper Co., at $307 9/13 for each $100 share, $8,000,000; Detroit Copper Mining Co. of Arizona, at $150 for each $25 share, $6,000,000; Stag Cañon Fuel Co., at $800 for each $100 share, $4,000,000; held for future issue, $5,000,000; total, $50,000,000. Stock listed on New York Stock Exchange. Annual meeting, first Tuesday after first Monday in April, at 99 John St., New York. Books close 10 days before and reopen day after annual meeting. Stock transferred at office of the company. Farmers' Loan & Trust Co., New York, registrar.

Comparative General Balance Sheet:

ASSETS

Year	Property and Equip.	Investments	Deferred	Cash	Other Current	Total
1918..	$198,551,420	$3,657,214	$.....	$12,985,403	$26,238,391	$241,432,428
1917..	195,405,392	3,129,481	.....	13,775,628	20,057,238	232,367,739
1916..	39,268,558	.....	2,763,213	7,746,519	15,735,612	66,513,903
1915..	38,550,942	.....	2,130,583	5,889,305	11,375,526	57,946,356
1914..	49,392,281	.....	264,076	4,891,697	4,687,999	59,236,053

LIABILITIES

Year	Capital Stock	Current	Reserve for deplet. and deprec.	Surplus	Total
1918.....	$45,000,000	$15,463,003	$49,589,707	$131,379,717	$241,432,428
1917.....	45,000,000	9,523,198	45,947,694	131,896,846	232,367,739
1916.....	45,000,000	5,826,777	.....	15,687,126	66,513,903
1915.....	45,000,000	4,608,492	.....	8,337,864	57,946,356
1914.....	45,000,000	7,224,944	.....	7,011,109	59,236,053

Recent earnings: $6,025,740 in 1909; $9,099,910 in 1910; $7,283,509 in 1911; $10,411,535 in 1912; $9,581,494 in 1913; $6,891,651 in 1914; $10,981,512 in 1915; $24,030,904 in 1916.

Income Account:

Year	Sales of metals, etc, Supplies, etc.	Expenses, includ. taxes	Profit	Dividends	Surplus for year
1918.....	$59,483,208	$43,537,525	$15,945,683	$10,800,000	$5,145,683
1917.....	62,262,186	39,805,279	22,456,906	10,800,000	11,656,906

Dividends: company pays a regular quarterly dividend of $2.50 per share and also extra dividends; these were $2 per share in 1909, 1910, 1911; $5 ni 1912; $6.50 in 1913; $4 in 1914; $10 in 1915; $22.50 in 1916; $14 in 1917; $14 in 1918; $7.50 in 1919, and $2.50 in 1920 to Jan. 2. The grand total is $83,471,527.

Company controls through personal holdings of its officers, the Old Dominion Co. and Commercial Mining Co. Members of the old firm also control the El Paso & Southwestern railway, a road that, while built originally as an outlet for the Copper Queen mine, has expanded steadily and bids fair to develop eventually into a transcontinental trunk line. The same interests are very large shareholders in the Rock Island and Great Northern railways.

The company controls some of the richest and most productive copper mines in existence, all able to make copper at unusually low costs, as is evidenced by the great increase in dividends of subsidiaries in 1910 over 1909, in a year when decreased dividends were the rule with a great majority of the large copper producers of the world.

Production: comparative statement of total production, of company's branches, years ending Dec. 31—

	Tons of Ore							
Year	Extracted	Milled	Charge Smelted	Co. Ore Smelted	Copper, lb.	Silver oz.	Gold, oz.	Lead, lb.
1919.....	.....	.....	.....	.....	110,000,000	.....	.....	.....
1918.....	2,684,701	1,797,161	1,400,911	1,168,882	169,035,687	1,772,119	30,434	1,683,113
1917.....	2,756,587	1,581,293	1,339,464	.....	153,974,692	1,524,632	24,423	8,136,356
1916.....	2,305,072	1,422,468	1,389,192	1,200,090	152,263,729	1,642,055	28,873	10,404,341
1915.....	1,583,364	800,600	1,129,766	1,016,746	140,478,003	1,655,669	31,696	9,525,584
1914.....	1,777,243	1,046,728	917,204	855,594	131,662,324	1,769,626	28,518	8,936,074
1913.....	1,978,892	1,122,372	1,035,367	856,520	155,665,712	1,870,162	31,141	5,701,628
1912.....	1,893,244	.....	1,051,315	953,741	148,678,889	1,689,152	27,687	.....
1911.....	1,841,210	1,017,352	930,331	822,647	134,149,627	1,794,895	27,154	.....

Company also took over the metals selling agency of the old firm, and in addition to marketing the product of its own mines, acts as sales agent for the Calumet & Arizona and other producers.

Comparative Statement of Copper Sales:

Year	Total	Own Comp.	Outside Product on Comm.	Domestic Trade	Foreign Trade	Aver. Price Cents
1918.....	294,237,716	153,541,647	140,977,101	214,237,716	80,281,032	24.55
1917.....	290,522,569	156,114,518	134,408,051	185,131,891	105,390,678	26.67
1916.....	247,303,587	138,968,320	108,335,267	176,468,527	70,835,060	24.48
1915.....	194,925,668	139,351,785	55,573,883	97,122,436	97,803,232	16.079
1914.....	188,687,378	134,553,404	54,133,974	80,978,884	107,708,494	13.57
1913.....	201,489,796	151,080,018	50,409,778	83,552,432	117,937,364	15.37
1912.....	192,297,374	139,759,515	52,537,859	98,267,037	94,030,337	15.51
1911.....	180,301,965	131,327,002	48,974,963	69,483,782	110,818,183	12.36
1910.....	194,138,698	139,297,409	54,841,289	100,819,254	93,319,444	12.826

Phelps Dodge Corporation, is one of the few new companies in the copper mining industry that is under-capitalized rather than over-capitalized, and this is but a detail in a general business policy that, while thoroughly progressive and abreast with the times, retains the fundamentally sound and conservative policies developed by the old firm in nearly a century of honorable and markedly successful business life.

Branches and Subsidiaries

Burro Mountain Branch.
Bunker Hill Mines Co.
Copper Basin Branch.

Copper Queen Branch.
Moctezuma Copper Co.
Morenci Branch.
Phelps Dodge Mercantile Co.
Stag Cañon Branch.

BUNKER HILL MINES CO.

Mine office: Tombstone, Ariz.
Officer. John H. Davis, supt.
Inc. to take over and operate the property of the old Tombstone Cons. Mines Co. at Tombstone, discovered in 1878, and at one time one of the largest producers of gold-silver-lead ore in the Southwest. At a depth of 560′ the volume of water became so great all attempts to handle it were unsuccessful and operations were discontinued until Phelps Dodge Corp. acquired possession.
Development: extensions were 5.049′ in 1915; 8,177′ in 1916; 11,598′ in 1917; and 2,996′ in 1918. Results from prospecting in the old workings and in new ground have not yet shown orebodies of great size or commercial importance. Lessees were granted blocks of ground in 1918, shipping 1,000 tons monthly.

The old cyanide plant of the Tombstone Cons. was converted into an experimental plant for the testing of Tombstone ores and was put into operation in June, 1915. Flotation of the gold-silver-lead ore was unsatisfactory. Half of the plant is utilized in concentrating manganese ore, producing for steel plants and silver-bearing tailing for the smelter at Douglas.

Power is supplied by a central plant.

Production:

Year	Ore Tons	Gold Oz.	Silver Oz.	Lead Lb.	Copper Lb.	Manganese Lb.	Employees
1918.....	19,312	1,335	276,007	448,616	39,209	834,337	103
1917.....	69,418	2,872	397,253	1,049,445	13,357	3,930,901	386
1916.....	59,299	3,950	343,453	983,983	131,546	1,061,409	403
1915.....	10,746	1,373	109,783	269,303	23,760	1,171,509	297

BURRO MOUNTAIN BRANCH

Mine office: Tyrone, Grant Co., New Mexico. E. M. Sawyer mgr.; E. F. Pelton, supt.
Property: 60 claims, 1,000 acres, bought 1906, from Southwestern Copper Co. The Savanna Copper Co.'s holdings of 2,600 acres were added in 1915, bringing the total acreage up to 4,464 acres. Property shows 36 porphyry dikes, carrying 5 orebodies of disseminated ore having 2 to 5% copper. The old mine, 15 claims, known as the St. Louis, is said to have produced upwards of $1,000,000 worth of ore, under former ownership, shipping ores ranging 15 to 25% in copper.
Geology: property contains a number of large orebodies of disseminated chalcocite, so-called porphyry ore, that are genetically dependant upon intrusions of monzonite, in pre-Cambrian granite, both rocks being shattered and faulted. The largest orebody is entirely in porphyry, the next largest in a brecciated zone, associated with dikes of aplite and dark felsite (phases of the porphyry), cutting through granite. Actual stoping and milling operations began in March, 1916. The East orebody is mined by milling the ore into 55° chutes going down to the 4,700′ Niagara tunnel, where it is loaded directly into standard gauge railway cars. The Breccia orebody is mined through No. 3 shaft, hoisted in 2-ton skips, dumped on an inclined belt conveyor, and discharged on a horizontal conveyor loading by tripping device into railway cars. Company has 5 Star churn drills, one electrically-driven.

The Burro Mountain and Chemung mines have been united by the Niagara haulage tunnel, starting at the Tyrone terminus of the Burro Mountain branch of the A. T. & S. Fé railroad; this tunnel, 8x9′, was driven to Leopold, a distance of about 1 mile, and serves the double purpose of drainage and haulage. While driving this tunnel the so-called Bison orebody was found. Development increases its size, but the oxide content is high.

Lands include a complete town, improved with waterworks, electric light, substantial buildings, numerous dwellings, bank, store, theatre, etc.

Development: in 1914-15, work consisted mainly in completing opening by underground work and churn drilling of orebodies already known. At the end of 1914, thirteen holes, with an aggregate of 11,571′, had been drilled. This work continued throughout 1915 and 1916, the holes being rather widely scattered and no effort being made to define ore limits, so that estimates of tonnage are not yet possible. The orebodies on the Mohawk and Thistle claims have been considerably extended as a result of drilling during the year. An unusual feature is the prospecting of the Mangas valley where several holes passed through as much as 1,000′ of recent valley gravel before reaching bed rock.

In 1917, there were 52 holes drilled an average depth of 587′. Discoveries were satisfactory. The Azure Mining Co.'s ground, held under option, was also partly drilled, so far without encouraging results. To open the Thistle and Mohawk deposits, widely separated, considerable work was started for their extraction.

In 1918, drilling was done in 23 holes to an average depth of 489′. Nothing important was found. Although development decreased by 7,519′, reserves were increased by 235,000 tons. The cost of ore extraction was reduced by the better condition of stopes and to increased drawing from the broken ore reserves in shrinkage stopes. The caving system is employed successfully.

The old concentrator, built 1905, and twice remodeled, has been dismantled. A standard-gauge 18-mile spur was built in 1913, at a cost of $350,000, from the main line of the Santa Fé railroad to the mine and mill. A central power plant equipped with four 1,000-h. p. Diesel engines, was built at Tyrone, near the collar of No. 2 shaft. Labor is almost exclusively Mexican, only the bosses being Americans. The concentrator at Tyrone, of daily capacity of 1,700 tons, with flotation equipment, went into operation April 12, 1916. It consists of two units and is 3 miles from the portal of the haulage tunnel. It is an all-steel concrete structure covering 500 sq. ft. There are 5 floors, all equipped with the Kahn ventilation system. With the two units, which can be later raised to four, the estimated cost of the plant was about $1,000,000. J. T. Hall is superintendent.

Production:

Year	Ore milled, tons	Copper, %	Concentrate, tons	Copper, %	Recovery, %	Copper lb.	Silver oz.
1918.....	585,083	1.928	53,146	14.875	70.232	15,188,619	43,150
1917.....	473,443	1.972	45,681	14.775	72.258	13,139,053	39,403
1916.....	253,782	2.117	26,362	13.937	68.390	7,510,674	20,763

Leaching of all old partly sulphatized dump ore was started early in 1917. During that year, 280,090 lb. of copper, equal to 25% of the original metal, was extracted, while in 1918, another 8.9% was extracted, making 33.9% in two years.

COPPER BASIN BRANCH

A. B. Peach, acting manager, Prescott, Arizona.

Property: the Copper Basin mine at Copper Basin and Snoozer gold mine near Prescott, Arizona. The past two years results may be tabulated as under:

Year	Development	Ore Shipped	Copper
1918.....	1,320 ft.	38,323 tons	1,907,205 lb.
1917.....	1,250 "	17,299 "	934,781 "

The ore was smelted at Clarkdale, Douglas, Humboldt, and Verde.

COPPER QUEEN BRANCH

Operating and works office: Douglas, Cochise Co., Ariz. **Mine office:** Bisbee, Ariz.

Officers: G. H. Dowell, mgr.; W. H. Webster, asst. mgr.; H. H. Stout, supt. of reduction works; P. B. Butler, asst. supt. of works; Arthur Notman, supt. of mines; G. B. Lyman, geologist.

The Copper Queen Consolidated Mining Co., retaining its charter, has changed its name to Phelps Dodge Corporation. Its properties in Bisbee and Douglas, Ariz. are now known as the Copper Queen Branch of that corporation.

The company was operated for many years as a close corporation, but is said to have paid from 1888 to 1907, inclusive, dividends aggregating $30,000,000 or more. Recent dividends: $3,000,000 in 1908; $4,025,00 in 1909; $6,300,000 in 1910; $5,200,000 in 1911; $5,707,351 in 1912; $5,700,000 in 1913; $4,500,000 in 1914; and $7,000,000 in 1915.

Property. comprises the Copper Queen and other mines at Bisbee, a large smelting plant at Douglas, on the Mexican border, 30 miles from the mines. Mineral lands in the Warren, or Bisbee district, comprise 176 patented claims, 2,298 acres.

The Copper Queen, one of the best known copper mines of the world, was opened 1880, on an outcrop of oxidized copper ore in massive limestone, opposite the Copper Queen hotel in Bisbee. The original orebody, now represented by a large cave, averaged 23% copper. The ore was smelted in a 30″ water-jacket furnace, with English coke, brought via San Francisco. This orebody was exhausted in 3 or 4 years and the mine experienced many vicissitudes, until additional orebodies were developed, by following seams and stringers of ore leading to further large and rich deposits.

Geology: the ore-bearing formation of the Copper Queen and other mines of the Bisbee district, consists of thickly bedded limestone beds, dipping to the southward and cut by intrusive porphyritic dikes. Until 1902, the principal orebodies were found at the base of the carboniferous limestone beds, which are broken by igneous rocks, that evidently have a strong genetic bearing upon deposition. The ore deposits occur as pockets, lenses, chimneys, bunches, shoots, veins, stringers and seams, the larger bodies being connected, in most cases, by small veins, or mere knife-blade seams. The limestone and its included orebodies have a general gentle dip to the southeast, necessitating deeper shafts as distance is made toward the southeast. Extensive bodies of high-grade ore have been found, since 1902, in the deeper levels driven in the older limestones (Cambrian), and developments prove these underlying orebodies to be persistent to great depth. The oxidized part of the mines shows beautiful caves, lined with calcite crystals and stalactites and wonderfully fine crusts of azurite, malachite and cuprite; some of these caves are of considerable size. Many of the shafts are bottomed in sulphide ores of high-grade, but like the oxide orebodies, they are flat or have a gentle S. E. dip, and a thickness of 50 to 200′ or so. New orebodies are developed yearly and the ultimate lateral limits of payable ore are unknown.

In the Copper Queen mine, the majority of the ore has occurred in a zone encircling the west boundary of the porphyry intrusion of Sacramento hill. It has a width varying from 800 to 1,200′, and a thickness of about 400′. It reaches the surface in the older part of the mine to the N. W., but dips to the S. E., where it is reached at 1,400′ below the Czar collar, in its farthest extension at present developed on Copper Queen ground. There is one major extension from the N. W. end of the zone toward the west along the Czar fault, and others of minor importance.

Individual orebodies are scattered through the zone in an eccentric manner, only matched by their own irregularities of form and size. Their most general characteristics are the softness of the ore and their great horizontal rather than vertical extent. It has been estimated that the average vertical thickness of ore in the Czar and Lowell divisions is between 30 and 35′. It is calculated by assuming it to be uniformly distributed over its horizontally projected area.

In this zone, and for some distance above it, the ground has been subjected to intense alteration and intense but irregular oxidation. It has resulted in an enormous quantity of earthy or clayey material, which may be either ore or waste, which, when wet, is both heavy and tenacious. Below alteration, the ground is fairly hard, and the limestones contain primary ores differing from those heretofore considered typical of the camp, and which have not yet been thoroughly exploited.

Development: the Copper Queen mine has 7 shafts, all connected on the even numbered levels. The entire output is concentrated at and hoisted from the 1,700′ Sacramento shaft. The mines are opened ahead for several years, development averaging about 1 mile monthly of new workings, or at the rate of

1 linear foot of new work for 10 tons of ore extracted, which figure is proven by past experience to maintain practically constant ore reserves, while avoiding excessive advance openings that require useless maintenance cost. The stopes are filled throughout and the mines are timbered with square sets, mainly Washington fir, an average of 30′ in timber, board measure, being required for each ton of ore won in the oxidized zone.

The underground haulage plant is very extensive, with 21 miles of tracks, covering every second level from the 4th to the 16th, inclusive, ore from the intermediate levels being dropped through chutes, and all ore hauled to the Sacramento shaft for hoisting. The haulage system includes electric locomotives and side-dumping ore cars. Chutes have been installed throughout the mine for loading the cars, which discharge into large storage bins at the Sacramento shaft, through which all ore is hoisted. The system is fully described by Gerald Sherman, supt., in Trans. A. I. M. E., Sept., 1915, p. 1837. In order to complete the undergrounnd traction system, it was necessary to open many lateral drifts and crosscuts, which were located in solid ground, wherever possible, as the electric tram lines are the arteries of the mine.

Great attention is paid to fire prevention and ventilation, these systems being improved continually.

The Uncle Sam mine has an old shaft, and a new shaft, sunk in 1908, of 224′ depth. This mine is connected with the Czar, Holbrook, and Sacramento shafts, and has a large orebody, discovered 1913, that compares favorably with the bonanza deposits of the adjoining Shattuck mine.

The White Tail Deer mine lies across the range on the edge of the mesa near Don Luis, being reached by wagon road through a detour of several miles. It is being worked, developing a good grade of ore and may become an important producer.

The 4-compartment Sacramento shaft, 1,700′ deep, concreted, handles the entire output of the mines. There are loading bins on the even-numbered levels from 400 to 1,600′, reached by the electric haulage lines from all other workings of the mine. The shaft was sunk in rock for practically its entire depth, insuring as great a degree of immunity from drawing as is possible in this district. The Sacramento shows some rich ore, discovered 1913, on the 1,500′ level near the Hoatson claim line. Exploratory work, in the porphyry stock of Sacramento Hill, which is the geological keystone of the Bisbee ore deposits, has shown up a large tonnage of concentrating ore.

The hoist at the Sacramento is a powerful Nordberg tandem-compound engine, having 7′ drums with 5′ face, operated by steam, with 6 auxiliary engines, actuated by oil, under 150 lbs. pressure. Hoisting is done in 3-ton skips, and the hoist can raise a skip each minute, giving the shaft a capacity of fully 4,000 tons daily.

The Sacramento shaft has, perhaps, the most elaborate and ingenious system for mixing and loading ores to be found at any copper mine. This is fully described by Sherman in the paper already noted. The ventilation of the whole property with its 6 downcast and one upcast (Lowell) shafts is well described by Chas. A. Mitke, in Bull. A. I. M. E., Sept., 1915, p. 1941.

The central power plant near the Sacramento shaft, includes a boiler house, having four 400-h. p. Stirling water-tube boilers, furnishing steam direct to the hoists at the nearby Sacramento and Gardner shafts, the hoists at the other shafts being operated by compressed air. Equipment of the engine house includes three 500-k. w. turbo-generators, 3 air compressors, of about 100 drills aggregate capacity, a 70-drill Nordberg air compressor, the largest in the Southwest, and a 7,000 cu. ft. Nordberg compressor. Fuel is Texas and California petroleum, with large tanks for oil storage. All of the shafts, and the principal mine buildings, are reached by spurs of the El Paso & Southwestern railway.

New Mine: during the past few years, churn drilling has developed in Sacramento hill, a large tonnage of concentrating ore known as the East and West orebodies, containing respectively, over 14,000,000 and 7,660,000 tons. The latter carries 2.2% copper. Removal of overburden commenced in Jan., 1917. There were 290,771 cu. yd. stripped in that year, and 1,099,660 cu. yd. in 1918. In mining the West orebody, 3,407,148 yd. of ore and 10,383,997 yd. of waste

must be moved. The West orebody, because of its nearness to the surface will be mined by steam-shovel. A 90-ton t st mill was built in 1914, the best saving being effected by combined gravity concentration and flotation methods. Tests, on a working scale demonstrated that 1.3% of copper will make ore, and it is probable that 1% material can be worked. Based on the results of this experimental work, a 3,000-ton concentrator will be built on the flat west of Douglas. Excavations were completed in 1918.

Geology: the ore is disseminated and lies in the intrusion of the prophyry between the Pinal schist on the north and the limestone on the south. There are two orebodies, separated by a strip of ore, too low-grade to be worked.

The following articles are available on the subject: Arthur Notman, on drilling, in Trans. A. I. M. E., Vol. 52, Sept., 1915; Courtenay De Kalb, Sacramento Hill disseminated copper deposit, 'Min. and Sci. Press,' April 20, 1918; and R. T. Banks, drilling, 'Eng. and Min. Jour.,' April 19, 1919.

New work in the mines, exclusive of Sacramento hill, was 80,853′ in 1916; 55,518′ in 1917, and 58,360′ in 1918. Reserves were increased, especially in the Limestone mines.

Reduction Works

The Reduction Works, Douglas, Ariz., 28 miles from the mine and one-half mile from the Mexican border, treat 3,000 tons daily, handling the output of the Copper Queen mines, that of the Burro Mountain branch and that of the Moctezuma Copper Co., as well as doing a general custom-smelting business. The works occupy a site of 320 acres and are served by a very complete standard-gauge railroad system, reaching every building. The plant was blown in March, 1904, since which time there has been almost continuous enlargement, the works costing fully $4,000,000, smelting about 3,000 tons daily, there being no concentrator to eliminate part of the tonnage from the final furnace charges. The plant is described by J. Moore Samuel, in Bull. A. I. M. E., June, 1916, p. 1079, in a paper on dust losses.

Water for the works is secured from artesian wells, of about 300′ average depth, the water rising nearly to the surface, with 1 well, of about 1,000′ depth, flowing 200 gal. per minute. A large reservoir and cooling tower have been built in connection with the water supply.

The ore-bedding system consists of 5 pits, each 40x800′ in size, and 11′ deep, having an aggregate storage capacity of 90,000 tons. Ore, received from the mine in side-dumping steel cars, is discharged into the pits, which are lined with white tufa rock. The pits are filled with the different grades of ore required to constitute a normal furnace mixture, and the ores mixed by a mechanical plow. Ore is removed, as required by the furnaces, with steam shovels, running on permanent tracks laid upon the floor of the pits.

The blast-furnace building, 150x900′ in size, of steel frame, also covers the converter department. Three 60-ton traveling cranes, 60′ span, run the entire length of the building. There are ten 400-ton blast furnaces, each 44x240″ with forty 4″ tuyeres, and 16′ in height from the tuyeres to the charging floor. The 10 furnaces are set 15′ apart, in a single row, with a 10x20′ settler between each pair, the lower half lined with chrome brick and the upper half with ordinary brick. Ore is charged on either side, alternately, charging being done from trains of twenty 2,500-lb. cars, hauled by 13-ton electric locomotives. Slag flows from the settlers into 18-ton slag cars, hauled by electric locomotives. The slag dump is 1,700′ long, and is kept trim by a special leveling machine, operated by electric power. The blast-furnaces consume 350 to 400 tons of coke daily.

The dust chamber is of steel frame with brick and tile walls, roofed with reinforced concrete supported by steel trusses and has a bottom of tiled hoppers.

Molten matte is taken from the blast furnace to the converters by 60-ton electric traveling cranes, each having two 15-ton auxiliary hoists. The converter department has 7 stands, operated hydraulically, with 10 shells, of the Great Falls type, basic lined. Copper is poured in a Walker casting machine, and product is blister copper of about 99% tenor, with considerable gold and silver values. The converter plant has a flue, taking the gases from the 7 stands to a dust flue 11′ in diameter at the hoods and 13′ at the dust chamber.

The 260′ steel stack of the blast furnace building is 30′ in diameter at the base and 25′ at the top.

The calcining and reverberatory plant is 100x850′ in size, of steel frame. Ore is brought in over an elevated railway track on steel trestles, 400′ in length, and dumped into concrete storage bins, and drawn, from the bins to the roasters by belt conveyors. There are three 100′ reverberatory furnaces and sixteen 75-ton McDougall calciners. A slag tunnel, 30′ wide, 15′ deep and 276′ long, has electric cars, connecting with the slag tracks. The tunnel is lined with 4′ concrete walls, with a 2′ separating wall in the center. The reverberatory furnaces are next to the old building, succeeded by the slag tunnel, on top of which there is a battery of four 400-h. p. water-tube boilers, followed by a dust chamber; the McDougall roasters occupy the northern end of the building. The reverberatory department has a separate 300′ stack, of 22′ inside diameter, built of special hollow bricks, with walls 42″ thick at the bottom and 12″ at the top, requiring 1,250,000 brick and standing on a base of 60′ diameter requiring 1,100 cu. yd. of concrete. A pulverizing plant, for making powdered coal for one reverberatory was finished early in 1919.

The power house, of steel and brick, was enlarged to transmit electric energy 72 miles to El Tigre mine, in northern Mexico. The power plant has about 20 units, of various sizes and types, aggregating more than 6,000 h. p. Equipment includes 4 Nordberg cross-compound blowing engines, each direct-connected to a 400-k. w. 250-volt direct-current generator; Nos. 9 and 10 Connersville blowers, set staggering; a cross-compound 2-stage condensing air compressor, with piston capacity of 2,000 cu. ft. of free air per minute, at 100 lbs. pressure, for running the pneumatic tamping devices, operating charging doors of the blast furnaces and pumping water; 3 triplex motor-driven pumps, delivering water into compression tanks, at 350 lbs. per square inch, with automatic regulation; four 400-k. w. 250-volt direct-current generators, supplying power for cranes, slag locomotives and electric lights; two 750-k. w. turbo-generators and a number of minor engines and dynamos. The power plant is equipped with a complete set of gauges and meters, keeping record of the distribution of power to every department and sub-department.

The steel boiler house has six 500-h. p. and four 1,000′-h. p. Stirling water-tube boilers, with a Green fuel economizer, and a Foster superheater with capacity of 90,000 lb. of steam per hour. The stack of the boiler house is of brick, 177′ high and 13′ in diameter at the base. Boilers are arranged to burn either coal or petroleum, but latter is used exclusively, consumption of Californian and Texan petroleum, at the mine and works, amounting to about 500,000 gal. monthly. Oil for fuel is at present cheaper in first cost, easier and cleaner to handle, and effects a great saving in the wages of 3 daily shifts of stokers, formerly required at every boiler plant.

A limestone quarry, at Lee station, 7 miles east of Douglas, has a large crusher and storage bins, the smelter requiring 400 to 500 tons of limestone daily for flux. A saw mill is operated, in the forests of the Chiricahua mountains, though the bulk of the timber and lumber requirements of the mine and works are met by the importation from the Pacific coast.

Production:

Year	Tons Mined	Lb. Copper	Oz. Silver	Oz. Gold	Lb. Lead
1918.....	770,524	90,988,156	558,433	16,409	1,234,497
1917.....	800,585	93,618,409	828,665	19,156	6,870,128
1916.....	951,978	102,685,722	1,096,136	24,030	9,421,562
1915.....	783,211	88,551,180	943,368	18,974	9,388,418
1914.....	**732,829**	**86,066,143**	**1,036,672**	**15,769**	**8,889,175**
1913.....	867,481	97,181,725	919,138	16,213	5,701,628
1912.....	786,368	88,280,908	1,027,130	18,023	2,953,685
1911.....	619,132	74,489,728	1,227,453	16,895	5,658,930
1910.....	596,193	76,428,908	608,096	12,430	696,118
1909.....	.....	84,802,147	601,828	8,674	437,601
1908.....	.....	82,533,145	530,492	8,352	182,677
1907.....	.....	66,916,972	338,723	4,197	.....
1906.....	.....	79,536,416	332,723	7,573	.....

Smelter production, including custom ores:

Year	Ore treated, tons	Gold, oz	Silver, oz.	Copper, lb.
1918	1,311,742	32,709	2,307,307	192,063,212
1917	1,276,817	32,331	2,042,263	191,581,131
1916	1,304,523	32,832	1,794,854	171,893,880
1915	1,063,329	29,840	1,388,149	125,144,027
1914	835,016	26,259	1,405,301	119,957,017

There were employed 3,671 men in 1916; 3,773 in 1917, and 3,910 in 1918.

MOCTEZUMA COPPER CO

Mine office: Nacozari, Sonora, Mexico. J. S. Williams, Jr., gen. mgr.; H. T. Hamilton, asst. gen. mgr.; C. I. Schultz, gen. supt.

Inc. 1896, in West Virginia. **Cap.** $3,000,000; issued, $2,600.000. Is controlled through entire stock ownership by Phelps Dodge Corporation, and holds direct title to lands through Moctezuma Copper Co., S. A.

Inc. Feb. 4, 1896, in Mexico. **Cap.** 500,000 pesos. **Dividends:** were 77% or $2,262,000, 1902-07; none in 1908; $998,000 in 1909; $468,000 in 1910; $754,000 in 1911; $2,118,569 in 1912; $1,950,000 in 1913; $1,170,000 in 1914.

Property: about 2,500 acres of mineral land in the Moctezuma and Arizpe districts of Sonora, including the Pilares de Nacozari mine 6 mines east of Nacozari. Company also owns the Juarez and Nicolas ranches of about 35,000 acres, which carry considerable valuable timber. Examined in 1911 by J. M. Boutwell.

Geology: the Pilares mine lies in a high and precipitous country near the divide of the Yaqui and Oposura rivers. The ore deposit is an oval shaped brecciated mass of latite having a major axis of 2,000′ and a minor axis of 1,000′, formed by two parallel systems of faults, one coursing nearly N. and S. and the other nearly E. and W. The N. and S. faults dip about 80° to the east. There were two flows of latite; the first while cooling was interrupted by the second causing the partly cooled mass to break up into the bombs and fragments which are barren of mineral and which are cemented together by the second and mineral bearing flow. The latite gives way to andesite and this to monzonite with depth. A "caliche" dike from 4′ to 10′ wide runs through the entire west side of the mine. The ore occurs mainly on the border of the breccia "pipe," but lesser bodies are found inside it as well. The ore carries chalcopyrite with pyrite and some bornite, chalcocite and some covellite, the ore being mostly of concentrating grade, averaged about 3.39% copper as mined, in 1918. There is a "chimney" outcrop with carbonate ore, but croppings are mainly brown, a dull red-stained porphyry, carrying hematite. The leached zone is about 20′ in depth only, with payable ore coming in at depth of about 60′.

Geology and mining methods at the Pilares mine was discussed by W. R. Wade and Alfred Wandtke in Bull. 152 of the A. I. M. & M. E., Aug., 1919. They summarize by saying that the Pilares ore deposit is of the pyrite-chalcopyrite type, and occurs in latite and andesite breccias, perhaps of early Tertiary age. The ores are genetically related to monzonitic intrusives. Enrichment of commercial importance is confined to the upper 200′ of workings, but primary ore of excellent grade continues downward to the deepest workings.

In addition to the Pilares mine, the company owns a number of other properties that have been operated for several years past by lessees, including the Churunibabi, Bella Union, Fortuna, San Francisco, El Vaquero, El Promontorio (about exhausted), La Caridad, and San Pedro. The Bella Union has high-grade ore, including oxides and native copper, shipments assaying up to 39% in copper tenor, with small gold and silver values. The Churunibabi property, yielding $100,000 worth of silver ore to the lessees, from a rich gold-silver-copper orebody struck July, 1913, has been operated by the company for the past few years. During the year the main tunnel was driven 828′ to connect with the Estrella shaft.

Development at Pilares mine include 4 shafts; three 3-compartment main working shafts, the Guadalupe 918′; Pilares 1,200′ and Esperanza 1,355′ deep. The Guadalupe shaft is an underground shaft running from the 500′ level to the 1,400′ level. The Pilares and the Esperanza shafts are on the extreme ends of the ore body and run from the surface, 100′ level to the 1,300′ level. The new 5-compartment Pilares shaft is 400′ S. W. of the old one, and is down 700′, fully equipped with electrically-driven hoist, compressors, etc., similar to that at the Esperanza.

The mile long Porvenir tunnel opens the deposit 600′ below surface; 25-ton narrow gauge railway cars run from Nacozari into the tunnel direct to the mine ore chutes. The tunnel has storage bins in a 25x100′ chamber, to which ore is milled down from the upper workings, no ore being hoisted, all ore as broken being sent in chutes to the tunnel.

Two methods of ore extraction are employed, the room-and-pillar with waste filling as work progresses, and shrinkage stoping with waste filling after all the ore has been extracted.

The mine has some enormous stopes, the 646 stope is 60′ wide by 600′ long. The ground stands very well and the systems of extraction used give minimum timber requirements at a cost of only a few cents per tons of ore mined. No water is hoisted above the Porvenir tunnel level and very little water is raised from the workings below. The mine is well ventilated and is equipped with electric lights.

New work in the mines totaled 23,252′ in 1916; 33,823′ in 1917, and 33,833′ in 1918. The outside properties were operated as usual, but results have been irregular in the Caridad, Churunibabi and Promontorio.

Ore reserves in the Pilares deposit were estimated Jan. 1, 1916, as 3,220,000 tons; for Jan. 1, 1917, a decrease was reported due to inadequacy of hoisting facilities on lower levels. Such exploration as has been done the management reported as having been distinctly encouraging and much ore encountered, especially during 1918, when reserves were increased.

Equipment: includes electric hoists, two 25-drill air compressors, and two blacksmith shops, one at Pilares and one at Esperanza. There is an emergency steam plant at the mine having 2 boilers held in reserve in case of accident, but electricity is used throughout.

The power plant, at Nacozari, built in 1908, has 435-h. p. Stirling water-tube boilers, equipped with Green fuel economizers, Foster super-heaters and Rooney stokers (burning New Mexican coal), and a 196′ reinforced concrete stack. The plant has three 1,000-k. w. Curtis turbo-generators giving a 6,600-volt current, and an auxiliary 50-k. w. steam turbo-generator set is used as an exciter. Current is transmitted at 6,600 volts to the mine and mill and at the mine is stepped down to 230 volts for the pumps, while the hoists and electric locomotives use a 250-volt direct current. Two 5-cylinder Nordberg-Carels Diesel engines were to be installed in 1919.

The mine is connected with the mill by a 6-mile 30″ gauge railway. Rolling stock includes four 60-ton locomotives and twenty 30-ton Ingoldsby steel side-dumping cars.

The 2,000-ton concentrator, designed and built by H. Kenyon Burch, at a cost of about $1,000,000, is one of the most complete and efficient in existence. The crushing plant receives ore from the mine in 6,000-ton bins, whence it is fed by 2 automatic ore feeders, of special design, to grizzlies, with bars set 2½″ apart, oversize, going to a No. 8 gyratory crusher, and undersize to a belt-conveyor, meeting material from the crusher, and going by belt conveyor to two 4x10″ manganese trommels, with 1⅛″ perforations. Undersize from the trommels goes to belt conveyors and oversize from the trommel goes to No. 5 gyratory crushers, breaking the material to 1″ cubes, which joins the material from the trommels and is sent by belt conveyors to 4,000-ton storage bins.

Each 1,000-ton unit of the mill is equipped with 6 coarse and 12 fine jigs, 3 sets of rolls, Swain classifiers, Callow screens, 44 Wilfley tables and 72 Johnson vanners. From the storage bins the ore is fed by a portable ore feeder to a belt conveyor, passing over an automatic weighing machine and sampler, delivering it to an 18-mm. trommel. This trommel screens the ore, the coarse pieces going to

bull jigs and undersize to 11-mm. trommels; the latter feed oversize to coarse jigs and undersize to 7-mm. trommels. These trommels in turn feed oversize to intermediate jigs and undersize to 4-mm. trommels, whose oversize goes in its turn to 2-mm. trommels; oversize from latter goes to fine jigs. The undersize from the 2-mm. trommels goes to 22-mesh Callow screens and thence to Wilfley tables handling oversize and undersize.

Slimes from the Wilfleys go to the vanner settling tanks and middlings from the Wilfleys go to the Chilean mills by elevators. Tailings from the bull jigs, coarse jigs and intermediate jigs go to either of 3 sets of 42x16″ rolls, then by elevator to the mixing-box at the head of the trommels. Tailings from the fine jigs go to dewatering machines, and overflow from dewatering machines goes to vanner settling tanks, dewatered material going to the jig tailings bin and thence to Chilean mills, crushing to pass a 2½-mm. screen and thence to Callow screens of 22-mesh. Product is a concentrate of about 12% copper tenor, about 85% of the assay value being saved.

Re-grinding, flotation, and filtering machines were first installed during 1916, and have been added to each year since, a large pneumatic unit being erected in 1919. Flotation has improved the recovery.

An aerial tramway carries tailings from the concentrator to a dump on the hillside, far above the river level.

Water is pumped from a well sunk at the side of the river by 1 triplex and 3 Worthington pumps, of 500 gal. capacity per minute, to 500,000-gal. tanks at the mill. Wash water from the concentrates is settled and re-used. A large dam 3 miles east of Nacozari, 90′ in height, stores water sufficient for 2 years steady operation of the mill.

The company built and owns the town of Nacozari, and a town at the Pilares mine. At Nacozari the company maintains both English and Spanish schools for the children of employees, a well-equipped hospital, free library, and amusement hall.

Production:

Year	Milled, tons	Copper, %	Concen. tons	Rec. %	Copper, lb.	Gold, oz.	Silver, oz.	Molydenum, lb.
1918.....	762,089	3.392	173,128	85.575	42,875,355	11,103	923,922	7,024
1917.....	750,897	3.179	156,057	81.190	38,186,451	2,677	511,738	35,630
1916.....	715,070	3.273	143,939	80.500	37,709,310	1,310	471,867	6,162
1915.....	.....	.....	.....	.....	22,889,885	599	331,836	.....
1914.....	.....	.....	.....	.....	29,591,658	1,006	435,482	.....
1913.....	.....	.....	.....	.....	36,598,132	.....	.....	.....

Forces normally are 1,300 men at the mine and mill, of which the great majority are Mexicans, with a few Japanese, no American labor being employed at the mine aside from shift-bosses and timbermen. Mining has been done under contract at 7 to 11 pesos per foot, and the larger part of the tramming is done by contract also, the mine proper employing about 200 miners, 300 muckers, 80 carmen and 75 contractors.

The Moctezuma is one of the world's really great copper mines and the management is of the best.

MORENCI BRANCH

(formerly known as Detroit Copper Co.)

Mine and works office: Morenci, Arizona.

Officers: J. P. Hodgson, mgr.; W. M. Saben, asst. mgr.; F. W. McLean, mine supt.; G. E. Hunt, mill supt.; V. P. Hastings, smelter supt.; J. A. McDougall, power supt.; G. M. Robinson, chief engineer.

Property: is extensive, including the Ryerson, Arizona Central, Copper Mountain, Yankee, W. Yankee, Montezuma and Santa Rosa mines, at and near Morenci.

Geology: The mines of this company work varied types of copper deposits, all dependent upon and co-extensive with a big intrusive body of quartz

porphyry and its dikes. The ores are chalcocite, chalcopyrite and pyrite with various oxidized products occurring either in altered limestones, or as fissure veins in the impregnated rocks adjacent to them, or in large masses of altered, impregnated, shattered porphyry. The geologic relations are fully treated in a monograph by Waldemar Lindgren, Prof. Paper 43, U. S. Geo. Surv.; see also Weed, "Copper Mines of the World," page 287.

Ores are mainly sulphide with slight gold-silver values and high silica and alumina contents. The oxidized and limestone ores are still produced in small quantities, but 98.8% of the ores mined consists of small particles of chalcocite, associated with chalcopyrite and pyrite, in a leached and whitened, decomposed porphyry, averaging 2.39% copper. The high-grade ore from fissure veins carries 6 to 18% copper.

Development: is very extensive, with numerous shafts and long cross-country connections. The workings have thus far been shallow, 400′ being for many years the greatest depth. In 1912, development on the 600 and 700′ levels of the Yankee mine, north of the Yankee fault, opened 194,939 tons of 2.36% ore and similar deep exploration in the Arizona Central mine upset previous ideas that ores would not go deeper. Total amount of development work in 1914 was 26,375′; in 1915, 14,709′; in 1916, 20,513′; while abnormal conditions in 1917 and 1918 prevented much being accomplished.

About 90% of the output is now mined by the slicing system, costing about 21% of the square set and fill cost, which is necessarily still used in some parts of the mine. .Block caving is still cheaper, uses but little timber, and costs but 54.8% of the square set and fill method, but like the gopher and fill method, which is slightly cheaper, can only be used where favorable conditions prevail.

The New England mine has 2 shafts, deepest 750′, and a 2,000′ tunnel. The Clifton mine has 7 shafts, of 70 to 315′ depth, with tunnels of 220′, 450′, 700′, 800′, 1,000′ and 1,700′.

The Copper King mine is as yet but slightly developed, but has been claimed to show 40,000 tons of ore. An aerial tram from the Copper King mine was completed in 1909.

Of the 465,807 tons mined in 1918, the Ryerson contributed 43%; the Yankee, 20%; the Copper Mountain, 11%, and the Arizona Central, 20%.

Equipment: includes power house, of steel frame on concrete foundations, with one steam-driven blowing engine, 9,000 cu. ft. per min., one gas-driven blowing engine, 6,000 cu. ft. per min., one motor-driven No. 10 Connersville blower and one No. 9 Connersville blower driven by a 200-h. p. gas engine, two steam-driven air compressors, one of 4,000 cu. ft. capacity, the other of 1,300 cu. ft., one 600-k. w. turbo generator delivering 2,300 v., 2-phase, 60-cycle current, four 250-k. w. and one 100-k. w. belted generators driven by gas engines, delivering 230 v., 2 phase, 60-cycle current, running in parallel with turbo generators through transformers.

Recent additions to the power-plant were three 1,000-h. p. Diesel engines, direct connected to generators, and one 3,700 cu. ft. Diesel air compressor.

The concentrator, designed by H. Kenyon Burch, has proved remarkably successful, running 95% of the time. It consists of two 650-ton units, is 166x240′ in size, and cost about $1,000,000. Equipment includes Chilian mills, 6 sets of 16x42″ rolls, 28 revolving screens, 80 Frue vanners, 40 Wilfley tables, and Deister tables, the mill putting about 7 tons into 1.

A re-grinding and flotation plant was started in 1916, being enlarged in successive years. The mill power plant has 3 gas engines of 200-h. p. and 2 of 175-h. p. each, in conjunction with electric motors driven from the smelter power house. During 1918, the gas engine drive was changed to electric.

The concentrator uses about 500 gal. of new water per ton of ore treated, the balance being obtained by reclamation of water from the tailings in a series of concrete tanks with Dorr mechanism. The water is purchased from the Morenci Water Co., which has a pumping plant about 6 miles distant on Eagle river. This also supplies the town and practically all of the mines of the district. Tailings are conducted from a slag lined launder along the walls of Chase Creek canyon to a point below bunkers 14,000′ away where it is stored in impounding reservoirs in the small cañons which empty into Morenci cañon.

The smelter has one 44x396″ blast furnace, and 3 stands of small basic lined converters. Flue dust is mixed with concentrate residue before being re-charged into the furnace. About 70% of the total charge of new metal bearing material in 1918 was concentrates. The smelter has 2,000-ton ore bins, surmounted by a steel railroad trestle.

A 36″ gauge railway connects the mines and smelters with the Arizona & New Mexico railroad, at Guthrie. A tunnel through Longfellow hill, completed 1909, gives direct rail connection with the mill.

The company operates an excellent hotel, and maintains a library and club room for its 1,200 employees.

Production:

Year	Tons Milled	% Copper	% Recovery	Tons Smelted	Copper, lb.
1918.....	449,990	1.91	76.22	154,216	17,130,209
1917.....	312,225	2.33	70.78	118,596	13,203,401
1916.....	451,395	2.39	71.25	140,938	17,541,258
1915.....	376,604	2.83	.....	.....	15,333,976

In Sept., 1919, it was announced that $2,500,000 was to be spent in new construction at the Detroit. This included a new 5-compartment shaft, hoist, tramming equipment, 2,000-ton mill, remodeling of the smelter, and extensive development work.

PHELPS DODGE MERCANTILE CO.

W. A. Meyer, gen. mgr., in charge of 644 employees. G. E. Crysler in charge at Tyrone, and C. H. Hyde at Morenci.

Production:

Year	Gross Sales	Merch. on Hand	Net Profit, %
1918.....	$10,408,913	$2,622,161	7.98
1917.....	9,789,639	2,123,820	8.42
1916.....	8,406,636	1,648,355	10.38

STAG CANON FUEL CO.

W. D. Brennan, mgr.; J. B. Morrow, supt. of coke department. Employees, 1,693 men.

Production:

Year	Coal mined, tons	Coke made, tons
1918.....	1,339,292	281,916
1917.....	1,406,079	306,455
1916.....	1,439,904	300,571

REPUBLIC IRON & STEEL CO.

Offices. 15 Exchange Place, Jersey City, N. J.; 17 Battery Place, New York; Youngstown, Ohio, and Birmingham, Ala.

Officers: J. A. Topping, chairman; T. J. Bray, pres.; H. L. Rownd and J. W. Deetrick, v. p's.; R. Jones, Jr., sec.; H. M. Hurd, treas.; F. J. Webb, mgr. of the northern, and C. T. Fairbairn, mgr. of southern divisions; L .L. Wilcox, chief engineer.

Cap. $30,000,000 com., $25,000,000 pfd.; $100 par; $27,191,000 com. and $25,000,000 pfd. outstanding. Funded debt outstanding, $16,346,000 ten to thirty-year sinking fund mortgage gold 5s.

Dividends: 1¾% quarterly on pfd. and 1½% on com. stock.

Property: includes the following iron mines in Michigan, Minnesota and Alabama, which yielded a total of 1,693,450 tons in 1916; 1,706,555 tons in 1917, and 1,512,071 tons in 1918.

Mine	Range
Cambria No. 1	Marquette, Mich.
Cambria No. 2	" "
Lillie	" "
Franklin	" "
Minckler	" "
Sherwood	" "
Bray	Mesabi, Minn.
Gordon	" "
Kinney	" "
Pettit	Mesabi, Minn.
Schley	" "
Victoria	" "
Alfretta Group	Birmingham, Ala.
Houston	" "
Raimund Group	" "
Spaulding	" "
Tannehill	" "

Ore reserves are 43,740,121 tons in the northern mines and 68,928,936 tons in the southern group, a total of 112,669,057 tons. Lands in Wisconsin, near Hurley, have been under investigation by drilling and shafts.

UNITED COPPER CO.

Dead. Fully described Vol. XI, Copper Handbook.

The preferred stockholders' protective committee of the United Copper Co. stated Aug., 1915, that it had been unable to obtain any offer from the holders of the company's pledged assets which justifies the committee in continuing its efforts either to formulate a reorganization plan or redeem the pledged assets; that $750,000 would have to be provided to redeem assets, which would require a cash assessment of about $20 per share, which it is believed could not be raised under existing conditions. Committee also stated that it had considered possibility of instituting proceedings to recover wasted assets, but decided that there were no reasonable prospects of obtaining substantial results in such proceedings. Preferred stockholders were notified that stock deposited with the committee would be returned on presentation of certificates of deposit to the Central Trust Co. of New York.

Explanation is yet to be made as to what became of the cash and assets of the United Copper Co. treasury, both before and after the Assets Realization Co. became entangled with it. Reported in April, 1918, that the receivers had abandoned the search for a trace of the $10,500,000 received from sale of its property to the Red Metal M. Co., which was later absorbed by the Anaconda Copper M. Co.

UNITED MINES CO.

Address: C. J. Walker, Boatmen's Bank Bldg., St. Louis, Mo.

Officers: C. J. Walker, pres.; Jesse F. McDonald, 1st v. p.; J. C. C. Waldeck, 2nd v. p.; E. T. Cash, sec.; H. W. Mann, treas., with T. T. Nardin, directors.

Inc. Aug. 23, 1919, in Delaware. **Cap.** 115,000 pfd. shares, $10 par, and 235,000 com. shares of no par value, of which 15,000 and 35,000 respectively, have been issued. No public offering is to be made.

President advises us, company represents "the efforts of a group of men that is mainly interested in the Down Town Mines Co. at Leadville, Colorado, to find something worth-while in the way of metal mines, on which effort considerable work has been done with fair promise of satisfactory results."

U. S. SMELTING, REFINING & MINING CO.

General office: 55 Congress St., Boston, Mass.. Corporate Office: 85 Exchange Place, Portland, Maine. New York office: 120 Broadway.

Officers: C. G. Rice, v. p.; S. J. Jennings, v. p. in charge of exploration and min. investment; D. S. Calland, v. p. and gen. mgr. of operations in Mexico; F. Y. Robertson, v. p. and mgr. of sales; N. W. Rice, 2nd v. p.; F. W. Batchelder, sec.-treas.; John Laurie, comptroller; A. P. Anderson, cons. min. eng.; C. F. Moore, cons. eng.

Directors: S. L. Bartlett, R. J. Edwards, J. J. Phelan, C. G. Rice, E. P. Brown, C. F. Brooker, B. P. Clark, C. A. Hight, S. J. Jennings, R. T. Paine, 2nd, E. P. Bayley, A. W. Preston, D. A. Ritchie, and S. W. Winslow, Jr., R. S. Bradley, J. J. Storrow, H. B. Endicott, E. V. R. Thayer, and D. G. Wing.

Executive committee: B. P. Clark, C. J. Rice, J. J. Storrow, D. C. Wing, and S. W. Winslow, Jr.

Operating officials. C. E. Allen, v. p. and gen. mgr. of Western operations; G. W. Metcalfe, eng.; D. D. Muir, Jr., mgr. of mines, Utah; A. P. Anderson, cons. min. eng.; C. F. Moore, cons. eng. G. W. Cushing, traffic eng.

Inc. Jan. 9, 1906, in Maine. **Cap.** $75,000,000; $50 par, in $37,500,000 of 7% pfd. cum. stock and $37,500,000 com. stock; 486,350 pfd. and 351,115 com. shares issued.

National Shawmut Bank, Boston, and Guaranty Trust Co., New York, registrars; Old Colony Trust Co., Boston, and Bankers Trust Co., New York, transfer agents. Annual meeting in May. Listed on Boston and New York Exchanges. Company had 9,499 pfd., and 2,634 com. stock holders at end of 1918.

Bonded debt: $12,000,000 six per cent convertible gold notes, dated Feb. 1, 1916, due same date in 1926, interest payable Feb. 1 and Aug. 1 of each year. First National Bank, Boston, trustee; First National Bank, Boston, and Guaranty Trust Co., New York, registrars. Principal and interest payable at first mentioned, and Hanover National Bank, New York.

The U. S. Metals Refining Co. was absorbed by the American Metal Co. in December, 1919.

Dividends: rate is 7% on preferred stock, payable quarterly (Jan., April, July, and Oct.), first dividend paid April 15, 1906. Dividends on common stock are given in the table below.

Year	%	Year	%	Year	%
1920	3	1914	3	1915	1½
1919	10½	1913	6	1909	4
1918	10	1912	5	1908	4
1917	10	1911	4	1907	6¼
1916	8½	1910	4	1906	None

Financial Statement:

Year	Net Earnings	Deprec. & Reserve	Previous Surplus	Pfd. Dividend	Com. Dividend	Net Final Surplus
1918	$7,249,533	$2,474,443	$13,004,970	$1,702,225	$1,755,575	$14,322,260
1917	5,769,391	1,571,576	12,957,455	1,702,225	1,755,575	13,004,970
1916	9,737,664	2,839,200	8,253,455	1,702,225	1,492,239	12,957,455
1915	7,579,184	986,859	.....	1,702,225	.....	.....
1914	2,932,519	666,878	.....	1,702,222	.....	.....
1913	4,555,122	969,536	.....	1,702,145	.....	.....
1912	5,497,965	1,265,000	.....	1,702,120	.....	.....
1911	3,961,103	1,120,690	.....	1,702,120	.....	.....
1910	3,551,387	1,067,069	.....	1,701,701	.....	.....
1909	3,956,608	810,248	.....	1,700,963	.....	.....
1908	3,359,222	311,632	.....	1,700,801	.....	.....

Net earnings for 1919 were estimated at $9,410,000.

Comparison of current assets and liabilities of all companies:

ASSETS

Year	Cash	Notes and Accts. Rec.	Metals, Ores Supplies, Etc.	Total
1918	$2,045,948	$3,100,533	$13,329,710	$18,476,191
1917	1,641,126	2,967,837	12,884,424	17,493,387
1916	5,105,678	3,794,475	10,852,098	19,752,251

LIABILITIES

Year	Notes Payable	Accounts, Drafts Payable	General Reserves	Dividends Payable	Total
1918	$1,470,000	$2,091,145	$3,568,746	$864,450	$7,995,341
1917	900,000	3,125,765	3,897,828	864,450	8,788,043
1916	5,000	2,609,648	3,116,301	864,450	6,595,399

Production: ore from all properties, including Mexico, was as under:

Year	Tons	Value of Metal Contents Copper, %	Lead, %	Zinc, %	Silver, %	Gold, %
1918.....	1,220,722	10	10	7	61	12
1917.....	1,129,678	28	10	13	39	10
1916.....	1,022,306	39	8	15	28	10

Year	Zinc, lb.	Copper, lb.	Lead, lb.	Silver, oz.	Gold, oz.
1918.....	18,771,684	20,359,378	96,567,485	15,337,465	137,315
1917.....	53,590,446	29,043,242	107,519,570	13,000,187	109,612
1916.....	64,584,001	28,888,093	103,855,451	11,647,205	129,273
1915.....	34,105,471	26,923,674	87,102,179	12,071,863	196,481
1914.....	.....	17,946,659	64,443,260	9,936,237	124,719
1913.....	.....	20,239,973	58,116,504	13,089,708	148,372
1912.....	.....	21,152,620	56,385,769	12,059,829	140,183
1911.....	.....	22,199,141	49,022,791	10,285,150	118,703
1910.....	.....	28,430,423	51,450,985	10,776,465	113,246
1909.....	.....	36,672,605	41,627,995	9,637,119	128,393
1908.....	.....	32,803,603	27,304,347	8,340,566	128,208

Average prices received:

Year	Copper, cents per lb.	Lead, cents per lb.	Silver, cents per oz.	Zinc, cents per lb.
1918.....	25.273	7.424	97.081	8.289
1917.....	27.201	8.558	81.765	9.353
1916.....	27.297	6.676	65.386	12.327
1915.....	18.183	4.546	49.965	14.964
1914.....	13.404	3.827	55.564	.....
1913.....	15.433	4.396	60.503	.....
1912.....	16.237	4.529	61.291	.....

The United States Smelting, Refining & Mining Co. owns and operates the following:

Properties covering a large number of patented and unpatented claims near Bingham, Utah, J. F. Barnard, supt., Bingham mines. These are in one block, and produce lead, silver, copper, gold, and zinc ores. They are connected by means of the Niagara tunnel with the Garfield-Bingham railway, which permits of the delivery of the ore produced to any of the smelters in Utah. These mines have been operated since 1899 under the present control, and since about 1870 by earlier ownership. In 1918, they produced 177,921 tons of ore of an average net value of $8.292 per ton at the mine, at mining cost of $5.424 per ton. Owing to the fact that the ore bodies occur in limestone, which economically precludes the blocking out of large reserves, only from two to three years of ore are in sight, but the unexplored territory is large and the probability of continuing the finding of valuable orebodies for a long period of time is good.

A lime quarry at Topliff, Utah, which produced 136,836 tons during 1918.

Lead smelter and a lead and zinc concentrating mill at Midvale, Utah. L. D. Anderson, chief engr.; Ambrose Nord, cashier, Salt Lake City. These plants are situated on a area of 235 acres, and are connected with the Denver & Rio Grande and the Oregon Short Line systems. The smelter and mill not only treat the ores produced from the company's own mines, but purchase ores on the open market and by contract in all the inter-mountain States, thus making of this unit a permanent custom lead smelter and concentrator.

The smelter has 7 blast-furnaces and has a capacity of 481,800 tons of charge per year. It is equipped with the most modern type of blast and roasting furnaces and charging apparatus, and a system of baghouses to filter the smelter fumes. The primary object of the baghouses was to prevent the smoke becoming a nuisance, but their installation has permitted the company to recover as by-products arsenic and cadmium on a profitable scale.

The concentrating mill has a capacity of 210,000 tons of ore per year. It produces lead concentrates containing gold and silver, which is reduced in the

adjoining lead smelter, and a zinc-iron middlings product. This latter is separated in the dry mill by means of the Huff electrostatic process into a zinc concentrate and an iron-silver-gold concentrate. The latter is smelted at Midvale; the former is under contract to a zinc smelter. By means of this concentrating plant, complex ores, which formerly could not be profitably handled, are now treated so as to yield a profit both to the mine and smelter.

A number of patent and unpatented claims and 85 acres of agricultural ground for water-rights at Eureka, Utah. The geology of the district has been fully described by the U. S. Geological Survey. The deposit consists essentially of a replacement in limestone, the ore-shoots making along north and south and also northwest and southeast fracture-zones. The ore produced from them can be delivered either to the Denver & Rio Grande or to the Salt Lake Route. The claims have been worked since the year 1887 and have produced a great quantity of high-grade ore. The recent developments have shown an ore of much lower grade, and although the possibilities of finding much ore, especially below water-level, have not been exhausted; these mines are no longer depended upon as a large source of ore supply for the Midvale smelter. During 1918, the Centennial-Eureka produced 29,559 tons of ore of an average net value of $16.97 per ton, at a cost of $8.65 per ton. This was 60% of the quantity for 1917. It has a shaft 2,300 ft. deep, with levels at approximately 100-ft. intervals. It is equipped with hoisting engine and compressor plant sufficient for a production of 120,000 tons per year. All this equipment is kept in first-class condition. A. P. Mayberry, supt., Centennial Eureka mine.

In Shasta county, California, is the company's Mammoth mine, one of the most important in the State, but its end is not far off as reserves are only about 115,000 tons. R. E. Hanley, gen. supt. Mammoth mines.

A copper smelter at Kennett, California. O. J. Egleston, mgr. Mammoth plant. It has five furnaces, three of which are in operation, and has a capacity of 450,000 tons of charge per year. From 1905 to 1919 it treated 3,420,410 tons of ore. The smelter is equipped with a converter plant from which the blister copper is shipped to the refinery of the U. S. Metals Refining Co. at Chrome, N. J. Besides the usual auxiliaries, the smelter is supplied with a large baghouse, the purpose of which is to render the emissions of the smelter harmless to agricultural interests. By reason of this baghouse, it is the only one of the smelters in Shasta county which is permitted to operate, such permission having been obtained by a decree of the Federal Court. The smelter treated the whole output of the operating mines, and is easily reached from any part of the mining territory in Shasta county which the company is exploring. The smelter is also treating custom copper ores originating in northern California, and silicious ore from California, Nevada, and Oregon. There are frequently found in the Mammoth group of mines copper-bearing orebodies that carry a high percentage of zinc. The smelter is equipped with a sorting plant for these ores, which turns out a high-grade zinc product. The smelter is liberally equipped with a power-plant, machine-shop, boiler-shops, round-house, etc., to allow an uninterrupted and economical operation. During 1917, the quantity of ore reduced was 345,990 tons, 164,540 tons coming from the Mammoth mine; and in 1918, a total of 413,082 tons, the Mammoth supplying 77,695 tons.

A milling plant at Needles, San Bernardino county, California. This is a concentrating plant of 125 tons daily capacity, equipped with crushers, jigs, tables, and a flotation plant, the latter for the recovery of zinc from tailings.

A number of patented claims and water-rights at Goldroad, Arizona, held by the Gold Roads Co. D. R. Muir, mgr. Gold Road and Needles properties. The ore is a gold-bearing quartz, occurring in a fissure vein, which strikes easterly and westerly. The claims cover 1¼ miles along the vein. The record of production prior to its purchase by this company in 1912 was a good one, the stoping operations having been carried down to the 500-ft. level. On taking control the U. S. Co. extended development on the strike of the vein and also down to the 900-ft. level. The assay-value of the ore diminished with depth compared with that previously mined, only a small percentage of the ore found on the 800-ft. level being of pay grade, though the vein continues strong and persists.

The mine is worked through two shafts; one reaching 800 and the other 900-ft. level, equipped with cages and skips. The precious metals are recovered by cyanide process in a mill of 300 tons daily capacity, located within a few hundred feet of the mine. The property is fully supplied with power house, air-compressor, shops, warehouse, dwellings and other accessories required by the operation. The motive power at the Gold Road mine is electricity, purchased from a power plant at Kingman, Arizona. Little work was done in 1917 and none in 1918, save that part of the mill was leased.

Zinc mines and mills in Kansas and Oklahoma. The zinc smelter at Checotah, Okla., uses natural gas as fuel, and is equipped to treat both carbonate and sulphide ore containing precious metals.

Niagara Mining Co.

G. W. Heintz, gen. mgr.; C. E. Ellen, mgr.

Inc. in Maine. **Cap.** 1,000,000 shares, $1 par, 650,005 shares issued. Of these, the U. S. S. R. & M. Co. owns 572,605 shares; of the balance, 38,498 are held by other shareholders, and 38,902 are held in the treasury of the Niagara Mining Co.

Property: company owns several patented and unpatented mining claims adjoining the mines of the U. S. S. R. & M. Co. at Bingham, Utah. The property is being worked through the Niagara tunnel, which connects at its portal with the Bingham & Garfield Railroad for delivery of ores to the Salt Lake Valley smelters. The property is now being developed to connect the known orebodies with the Niagara tunnel haulage-system, and is prospecting for new orebodies in hitherto undeveloped areas. The property is fully equipped for mining operations.

Bullion-Beck and Champion Mining Co.

Inc. in Utah. **Cap.**, 100,000 shares, $10 par, 63,787 issued; 54,824 shares being owned by the U. S. S. R. & M. Co. Lessees are doing most of the work. Production in 1917 was 5,700, and in 1918, 2,072 tons.

United States Fuel Co.

S. J. Jennings, pres.; Moroni Heiner, v. p.; R. M. Magraw, gen. supt.; E. R. Gibson, auditor.

A Utah corporation.

Capital, $10,000,000, of which $3,000,000 is pfd., par $1, and $7,000,000 com., par $10; 2,355,690 pfd. and 700,000 com. issued.

Bonds: This company has outstanding $3,636,300 first and refunding 6% bonds, of which $3,424,800 are owned by the U. S. S. R. & M. Co.

The U. S. S. R. & M. Co. owns 1,359,619¼ pfd. shares, and 700,000 com. shares.

The U. S. Fuel Co. has acquired the properties of the Castle Valley Coal Co., Black Hawk Coal Co., Consolidated Fuel Co., Panther Coal Co., and has assumed the joint first mortgage bonds of the Consolidated Fuel Co. and Southern Utah Railroad Co., par value $303,000.

The U. S. Fuel Co. also owns all the outstanding capital of the following companies:

	Shares.
Utah Coal Sales Agency	7,500
Mohrland Mercantile Co	18,000
Southern Utah Railroad Co	749
Castle Valley R. R. Co	10,000
Price Reservoir & Irrigation Co	20,000

The Utah Coal Sales Agency owns all the outstanding capital of the Western Fuel Co—361 shares.

By acquisition of the above properties, the U. S. Fuel Co. owns and controls four coal mines, each equipped with haulage system and separate tipples. The joint output of these mines in 1918 was 1,272,081 tons.

United States Stores Co.

J. H. Horlick, mgr.; R. T. Walker, mgr. of Ore Purchasing Dept. at Salt Lake City.

Is the purchasing department of the U. S. S. R. & M. Co., organized under the laws of the State of Utah. Authorized capital of 500 shares; all issued and owned by the U. S. S. R. & M. Co.

Utah Railway Co.

G. W. Heintz, pres.; G. S. Anderson, v. p. and gen. mgr.

A corporation organized under the laws of the State of Utah.

The funded debt of Utah Railway Co. is $4,500,000 in 5% gold coupon notes, maturing April 1, 1922, all of which are owned by the U. S. S. R. & M. Co.

Cap., 35,000 shares, $100 par; 30,652 issued and owned by the U. S. S. R. & M. Co.

Property: company owns and operates 45.56 miles of track, and has trackage rights over 52 miles of road (double track entire distance) of the Denver & Rio Grande company, between Thistle, Utah, and Utah Railway Junction, Utah, aggregating 98.56 miles of road operated exclusive of other trackage rights, yard tracks, and sidings. All the coal produced by the U. S. Fuel Co. and other mines along the road is hauled by the company which is fully equipped with the latest type of engines and coal cars.

Carbon-Emery Stores Co.

A corporation organized under the laws of the State of Utah. Authorized capital, 30,000 shares, par value $5, of which 27,000 shares are issued and owned by the U. S. S. R. & M. Co.

San Pete Valley Coal Co.

A corporation organized under the laws of the State of Utah. Authorized capital, 2,000 shares, par value $10, of which 1,877 shares are owned by the U. S. S. R. & M. Co.

Richmond-Eureka Mining Co.

G. W. Heintz, gen. mgr.; C. E. Allen, mgr.

Inc. in Maine. Cap., 360,000 shares, $10 par, 309,397½ issued, 182,213 of which are owned by the U. S. S. R. & M. Co.

Property: several patented and unpatented claims situated at Eureka, Nevada. The geology of the district, and of the deposit is fully described in a monograph of the U. S. Geological Survey. Mining began in 1869, and continued with minor interruptions up to 1910. In February of that year the Eureka & Palisade Railway, which connects the mine with the Southern Pacific and also Western Pacific Railway at Palisade, was washed away. When the railway was repaired, the high freight demanded made the ore, all of it low-grade, unprofitable. Regular mining operations have not yet been resumed. A little speiss has been shipped from the dumps to the U. S. S. R. & M. Co.'s plants for experimental treatment.

The mine is equipped with hoists, pumps, and compressors, shafts, and drifts. It has never been prospected below the water-level and there remains a large section of ground above that level also unexplored. Whenever the railway puts in a rate approximating the former one mining can be resumed, and the possibilities of the ground determined.

See this company in Nevada.

Sunnyside Mining & Milling Co.

Inc. in Maine. **Cap.**, 18,000 shares, $100 par, all issued, of which the U. S. S. R. & M. Co. owns 9,001 shares.

Property: Several patented and unpatented claims at Eureka, Colorado, at an elevation of 12,000′. Control was secured in 1917. The ore carries zinc, lead, silver, and gold. Reserves are estimated at 850,000 tons. Workings on 8 levels aggregate 12,000′ of openings. A fire in 1919 destroyed part of the surface works, delaying production thereby. The mill is a 500-ton flotation plant.

See this company in Colorado.

United States Smelting, Refining & Mining Exploration Co.

Offices: 55 Congress St., Boston, Mass.; 120 Broadway, New York; 920 Newhouse Bldg., Salt Lake City; 1504 Hobart Bldg., San Francisco, California.

S. J. Jennings, v. p. in charge of exploration and mining investment; C. E. Allen, v. p. and gen. mgr. of Western operations.

A corporation organized under the laws of the State of Maine. Authorized capital of 1,000 shares; $50 par value; 900 of which are issued and owned by the U. S. S. R. & M. Co. The Exploration Co. was formed for the purpose of developing new properties, which, when acquired, would be turned over to the U. S. S. R. & M. Co.

Some of the many properties examined and developed were the Ebner in Alaska working on a small scale), Fryer Hill basin at Leadville (abandoned after doing considerable work), Stowell copper claims in California, the Sunnyside in Colorado (put on a 500-ton daily output), Keystone claims in California (ore found by drilling), silver-lead property in Idaho, and options on ground in Mexico.

Compania De Real Del Monte Y Pachuca

S. M. Cancino, pres.; D. S. Calland, director.

A Mexican corporation with authorized capital of 2,554 shares, of which 2,535 shares are owned by the U. S. S. R. & M. Co. It operates a large number of claims in the districts of Pachuca and Real del Monte, State of Hidalgo, Mexico, producing gold and silver, and also owns large agricultural tracts. This company owns two cyanide plants, one of 1,000 tons daily capacity in the Real del Monte district, the other of 1,800 tons for the Pachuca district. About 20% of the total recovered metals are in the form of concentrates, which are shipped to custom smelters; the remainder, in the form of bullion, is exported. A third mill, for treatment of ore from the New vein, which contains large reserves of rich ore, is contemplated.

In Aug., 1919, the Santa Ana property, of 200 acres, in the extreme western part of the Pachuca district, was acquired. This gives a solid block of 300 acres in that area. The eastern section of Santa Ana contains part of the famous Viscaina vein. The mine has been producing silver ore for several years. A large body of rich ore is available. An aerial tram a mile long is being erected to carry to Santa Ana ore to the Loreto mill. See this company in Mexican mines.

United States Smelting, Refining & Mining is ably managed and in the hands of experienced, yet courageous, executive officials, so that an even more prosperous future is assured.

UNITED STATES STEEL CORPORATION

Through its subsidiaries this company controls about 140 iron mines in Alabama, Michigan, Minnesota, and Wisconsin. The most important are described under their respective titles. Recent production:

Year	Tons	Year	Tons	Year	Tons
1918.....	28,332,939	1917.....	31,781,769	1916.....	33,355,169

YUKON GOLD CO.

Controlled by the Yukon-Alaska Trust, Incorporated, 1916, to take over the residuary assets of the dissolved Guggenheim Exploration Co.

Office: 120 Broadway, New York.

Trustees: William Loeb, Jr., C. K. Lipman, Charles Earl, and R. W. Straus.

Officers: Wm. Loeb, Jr., pres.; C. K. Lipman, v. v.-sec.; C. H. Munro, acting cons. engr.-gen. mgr., with Daniel, Isaac, Morris, S. R. Guggenheim, E. L. Newhouse, F. R. Foraker, Charles Earl and O. B. Perry, directors; L. Fredrick, treas.; W. E. Bennett and C. E. Moran, asst. sec.; M. M. Van Keuren, comptroller; O. L. Myers, gen. aud.; F. R. Raiff, traffic mgr.; E. R. Reets, purch. agent; E. E. McCarthy, mgr. at Dawson, H. C. Perring, mgr. at Oroville.

Inc. Feb. 28, 1907, in Maine. **Cap.**, $25,000,000 reduced, Jan., 1915, to $17,500,000; $5 par; all issued; $14,213,125 stock owned by the Yukon Alaska Trust. Guaranty Trust Co., New York, registrar; D. A. Crockett, 120 Broadway, New York, transfer agent. Listed on New York and Boston Curb. Annual meeting 2nd Monday in January, at Augusta, Me.

The Guggenheim Exploration Co. had loaned the Yukon Gold Co. $5,000,000, at 5%, covered by 8 serial notes for $625,000 each, one of which was payable each year for 8 years, from Feb. 1, 1917. When the first note was due, re-payment was extended one year from the date of maturity of the last of the series of 8 notes. In 1917, it was calculated that earnings from the holdings would be insufficient to meet the notes and continue dividends. The second note became due on Feb. 1, 1918, but was extended to 1926. No. 3 note, due Feb. 1, 1919, was paid.

Dividends: 8% (40c. per share), quarterly from Sept., 1909, to Dec., 1911; 6% (30 cents) annually from April, 1912, to Dec. 31, 1917; and 1% (5 cents) in 1918. Payments were suspended in Sept., 1918, on account of abnormal conditions.

Comparative General Balance Sheet

ASSETS

Year	Property & Invest's	Equip.	Def'd Charges	Bullion & Cash	Other Current	Total
1918.....	$2,492,818*	$2,857,471*	$158,542	$1,392,282	$2,550,339	$9,451,453
1917.....	2,878,416*	3,323,752*	434,144	1,279,003	2,207,454	10,551,082
1916.....	12,311,019	8,312,943	501,094	2,046,748	1,735,985	24,907,780
1915.....	11,569,474	7,039,902	548,532	469,729	1,357,015	20,984,652
1914.....	11,524,181	7,036,424	600,066	195,283	1,509,654	20,856,608

* On basis of re-valuation.

LIABILITIES

Year	Capital Stock	Yukon-Alaska Trust	Current	Deprec.	Surplus	Total
1918.....	$17,500,000	$5,000,000	$195,877	$.....	$4,255,576*	$9,451,453
1917.....	17,500,000	5,000,000	244,985	.....	5,306,097	10,551,082
1916.....	17,500,000	5,000,000	189,614	1,567,822	650,344	24,907,780
1915.....	17,500,000	1,500,000	158,078	1,223,740	602,834	20,984,652
1914.....	17,500,000	1,675,000	134,729	987,995	567,884	20,856,608

* On basis of re-valuation.

Comparative Income Account:

Year	Net Operating Income	Royal-ties Paid	Amort-ization	Int. Ch's. Exp's, etc.	Total Deduct's	Surplus
1918.....	$325,455	$61,020	$.....	$218,536	$279,556	$45,898
1917.....	1,738,239	119,217	.....	245,876	365,094	1,373,146
1916.....	2,101,701	362,852	250,647	390,691	994,191	1,107,510
1915.....	2,121,031	542,241	248,037	245,803	1,036,081	1,084,950
1914.....	2,213,126	489,169	534,073	61,577	1,084,819	1,128,307

Property: includes 650 claims in the Klondike, Yukon Territory; 24 claims on Flat and Greenstone creeks, Iditarod district, Alaska; considerable areas on the American, Feather, Trinity, and Yuba rivers, and Butte creek, California; lease on property of the Coeur d' Alene Mining Co., Prichard creek, near Murray, Idaho; and the Long Hike, O. K. and Starlight lode claims, in the Jarbidge district, Elko county, Nev., the last three operated by the Elkoro Mines Co., which see.

The new properties acquired by purchase or lease contain gold estimated to be worth $8,000,000, of which the company's proportion will be $3,500,000.

The Idaho property, early in 1918, was reported to contain 10,600,000 cu. yd. of gravel and $1,530,000 in gold.

Heretofore Yukon Gold has confined its operations to placers, but the lode property in Nevada marks a departure from this policy.

Equipment: at Dawson, Yukon, 7 large dredges, 70 mile ditch, power plant, steam thawing apparatus and hydraulicking plant; on 5 rivers in California, one dredge on each; in Idaho, one 7½ cu. ft. dredge; and at Elkoro mines, Nev., 100-ton cyanide mill.

Production:

	1918			1917		
	Yards	Yield Cts.	Cost Cts.	Yards	Yield Cts.	Cost Cts.
Alaska (1 dredge)..	644,125	83.06	75.72	1,135,177	91.5 to $1.17	48.1 to 53.2
Klondike (5 dredges)	2,767,058	30.87	34.36	4,583,326	37.87	25.81
Klondike (sluicing)..	2,054,390	16.00	8.40	2,143,444	21.47	11.80
California (5 dredges)	4,444,404	7.00	6.00	6,161,941	8.40	3.71
Idaho (1 dredge)....	1,448,306	12.97	7.30	.....	.....	.....
Total quantity..	11,358,283			14,023,788		

	1916			1915		
	Yards	Yield Cts.	Cost Cts.	Yards	Yield Cts.	Cost Cts.
Alaska (2 dredges)..	1,222,428	86.7 to 95.6	80.6 to 39.8	926,956	91.30	38.70
Klondike (dredges)..	5,433,052	41.89	23.32	5,041,075	48.73	26.46
Klondike (sluicing)..	2,245,084	19.40	11.90	3,031,647	13.60	7.00
California (3 dredges)	4,032,476	10.27	3.94	3,818,127	11.46	4.51
Total quantity.	12,933,040			12,817,804		

The boats in Alaska have worked out their ground, and have been dismantled. Company's financial and technical direction is excellent.

ZINC CONCENTRATING CO.

Office: L. N. Godfrey, pres.; 60 Congress St., Boston, Mass.

Company controls the Campbell system of magnetic separation and the Dings' magnetic separators used by the Linden Zinc Co. and the Wisconsin Zinc Co.

ALABAMA

ALABAMA COMPANY, THE — ALABAMA

Office: H. W. Coffin, gen. mgr., Birmingham, Ala.

Inc. 1913 in Del. **Cap.,** $2,000,000 com.; $600,000, 7% cumulative 1st pfd.; $1,500,000, 7% non-cum. 2nd pfd.; par $100. Bonds $2,256,000, all issued.

Dividends: July, 1917, paid back dividends in full on 1st pfd. amounting to 21%. On 2nd pfd. initial 7% paid Dec., 1917. On common 1st dividend, Dec., 1917.

Property: includes 10,164 acres of iron orelands in Etowah, Talladega and Jefferson Counties, Ala.; and in Polk Co., Ga. Also owns 4 blast-furnaces, capacity 300,000 tons; coal mines and coke ovens in Alabama.

Ore: production for the last 4 years was: 135,398, 166,582, 257,958 and 336,135 tons, respectively.

CENTRAL ALABAMA C. & I. CO. — ALABAMA

Office: Jenifer, Ala.

Reported, 1919, that company would rehabilitate the Jenifer iron furnace plant, erect hot blast stove and machine shop, install complete electrical equipment, add 50 coke ovens at coal mine, and build additional washery at brown ore mines near furnace. The Thomas Furnace Co. will probably operate the plant.

GULF STATES STEEL CO. **ALABAMA**

Offices: Brown-Marx Bldg., Birmingham, Ala.; 55 Cedar St., New York City.

Officers: James Bowron, pres.; N. Sanborn Smith, v. p.; C. A. Moffett, v. p.-gen. mgr.; A. R. Forsyth, v. p.-treas.; W. H. Moore, sec. Wm. H. Coverdale, cons. eng.

Inc. Nov. 1, 1913, in Del. as reorganization of Southern Iron & Steel Co. **Cap.,** common stock authorized $10,639,200; issued $8,139,200; 1st pfd. 7% cum., authorized, $3,000,000, issued $2,000,000; non-cum. 6% pfd., authorized $1,860,800, issued $860,800. Bonds $210,000.

Dividends: Feb., 1916, accumulated dividends of 15 1/6% paid on 1st pfd.; regular quarterly dividend of 1¾% paid since. On 2nd pfd. initial dividend of 1½% paid Aug., 1916, regular quarterly dividends since, also extra of 1½% paid Nov., 1916. On common, initial quarterly dividend paid Jan., 1917, continued regularly with extras. Common received a 25% stock dividend, June, 1918.

Property: owns and operates blast-furnaces, steel plants and rolling mills at Alabama City; red-ore mines 5 miles S. of Birmingham; 401 acres of limestone and 15,277 acres of coal land in Jefferson county; also coal lands near Bessemer, Ala.; by-product coke-ovens, etc.

REPUBLIC IRON & STEEL CO. **ALABAMA**

See same title in U. S. section.

TALLADEGA IRON CO. **ALABAMA**

Property reconstructed by Japanese capital. In May, 1918, the furnace was about ready for operation though it was reported that the U. S. Government had refused export license.

TENNESSEE COAL, IRON & RAILROAD CO. **ALABAMA**

Office: Brown-Marx Bldg., Birmingham, Ala.

Officers: G. C. Cramford, pres.; H. C. Ryding, v. p.-gen. mgr.; L. T. Beecher, sec.-treas.

Inc. 1860 in Tenn. as Tenn. Coal & Ry. Co.; name changed 1881. **Cap.,** com. $50,000,000; issued $32,528,698; and $108,200 8% cum.-pfd., par $100. The U. S. Steel Co. owns all but $66,092 of the common stock.

Property: Owns or controls coal mines and iron ore mines (in Birmingham district) and shipping plant, coke ovens, steel mills, etc., in the Ensley district, Ala. In 1918, the Chichran Shipbuilding Co. near Mobile, and the Fairfield Steel Co. were organized as subsidiary companies.

Production: not published, but is probably about 3,000,000 tons; this State yields 5,000,000 tons annually.

U. S. STEEL CORP'N **ALABAMA**

See same title in U. S. section.

WOODWARD IRON CO. **ALABAMA**

Office. Woodward, Ala.

Officers: A. H. Woodward, pres R. H. Banister, v. p.; D. E. Wilson, treas.; H. E. Smith, sec.

Inc. Nov., 1911, in Del. **Cap.** $10,000,000 com. and $3,000,000 6% cum. pfd.; par $100; all issued.

Property: owns and operates 5 blast furnaces with annual capacity about 450,000 tons of pig iron, by-product coke ovens and coal and iron mines near Birmingham, on one of which the E. J. Longyear Co., is said to be sinking a 14x22′ shaft 1,400′ deep.

ALASKA

Metal production of this Territory during 1918 was valued at approximately $29,000,000, $12,000,000 less than in 1917. The copper product was $17,180,000; gold, $10,000,000 and silver, $870,000. Chromite, tungsten, antimony, etc., totaled $117,000, and tin $90,000. Since 1880 the total copper output has been $106,000,000, and gold $302,000,000. Mines are arranged alphabetically in this Territory.

The total output in 1919 was $18,850,000.

Prince William Sound region, in which most of the copper mines occur, includes Ellamar district on eastern shore, and Knight Island on western part of sound. The rocks of the region are mainly metamorphosed sedimentaries, dominantly graywacke, argillite, slate and conglomerate, with very minor amounts of limestones, chert or jasper. They are folded and intruded by large bodies of basic igneous rocks now altered to greenstones, and by still more recent granite stocks.

There are two periods of mineralization, the copper ores being associated with the greenstones while the later gold-bearing quartz lodes are genetically related to the granite. The copper deposits are replacements and impregnations of sheared and shattered zones in the greenstone or adjacent rocks. The ores contain chalcopyrite, chalmersite, pyrrhotite, sphalerite, galena, pyrite, arsenopyrite, gold, silver with associated epidote, quartz, calcite and chloride.

ALASKA-CHITNA EXPLORATION CO.

Reported to have bought the Westover group in southwestern Alaska, from Louis C. Dillma of Seattle, Wash., in 1917.

ALASKA CONSOLIDATED COPPER CO. **ALASKA**

See Alaska Copper Co.

ALASKA CONSOLIDATED MINING & SMELTING CO. **ALASKA**

Mines at Copper Mount, Sulzer P. O., Prince of Wales Island, Alaska.

Officers: Geo. H. Crosby, pres.-gen. mgr., Lonsdale Bldg., Duluth, Minn.; A. M. Sellwood, v. p.; I. M. Lennan, sec., with A. L. Warner and Henry W. Armstrong, directors. Thos. Wright, supt.

Inc. Oct., 1912, in Ariz. **Cap.** $2,500,000; $5 par; $1,500,045 outstanding.

Company purchased of the Alaska Copper Co. at sheriff's sale. Property: 23 claims, 18 patented and 5 being patented, with 15-acre mill site, known as the Copper Mountain group, situated on Copper Harbor, Prince of Wales Island, Alaska.

Geology: mine covers a contract metamorphic zone between granite and limestone with a porphyry intrusion along the contact. Orebodies are from 3 to 50′ wide with mineralized zone 900′ wide and quite attractive surface showings. Development: by 4,600′ of tunnels and several shallow shafts.

Equipment: includes smelter, sawmill, tramway and many buildings, put up before sufficient ore had been found to keep smelter in operation. Reports made by W. H. Weed and other engineers on file in company's office. No ore shipped since 1907. Idle.

ALASKA COPPER CORPORATION **ALASKA**

Office: 25 Pine St., New York. **Mine office:** Strelna, Alaska.

Officers: Frederic B. Bard, pres.; Alvan Markle, treas.; Edward Barr, sec. **Directors:** Samuel D. Warriner, Alvan Markle, John W. B. Bausman, W. F. B. Stewart, George R. Bedford, Edwin Barr, Frank P. Lauer, Frederic B. Bard and D. George Dery. Angus McLeod, supt.

Inc. November, 1912, in Delaware. **Cap.**, $10,000,000; $5 par; 1,740,000 shares issued. **Bonds:** Authorized and issued in 1917, joint mortgage bond for $1,000,000 with Alaska Consolidated Copper Co. at par, of which 1,137, 6% $500 10-year Gold Bonds convertible into stock of the Alaska Copper Corporation have been subscribed and paid for to March, 1919. Proceeds expended in and about the enterprise. Guaranty Trust Co., New York, transfer agent; Columbia Trust Co., New York, registrar. Annual meeting, third Tuesday in February.

Company controls by ownership the majority of the capital stock of the Alaska Consolidated Copper Co. and holds an operating lease for 99 years from the latter company.

Property: 35 claims, 700 acres; eleven claims patented and balance in process of patent. Holdings comprise Nuggett group, situated about 18 miles from railroad station of Strelna, on the Copper River and North Western R. R., at an elevation of about 3,500′.

Geology: property is crossed by a series of parallel fault fissure veins, in amyglaloidal greenstone, containing mostly bornite and some chalcopyrite, in

a siliceous limestone gangue. The several parallel veins dip 83° N. W. and strike N. 40° E. One vein system has been followed on the surface along its strike for 3,500′, by means of test pits sunk at frequent intervals. Ore said to average 7½% copper per ton. In March, 1918, a carload shipment of hand-picked ore was reported to have averaged 15.61% copper and 4 oz. silver per ton.

Development: by about 5,500′ of workings.

Equipment: includes three 30 h. p. of the N-S-O type of fuel oil engines. The air compressors are direct connected, furnishing 500 cu. ft. air per minute, at 100 lbs. pressure.

The general equipment includes small experimental mill with crusher, jigs and Wilfley tables; a Leyner sharpener, oil furnace for heating steel, four Tugger hoists and several pumps. During summer of 1917, a 19-mile motor truck road from the mine to rail at Strelna, was constructed and motor trucks and trailers purchased. Employs 25 men.

In 1918 shipments amounted to 131 tons concentrates and hand picked ore; smelter returns were 77,000 lb. copper and 800 oz. silver.

Property considered meritorious, but further work necessary to determine size and value of orebodies.

ALASKA DOME MINING CO. **ALASKA**

U. G. Myers, representative, Eagle, Alaska; Rufus Buck, mgr. Placer ground on Dome Creek, Eagle district. Report completion of dam, enlarging 6-mile ditch and laying of 2,000′ of pipe preparatory to hydraulicking.

ALASKA DOUGLAS GOLD MINING CO. **ALASKA**

Idle. **Office:** 809 Electric Bldg., Portland, Ore.

Officers: F. W. Bradley, pres.; F. A. Hammersmith, sec-treas.

Cap. $100,000; $1 par; all issued.

Property on Douglas Island, Alaska. Assessment work only being done.

ALASKA-EBNER GOLD MINES CO. **ALASKA**

Property, sold under bondholders' foreclosure for $225,000, to A. W. Middleton, former treasurer, acting for a bondholders' protective and re-organization committee. Company's best asset was 100,000 shares Ebner Gold Mines Co. stock. Now being operated by the United States Smelting, Refining & Mining Exploration Co. Litigation described, Mines Handbook, Vol. XII.

ALASKA-ENDICOTT MINING & MILLING CO. **ALASKA**

Address: C. W. Mason, pres.; Juneau, Alaska or 402 Tacoma Bldg., Tacoma, Wash.

Re-opened 1919, and report crosscutting on an 18′ vein in tunnel 800′ long, with a strong vein continuing in line with tunnel. A mill is proposed for 1920.

ALASKA FREE GOLD MINING CO. **ALASKA**

Originally organized as a stock company, now operated under an 8-year lease from 1912. Wm. Martin, lessee, 206 Collins Bldg., Seattle, Wash.

Property: 22 claims, surveyed for patent, in Fishhook Creek Valley, Willow Creek district, south-central Alaska. It was on this property the first gold quartz of the district was discovered in 1906. Two orebodies have been opened on two different veins, that are sharp, clean fissures in quartz diorite, traceable for several hundred feet on surface. Ore treated in the mill has averaged about $36 per ton. Development: by tunnels, maximum length 500′ with some stoping.

Equipment: includes 3 aerial tramways, mill, cyanide plant and compressor. Sixty men employed. Production to date is reported by company as $540,000. Operating costs are high, due to short season of 100 to 150 days each year, and the isolated position of property. District will be made easily accessible by the Gov't railroad from Seward to Fairbanks, construction of which is under way. See U. S. G. S. Bull. 607, page 60. Installation of electric power planned.

ALASKA GOLD BELT MINING CO. **ALASKA**

Address: 170 Broadway, New York. **Mine office:** Juneau, Alaska.

Officers: Sanford Makeever, pres.; A. B. Dodd, v. p.; M. M. Makeever, sec.; J. Makeever, treas.; preceding officers and D. C. Bard, directors; A. B. Dodd, supt.

Inc. 1915, in Alaska. **Cap.**, $1,000,000; $1 par, none outstanding Feb. 3, 1916.

Property: 93 lode claims, 13 tunnel claims and 18 wharfage claims, total area 2,500 acres, located 4 miles south of Juneau and adjoining property of the Alaska Gastineau on the southeast. They cover the extension of the Juneau gold belt and the ore is supposed to be of the same general character as that of the Alaska Gastineau.

Development work was started in the summer of 1915 on the Lott-Nelson group of 30 claims, located in the upper Sheep Creek basin. Roads were built, buildings constructed, and an air compressor put in, preparatory to driving a 3,000′ exploratory and development tunnel in Sheep Creek mountain to cut upper part of orebody. In July, 1916, this tunnel had been driven 2,880′ and $100,000 is said to have been spent thus far on the development work. Did some diamond drilling in an attempt to cut the Gould & Curry vein, supposed to be the main orebody of the property. At last accounts, April, 1916, this drill hole had reached a depth of 1,575′ in a horizontal hole without results. Company planned to drive a 9,000′ tunnel at sea-level to cut the orebody at depth, and to build a mill on the beach south of that of the Alaska-Gastineau Co. No work reported done since September, 1916.

ALASKA GOLD HILL MINING CO. ALASKA

Address: A. E. Rucker, Valdez, Alaska.

Property: a gold mine in the Black district on west side of Valdez bay. In October, 1919, it was reported that a rich shoot had been revealed in a new tunnel.

ALASKA GOLD MINES CO. ALASKA

Office: 25 Broad St., New York. Mine near Juneau, Alaska.

Officers: Chas. Hayden, pres.; D. C. Jackling, v. p.; C. W. Peters, treas.; K. R. Babbitt, sec.; directors, Chas. Hayden, D. C. Jackling, K. R. Babbitt, C. M. MacNeil, Sherwood Aldrich, F. H. Goff, E. A. Clark, B. L. Thane, mgr. director, F. L. Ames, and J. B. Hardon.

Inc. Aug., 1912, in Maine. A holding company, owning $11,756,100 of the $12,000,000 capital stock, and $3,269,000 of the $3,500,000 bonds of the Alaska Gastineau Mining Co. Property is described under title of Alaska Gastineau Mining Co.

Cap. $7,500,000, increased Jan., 1915, to $10,000,000; $10 par, outstanding $7,500,060. Of the unissued stock, $500,000 is reserved for conversion of 10-year, 6% debentures. Transfer agents: Guaranty Trust Co., New York, and National Shawmut Bank, Boston. Registrars: Bankers Trust Co., New York, and First National Bank, Boston. Listed on the New York and Boston Stock Exchanges.

Bonded debt: $2,999,800, consists of $1,500,000 10-year, 6% convertible gold debentures, series A; dated March 1, 1915; due March 1, 1925; int. M. & S. 1, at Guaranty Trust Co., New York, Trustee, and $1,500,000 10-year 6% convertible gold debentures, Series B; dated March 1, 1916, due March 1, 1926: Coupon, $100, $500 and $1,000; principal may be registered. Authorized, $1,500,000. These bonds were sold for purpose of providing funds for increasing the mining and milling operations of the Alaska Gastineau Mng. Co. Convertible at any time into stock of the company at $30 per share. Subject to call as a whole, or in part, at 110 and interest at any time on, or after 3 years from their date. Company agrees that it will not, while any of these debentures are outstanding, mortgage or otherwise encumber any of its assets. Company is not, however, prohibited from issuing other debentures similar to series A and series B, at any time and to any amount, provided that said debentures shall not be given priority over series A, and series B, debentures. Normal income tax deducted from interest.

A comparative consolidated balance sheet of Alaska Gold and Alaska Gastineau shows the following, years ending Dec. 31:

Assets:	1918	1917	1916
Property	$14,370,921	$14,363,371	$14,355,438
Development, construction, plant	8,041,080	8,064,524	7,953,109
Current	692,476	896,082	941,027
Deferred charges to operation	481,420	535,403	746,256
Total assets	$23,585,897	$23,859,380	$23,995,830
Liabilities:			
Alaska Gold Mines Co.:			
Capital stock issued	$7,500,060	$7,500,060	$7,500,060
Debenture bonds A and B	2,999,800	2,999,800	2,999,800
Alaska Gastineau Mining Co.:			
Capital stock held by public	243,900	256,400	556,320
First mortgage bonds	231,000	231,000	231,000
Current	498,677	635,495	918,498
Deferred liabilities (interest accrued, etc.)	322,005	128,145	.....
Reserves for depreciation and insurance	642,605	325,045	.....
Surplus	11,147,850	11,783,435	11,790,152
Total liabilities	$23,585,897	$23,859,380	$23,995,830

Notes payable by Alaska Gold were reduced from $650,000 to $500,000 in 1917 and to $400,000 in 1918. Interest due March 1, 1918, on the A and B debenture bonds was not paid, there being insufficient funds.

Comparative Consolidated Profit and Loss Account, years ending Dec. 31:

	1919*	1918	1917	1916
Revenue	$1,052,035	$1,136,223	$2,009,632	$1,837,291
Expenditure	1,240,916	1,233,168	1,724,474	1,543,908
Profit or loss	—188,881	—96,945	+285,158	+293,383
Sundry income	—1,678	—19,621	—12,071	+37,198
Operating profit or loss	—190,559	—116,565	+270,826	+330,581
Interest paid and accrued	.....	219,685	228,552	217,747
Final profit or loss	—190,559	—336,250	+42,274	+112,833

*9 months.

Shares in Nov., 1919, sold around $2.50, compared with $40 in 1915, and $1 early in 1918. Dividends are a long way off, but those in charge are doing everything possible to increase the profits.

ALASKA GASTINEAU MINING CO.

Operating company for Alaska Gold Mines Co.

Address: Thane, Alaska.

Officers: G. T. Jackson, mgr.; D. J. Argall, mine supt.; Roy Hatch, mill supt.; W. T. Tolch, chief engineer; Wm. Carlberg, railroad supt.; E. M. Gastonguay, chief electrician; H. E. Biggs, auditor.

Inc. Jan. 14, 1911, in New York. **Cap.** authorized and outstanding, $12,000,000; $5 par. Is controlled by the Alaska Gold Mines Co., which owns $11,756,100 of the outstanding stock.

Bonded debt: $3,500,000 (entire issue) first gold 6%; dated Feb. 1, 1911, due Feb. 1, 1931. The Alaska Gold Mines Co. owns $3,269,000 of the issue.

Properties: in the vicinity of Juneau, Alaska, in what is known as the Juneau Gold Belt, comprise a net area of 2,166 acres, consisting of 1,672 acres of lodes, 219 acres of placers, and 275 acres of millsites and home-

steads. The mining claims consist principally of 4 groups, formerly owned and operated independently of each other, locally known as the Alaska Perseverance, Ground Hog, Silver Bow Basin, and Sheep Creek groups. They cover the so-called Gold Creek lode system of ore deposits, across a low spur of mountains from Gold creek to Sheep creek and extending into the basin of each stream, total length of lode system so covered being in excess of 2 miles. The company owns a 310-acre mill site near the mouth of Sheep creek, on the Gastineau channel. In addition to the above the company owns and controls lands, reservoir sites, power plant sites and rights-of-way on Salmon creek, emptying into Gastineau channel, in connection with its principal water power development; and also on Annex creek and Carlson creek, streams emptying into the Taku inlet about 10 miles east of the mill, and on Granite creek, Gold creek and Lurvey creek. The property of the Alaska Juneau Gold Mng. Co. adjoins the Alaska Gastineau on the west.

Geology: The mineralized zone dips 70° E., in the main has a slate or a schist hanging wall and greenstone foot-wall. It is cut in a number of places by metagabbro dikes, intrusive into the vein. Gold-bearing quartz is irregularly distributed through the zone in the form of veinlets, stringers, and masses. The height of vein measured on the dip above Sheep creek tunnel and for the length of zone developed on No. 10 level is almost 2,000′ with a length of 5,000′. Thickness of the main vein, as used for estimates of tonnage, is 70′. A solid block of ore this size would contain more than 50,000,000 tons. This vein is known as the Perseverance block. It served as a basis for the purchase of the property. Another orebody known as vein No. 2, has been opened up for several hundred feet, with an average width of over 100′. It is about midway of the length of the Alexander crosscut. On Jan. 1, 1915, the estimated tonnage was 21,000,000 tons of fully-developed ore, whose average assay was estimated at $1.75 per ton, but which actual operations have shown to be about $1.05 as milled. Costs were calculated at 75c and tailing loss at 25c per ton. A third orebody, the Ground Hog or Footwall orebody, has been developed in a few places, principally on the Sheep Creek tunnel-level, where it was opened for 1,500′ in driving the tunnel. At this point its width and value are as large as those of the Perseverance vein, lying immediately north. The ore zone, known as No. 1, and lying between the Footwall vein and No. 2 vein, contains two, and possibly three, distinct veins, ranging in width up to 200′ or more.

The several orebodies opened thus far in the Perseverance block, are composed of schist, slate, and metagabbro and slate, with the highest grade ore found to date, occurring in the schist; it has averaged in excess of $2 per ton; No. 2 east stope on the 5th level averages $2.70 per ton. This orebody has a strong rake to the east appearing further away from the central shaft and workings on successively deeper levels, until on No. 10 level it is first found east of No. 2 shaft. The slate orebody is the lowest grade so far developed; west of No. 1 shaft the vein widens out to twice and three times the width of the original development of 70′; this widening of the ore zone has resulted in a decrease in assay value. East of No. 1 shaft and below No. 5 level the slate orebody is narrower and higher grade, $1.50 to $2.50 per ton. West of No. 1 shaft and below No. 9 level the orebody is made up of meta-gabbro and slate, the meta-gabbro dike replacing the foot-wall and making up a larger percentage of the orebody. This section so far as sampled and opened, is higher grade than the slate orebody west of the shaft, but lower grade than the schist orebody; it will furnish ore of an average grade.

Development: by Perseverance, or No. 1 shaft, 1,544′ deep; No. 2 shaft extending from the 5th to the 10th level, with an oreway from the 10th to 13th level at this point; the Sheep Creek tunnel, or No. 13 level; and the Alexander or No. 10 level. The 8′ by 10′ Sheep Creek tunnel with length of 9,178′ from the bottom of the Perseverance shaft to the portal near

Sheep creek, was started Nov., 1912, and finished April 1, 1914. The tunnel was driven both for the purpose of developing the property longitudinally and at depth, and to provide a transportation outlet for delivery of ores to the new mill. It is driven parallel to and in the foot-wall of the principal or Perseverance vein. At certain points, irregularities of the orebody threw portions of the vein into the direct course of the tunnel; at such places the ore was found to be of good value. The Alexander crosscut, 10th level, 700′ above the Sheep creek tunnel and 1,300′ from the surface on the dip of the vein, runs from the Perseverance mine camp to No. 1 shaft, which is vertical and connects No. 13 level with the top of No. 5 level. It is used only for men and supplies, has a reinforced concrete shafthouse and is equipped on the 13th level, with an air-driven hoist, which operates two cages. Between the 10th and 5th levels the mine is opened by levels spaced 200′ apart. The ore is dropped from the different levels through oreways to the 13th, or main haulage-level, Sheep creek tunnel. No. 1 oreway extends from No. 5 level to No. 13 level, parallels the vein and is almost wholly in the foot-wall. On No. 9 level there is a timber bulkhead which is used to break the fall of ore. It is hinged and can be pulled out of the way when not required. Oreway No. 2 extends from the 9th to the 13th level. It is expected to put these oreways in at 2,000′ intervals.

Two methods of mining are used, shrinkage stopping in the gabbro where the back is so hard it must be drilled and blasted, and a caving system in the slate. Full size stopes are 400′ long with 40′ pillars between. A 2-compartment raise is carried through the middle of each pillar, half of it being used as a manway, the other half as a skipway through which supplies are delivered from the level below by means of an air hoist. Stopes are started from the tops of chutes run along the footwall, a slice being taken across the lode at right angles to the dip. In order to start movement in the lode a cut is driven along the length of the stope and in the foot-wall. No attempt is made at sorting, the mining being done on a large scale and everything extracted put through the mill.

Blasting in the Perseverance mine is described in 'Eng. & Min. Journal' of May 19, 1918, by R. L. Healy; No. 3 stope east, 6th level, had been mined to the 5th level. The upper stope, No. 2 east, 5th level, had been worked out and emptied, except for the compact ore built up on the floor of the stope between the chute raises. The purpose of the blast was to knock out and shatter the floor pillar (level bottom) allowing the ore to drop into the stope below. Tunnels and short crosscuts (225 ft.) were driven in which to place the explosive (5,850 lb.) There was 30,000 tons of ore broken at a cost of 10c per ton.

Mining: the Perseverance ore is discussed Bull. 153, Sept., 1919, of the A. I. M. & M. E. The cost of driving drifts is $13.55 per foot in slate, $15.12 in gabbro, and $15.59 in schist. These drifts are 7x8x9 ft., with 24x24 in. ditch on footwall side. Raising runways costs $10.54, $16.13, and $13.06 per foot in these respective rocks. Stoping costs from 13.567 to 28.476 cents per ton, and 7.46 cents for bulldozing large rocks. The average cost of underground work and delivering ore to the mill was 47.859 cents per ton, representing 6,523,873 tons in 4 years.

Haulage on the different levels is done in 4-ton cars of the Granby type, by means of 6-ton Baldwin storage-battery locomotives, thus eliminating the trolley-wire. The locomotives are operated for 16 hours, then charged for 8 hours. On the main haulage-level four 12-ton cars can be loaded at the same time. Haulage to the mill is done over a narrow-gauge railroad by electric locomotives of the trolley type. The railroad to the mill runs through Sheep Creek tunnel for 10,000′, then along the north side of Sheep creek for 6,000′ to the coarse crushing plant. When the mine and mill are running at full capacity this railroad can handle from 10,000 to 12,000 tons of ore daily.

Machinery at the mine includes a main geared hoist, driven by compressed air, 5 compressors of 9,000 cu. ft. per minute, total capacity, 48

motors for all purposes using 2,852-h. p.; water-Leyner and jackhammer drills, and completely equipped repair shops.

Recent work: extensions for 1918 are not published in the company's report; they were 4,897 ft. during the first quarter, but for the year must have been less than 15,472 ft. of 1917 and 24,562 ft. in 1916. Diamond-drilling in the two last mentioned years were 12,754 and 15,675 ft., respectively. Total workings are over 20 miles. No new orebodies of importance were encountered and development operations proved a great disappointment. The recovered value per ton has been remarkable in its percentage but the amount has been much less than expected. There is but slight promise of an improvement in average grade in the Perseverance block until the ore now broken is milled and new mining methods can be used. Samples during 1916—by moil and diamond-drilling numbered 20,880.

Coarse, free gold rendered checks difficult to agree. It has been found that (1) sampling of the slate zone would not check with actual mill returns because it is difficult to define the limits of the orebody that will cave in mining, also on account of peculiarities in this deposit; (2) sampling of the orebody consisting of either schist or metagabbro was more satisfactory and uniformly averaged with actual milling results, due to the more even texture of the rock, better cores and moil samples and definite boundaries to the orebodies that could be maintaind in mining; (3) on account of its greater width and irregularity the slate zone in the west section of the mine averaged uniformly lower grade than had been calculated; (4) the higher grade sections as developed lay east of the shaft where the schist orebodies had been encountered and opened; and (5) the slate zone west of the shaft showed a decrease in values beginning with No. 9 level and extending up to No. 6, where better values continued to the surface.

At beginning of 1915 the minimum estimate of fully developed, partly developed, and probable ore, was from 75,000,000 to 100,000,000 tons having a recoverable value of $1.50 per ton. Allen H. Rogers reported in 1916, that tonnage developed and partly developed, amounting to 5,500,000 tons would average about $1.45 gross, and that after the newer areas are developed and contribute their proportion of milling ore, the mine should be able to supply the maximum capacity (10,000 tons) with ore that would yield a profit of 45 to 50c per ton.

During 1917, the principal work was on the block of ground between No. 1 and 2 shafts on No. 6, 7, 8, 9, 10 and 13 levels. The object was further exploration of the schist ore-zone, which had originally shown good ore as on No. 5 and 10 levels from which a large quantity of good ore had been milled. Other work was east of No. 2 shaft, between No. 10 and 13 levels west of No. 1 shaft, and on No. 2 vein west of the Alexander crosscut. No new orebodies were found, east of No. 2 shaft, but the work of 1916 in the schist orebody was confirmed. In the block between No. 1 and 2 shafts, from No. 5 to No. 13 level, it was estimated that there was available 9,000,000 tons of $1.06 ore. Of this, 2,357,588 tons were broken, 2,398,242 tons prepared for stoping, and the remainder prospected, but not prepared.

During 1918, the principal work consisted in preparing stopes on No. 11 level. Above No. 9, all mining of the orebody in the west section of the mine, and the east section for 1,000 ft. east of No. 1 shaft was practically finished. In order to recover ore in the shaft pillar, containing 1,500,000 tons of $1.15 ore, No. 1 shaft was abandoned above No. 9 level. The broken ore in the mine at the end of 1918 was 2,000,000 tons. The quantity in reserve, between No. 2 shaft and the west end of the mine above No. 13 level, is 6,323,117 tons, worth $1.02 per ton.

The mill was designed to treat 1,500 tons daily in each of its 4 sections. Since starting operations Feb. 15, 1915, it has been demonstrated that the mill will handle from 10,000 to 12,000 tons of ore per day, necessitating a larger mine output. The mill is essentially a concentrator, accompanied by a separate small plant for retreatment of concentrates produced. It differs greatly from the conventional type of amalgamating gold mill, in

that the main milling plant produces nothing but concentrates, at a ratio of about 60 to 1. A novelty has been introduced by crushing with rolls instead of stamps. In the retreatment plant the coarser gold containing some silver is separated from the concentrates and reduced to gold and silver bullion; this separation produces a small tonnage of lead concentrates containing gold and silver that is shipped to Pacific coast smelters. The residual portions of original concentrates, consisting chiefly of iron and zinc sulphides, are finely ground and amalgamated for gold and silver, resultant iron-zinc tailing being discarded. In 1918, a hearth furnace was erected to reduce the high-grade concentrate, which carries most of the coarse gold.

The mill is built upon a very steep slope, the bottom floor is 192′ above Gastineau channel, the crushing plant 685′ above the water. Supplies to the mill are handled over an inclined tramway, while supplies for the crushing plant or the mine are handled over a longer tramway to a loading station on the ore railroad. The course of the ore through the coarse crushing plant is as follows: From the mine cars to the rotary dump, capable of handling four 10-ton cars at once, to grizzly; oversize to two 36″ by 42″ rolls set to 5″; over caterpillar feeders to stationary inclined screens with 1½″ square openings; oversize to two No. 8 gyratories set to 2″; to ore pocket beneath the crushing plant. This pocket is cut in solid rock, is 30′ by 50′ in cross-section and 225′ in height, 110′ of which is the ore-pocket proper. Remaining 115′ is a raise connecting the ore-pocket with the crushing plant. The bin has a capacity of 10,000 tons of ore. At the bottom of the bin 8 feeders supply ore to a 42″ belt-conveyer, 608′ long, that runs through a tunnel to the coarse ore-bins in the mill. From the bins the ore goes to stationary inclined screens, 1½″ square openings; oversize to 72″x24″ rolls set to ⅞″; undersize to 54″x24″ rolls set to ⅜″. Rolls are run on choke-feed and crush dry, and are of heavy design, having the large pulley in the form of an 8,000-lb. flywheel. Bearings are water-cooled. Roll shells are 6″ thick and are shrunk onto the roll-cores. Five-ton skips, working in balance, raise the roll product 115′ to a series of 10-mesh impact screens; undersize goes to concentrator; oversize is returned to the 54″ rolls. Each of the 4 sections contains 15 impact screens, and there are two 54″ rolls for every 12 screens. The two 72″ rolls serve the entire 4 sections of the mill. Seven sets of skips are used; one set for each 72″ roll, and one set for each of the 5 pairs of 54″ rolls. Exhaust fans carry away the excessive dust caused by dry crushing.

The concentrating department has a primary set of 10 double-deck Garfield tables and 10 Wilfley tables per section. Products are tailings and a concentrate that assays nearly 50% lead, which is shipped. Tailing goes to a 4-spigot Janney classifier; product of first 3 spigots to tube-mills. Tube-mill product goes to a secondary set of 10 double-deck Garfield tables, followed by 10 Wilfley tables using as wash water the 4th spigot product of the classifier. Each primary Garfield table can handle 300 tons per day. A 15-h. p. motor drives 10 tables.

Hydro-electric power is used. The chief sources of supply at present are the Salmon Creek plants, 2 miles northwest of Juneau, and the Annex-Carlson Creek plant furnishing 4,000-h. p., these furnish a minimum of 6,000-h. p. Ultimate capacity of the Annex Creek project will be 12,000-h. p. The Salmon creek project necessitated the building of a concrete dam 165′ high and 700′ long on its crest. Base of dam is 1,000′ above sea-level. In order to get maximum benefit from the water available 2 power plants were built. No. 2 is a mile below the dam and operates under a head of 600′. Power plant No. 1 is on the shore of Gastineau channel, near the mouth of Salmon creek. Water discharged from upper plant is conveyed by a 10,000′ flume to No. 1 plant and there used under a head of 500.′. Power plants No. 1 and No. 2 are each equipped with two 1,500-k. w. generating units with total capacity of 6,000-k. w. or 8,000-h. p. Office buildings, machine-shops sawmill, six 50-men bunk-houses, mess-house, and dock

been built on the beach below the reduction plant. Operating costs are very low, averaging $0.00174 per k. w. hr. during the last 4 years.

Production: the first ore was run through the mill Feb. 15, 1915. Towards the end of the year a daily capacity of 6,000 tons was reached, but the grade of ore falling for a time, this tonnage was reduced to 4,000 tons daily.

Year	Tons Milled	Gross Value	Tails	Extraction %	Value Recovered	Oper. Exp. less Misc. Inc.	Profit or Loss
1919*.....	2,251,654	$0.820	$0.180	77.30	$0.640	$0.800	—$0.160
1918.....	1,285,445	1.090	0.210	81.10	0.880	0.970	—0.09
1917.....	2,240,346	1.110	0.210	81.32	0.900	0.780	+0.12
1916.....	1,892,788	1.193	0.222	81.33	0.970	0.796	+0.174
1915.....	1,115,294	1.156	0.219	81.06	0.937	0.688	+0.249

* 12 months tonnage, but 6 months for averages.

ALASKA HERCULES MINING CO. **ALASKA**

Mail returned March, 1918, stamped "Out of Business."

Address: J. A. Hannon, pres., Cordova, Alaska.

Property: 15 claims on Shoups Bay, near Valdez, acquired 1917 from the Sea Coast Mining Co., and said to show 6 gold quartz veins in graywacke and argillite. Developed by tunnels, 400′ of drifting on the vein. **Equipment:** included a 10-stamp mill, with 2 tables, hydro-electric power plant, 1,800′ aerial tram, air compressor, etc. Mill and power plant sites are near the landing, while the mine workings are at elevations from 1,750′ to 2,600′. See U. S. G. S. Bulletin 622, p. 178 and Bull. 662, p. 191.

ALASKA HOMESTAKE MINING CO. **ALASKA**

Address: Crary Bldg., Seattle, Wash.

Officers: Edw. Eckern, pres.-mgr.; S. A. Pepper, v. p.; Edmund Smith, sec., with L. L. Bair, directors.

Inc. May, 1916, in Washington. **Cap.** $1,000,000; $1 par; 800,000 shares outstanding.

Property: 2 claims, about 40 acres, at Port Wells, Prince William Sound, said to show shoots of gold-silver-lead ore, 12″-36″ wide, in a contact deposit in granite, averaging $50 per ton. Developed to depth of 250′ by tunnel, in 300′, Jan., 1919. About 7,000 tons of ore reported blocked out.

Equipment: includes gas hoist, 20-ton concentrating plant and compressor. About $25,000 expended in development work to date. Mill, started Jan., 1919, was stated to be producing concentrates worth $10,000 per month. Values practically all in free gold.

ALASKA INDUSTRIAL CO. **ALASKA**

Office: 115 Broadway, New York. Mine office: Sulzer, Prince of Wales Island, Alaska.

Officers. Col. A. S. Bacon, pres.; S. I. Frankenstein, v. p.; Samuel F. Grossman, sec.; S. B. Thomas, treas.; Charles A. Sulzer, lessee.

Inc. in Washington. **Cap.** $1,000,000; $1 par. Annual meeting, second Saturday in January.

Property: The Jumbo group of 35 claims, patented, area 700 acres, also 60 acres in mill sites and miscellaneous properties. Main holdings are near the head of Hetta inlet, 2 miles from the beach and 1,500 to 2,000′ above tidewater.

The Jumbo mine has a mineralized contact metamorphic zone up to 1,000′ in width, with granite foot and limestone hanging, ore fading into the lime. Property shows 7 lenses and irregular masses, ore being mainly chalcopyrite, with some bornite and a little tetrahedrite in a gangue of magnetite, garnet, epidote and other contact minerals, together with occasional molybdenite. Ore averages 4 to 5% copper, with $3 gold and silver per ton. Average recovery said to be 100 lb. copper per ton of rock.

Development: mainly by tunnel, with 4 shallow shafts and numerous open cuts. The tunnels are in series, lowest 500′ vertically below the

highest, all connected by winzes, and the mine has over 3 miles of workings; greatest depth of workings is 100′. The ore stands well, requiring little timbering, even in stopes up to 50′ in width.

Equipment: includes 200-h. p. electric hoist and duplex air compressor, electrically driven. Buildings include a 35x40′ warehouse, 30x35′ powerhouse, smiths, store, office, dwellings, bunkhouses and various smaller buildings.

The property carries an available water power, rated at 5,000 h. p., and this has been partially developed by a 36″ Pelton wheel, taking water from Beaver creek and actuating a 6-k. w. generator, and a 16″ Pelton wheel taking water under a 330′ head from Jumbo creek, through a 10″ pipe line of 3,000′ length, this actuating a 55-k. w. 3-phase 2,300-volt 60-cycle generator, current being stepped down to 220 volts for lighting and power. Mine is equipped with electric fans, blowers and Temple-Ingersoll electric drills.

A 9,000′ Riblet aerial tram has 14 wooden towers with 22 half-ton buckets, operated by gravity with a 600′ auxiliary tram. Capacity of tram line is 10 tons per hour. The main tram has small bins at the mine and 4,000-ton storage bins at tidewater, where there is a 200′ wharf.

Production: begun 1907, now aggregates 137,000 tons. All profits have gone back into the property for development and permanent improvements. Shipping about 1,000 tons monthly to the Tacoma smelter.

Property considered valuable and management good.

ALASKA JUNEAU GOLD MNG. CO. **ALASKA**

Office: Crocker Bldg., San Francisco, Cal. **Mine office:** Juneau, Alaska.

Officers: F. W. Bradley, pres.; Wellington Gregg, Jr., and A. B. Davis, v. p.; G. D. Abbott, sec.-treas.; J. S. Wallace, asst. sec.; directors, Eugene Meyer, Jr., Seeley W. Mudd, F. W. Bradley, Wellington Gregg, Jr., A. B. Davis, C. A. Norris, and F. A. Hammersmith; P. R. Bradley, gen. supt.; John Richards, mine supt.

Inc. Feb. 17, 1897, in West Va. **Cap.** $150,000, consisting of 1,500,000 shares, increased April, 1915, to $15,000,000; $10 par; outstanding, 1,400,000 shares.

Bonds authorized: $3,500,000, 7%, dated March 15, 1919, payable same date in 1929, unless redeemed at option of company prior to maturity at 110% of face value thereof with accrued interest. Denominations are $1,000 and $500. On April 30, 1919, $989,000 were outstanding. Sinking fund to be provided for purchase of outstanding bonds. This issue is for paying indebtedness and re-modeling of the mill.

Registrar, Metropolitan Trust Co., New York; transfer agent, Central Union Trust Co., New York. Listed on the New York Stock Exchange. Annual meeting first Tuesday after first Monday in April.

General Balance Sheet: years ending Dec. 31—

Assets—

Year	Property	Devel.	Const. & Equip.	Cash	Other Current	P. & L. Surplus	Total
1918...	$9,617,790	$1,552,925	$2,945,856	$6,628	$878,487	—$563,625	$15,565,311
1917...	9,612,246	1,201,304	2,813,254	22,561	1,038,752	+563,625	15,251,742
1916...	9,645,489	994,240	2,180,760	361,289	330,318	563,625	14,075,723

Liabilities—

Year	Capital Stock	Notes Payable	Accounts Payable	Deprec. Reserve	Total
1918.....	$14,000,000	$1,427,500	$131,235	$6,576	$15,565,311
1917.....	14,000,000	1,100,000	149,172	2,570	15,251,742
1916.....	14,000,000	.....	75,723	.....	14,075,723

Profit and loss—

Year	Total Income	Operating Expense	Interest General, Etc.	Loss
1918.....	$460,322	$621,901	$163,921	$325,500
1917.....	490,049	624,255	86,367	220,573
1916.....	149,744	230,474	68,367	147,456

On April 1, 1919, the company's indebtedness, less cash assets totaled $1,580,000, which includes $943,000 of bonds sold of the new $3,500,000 issue.

Property: the mineral area of the company covers a tract of land adjoining the property of the Alaska Gastineau Mng. Co. on the west and that of the Ebner Gold Mng. Co. on the east, one mile inland from Gastineau channel. In addition the company owns a large tract of land stretching along the east side of the channel south of Juneau. This area, used as the mill site, is connected with the large mineral area by two narrow strips of land, one along Gold creek and the other farther south through which a long transportation tunnel connected the mine and mill.

Geology: The mining lands include the first quartz claims located on the wide vein called 'the Juneau gold belt,' and are supposed to be in the center of the mineralization of the belt. The property owned by the Alaska Juneau covers the outcrop of the vein or mineralized zone, for over a mile in length. The lode has a width between walls of 900′ and dips 70° east. The orebody is composed of slate with gold bearing quartz, irregularly distributed through it in the form of veinlets, stringers and masses. Meta-gabbro dikes, intrusive into the vein, carry gold bearing quartz similarly distributed. The quartz distribution is not regular, but where the gold content of the entire vein is too low to pay, sorting can be resorted to and profitable grade of mill feed obtained. Associated with the gold in the quartz is pyrite, pyrrhotite, galena and a little sphalerite. The footwall is greenstone, the hanging wall schist.

The vein was mined in a surficial way for a great many years. Deep development was first planned in 1899, started in 1909, but not actively pushed until 1910, when a main working crosscut, 8′x10′, called the Gold Creek tunnel, was commenced at an elevation of 425′ above sea-level, starting from a point immediately behind the town of Juneau. At 6,540′ from the portal, where the surface could be reached in the shortest possible distance, an 800′ inclined raise in the hanging-wall was put through to surface. In driving the tunnel that portion of the vein lying west of the Silver Bow fault was crosscut diagonally for 650′, disclosing orebodies of average assay values slightly less than $2 per ton. The true width of the vein where cut is 500′ with average assay value close to $2 per ton. Although this is better than shown by any surface developments, it was believed this width and assay value would persist for considerable distances logitudinally and vertically. This belief was based on the result obtained from a 30-stamp mill working 5 months each year, from 1896 to 1914, on ore mined by open-pit work along the outcrop of the vein. During this time, 295,807 tons were milled, yielding $2.26 free gold per ton, obtained by milling 63% of ore mined. The rejected vein matter was gold bearing, but of lower grade. No attempt was made to save the gold in the sulphides, which would have added about 20c per ton.

Ore extracted from the Gold Creek tunnel and the intermediate level opened from the incline raise at an elevation of 495′ above the tunnel was milled in the new 40-stamp mill on Gastineau channel. A total of 50,000 tons milled up to Dec. 1, 1914, averaged $1.36 per ton, the low value being due to the dilution of ore with waste attendant upon the opening of the two levels preparatory to stoping. In Dec., 1914, there was milled 9,657 tons of average assay value of $1.74 per ton; in Jan., 1915, there was milled 12,000 tons of average grade of $2.09 per ton.

Confidence in the persistence of the vein and its value is also derived from records of the 100-stamp Perseverance mill, now part of the Alaska Gold Mines Co., and the results obtained by a small mill operating on the Ebner property.

The mine development work as outlined was designed to give a daily tonnage of not less than 8,000 tons, making available for caving and extracting 7,500,000 tons of ore in one section of the vein. All tunnels are double-tracked and so equipped that 16,000 tons of ore daily can be transported from the mine to the mill.

Selective mining was originally contemplated and wholesale mining may have to be abandoned, if the mine is to become a dividend payer. Mining methods are concisely described by F. W. Parsons in the Engineering and Mining Journal of Aug. 4, 1917.

To the end of 1918, mine development had cost $1,552,945, opening 81,564′ of workings.

Briefly, the milling plant included: two revolving tipples, 2,000-ton coarse-ore bin, four 60″ apron-feeders, four 8x5′ grizzlies, with 8″ openings, two 36x48 jaw-crushers, four 4x8′ grizzlies with 3″ openings, four No. 9 Gates gyratory crushers, four 30″ conveyors, 4 distributing boxes, two 36″ shuttle conveyors, twenty-four 30″ apron feeders, twelve 8x6′ ball mills, 12 revolving screens, 12 V-shaped tanks, 12 mechanical distributors, 48 roughing tables, 24 classifiers, 12 shovel wheels, twelve 6x12′ tube-mills, 24 settling tanks, 24 mechanical distributors, 96 finishing tables, and 12 Wilfley tables. There is a retreatment department containing two 5x5′ ball-pebble mills, pumps, classifiers and tables. Power-plant contains four 825-h. p. Stirling water-tube boilers, with economizers, and forced draft apparatus, one 9-stage Curtis 6,000-k. w. turbo-generator, condensers, and auxiliaries. Electric installations at the property were described in the "Salt Lake Mining Review" of Nov. 30, 1919, by F. S. Rice.

The railway between mine and mill cost $167,144. This plant is to be altered considerably at a cost of $500,000. To the end of 1918, construction and equipment had cost $2,945,856.

Results since March, 1917; at the new mill trouble started, in the ball-mills. In May, the daily capacity was only 1,200 tons, and 3,274 in December, the highest being 3,833 in November, less than half that expected. The cost of milling was 40c per ton during the last 4 months of 1917, and all costs 70c. The recovery from 82c ore was 75%, so that a loss of 8c per ton was recorded. F. W. Bradley, president of the company, issued the following statement to the shareholders, with the annual report for 1917:

The new mill has been in combined process of completion and operation since March 31, 1917, and the best it has so far been made to accomplish is less than one-half of its promised capacity, at an operating cost per ton of over twice the expected cost. By installing machinery for an additional stage of crushing, the capacity of the mill can be increased, and by making other costly additions to and changes in the mill it would be possible to reduce the present high operating costs; but the real problem has been to keep as much waste as possible out of the fine-grinding end of the mill-work. It is estimated that two-thirds of the feed to the mill has been straight waste, and that the cost of fine grinding it is greater than the cost of fine-grinding ore.

The new mill was designed with the plan in view of both 'wholesale' mining and 'wholesale' milling; but as the layout of the pre-mining work has resulted in a caved mixture of an undue proportion of waste with ore, the wholesale plan of milling what has turned out to be (as far as the original pre-mining caving system is concerned) an uncontrolled mixture of waste and ore has had to be abandoned as unprofitable. Therefore in order to operate at a profit, the mine and mill operations are being re-adjusted to the 'sorting' plan of working which was interrupted nearly three years ago when the 'wholesale' plan was decided upon.

The payable values in the vein are carried in quartz stringers that, so far as developed in the Alaska Juneau property, have averaged about $6 in gold per ton, in addition to their lead and silver values, and are susceptible of being partly sorted out from their enclosing vein-matter. This is not only because of the marked difference in color between the quartz and vein-matter, but because the quartz is much more friable than the vein-matter and thus lends itself to a partial mechanical separation, both when mined and when subjected to coarse crushing in the mill. Monthly crush-

ings of several thousand tons each during the 16 years' operation of the old 30-stamp mill have given free-gold yields varying from a minimum of 35c. for low-grade vein-matter up to a maximum of $6.21 for sorted-out quartz. In addition to its recoverable gold, the ore also carries recoverable lead and silver values. Many milling-tests in the old 30-stamp mill on ore sorted from the surface workings in the vein, and also milling tests in the pilot mill on ore sorted from the deepest workings in the vein have given recoveries of over $5 free gold per ton from all the ore so sorted. During the first six months of 1915, 23,286 tons of mixed sorted quartz and vein-matter made an average mill-feed for the pilot mill of $3.22 gold assay-value per ton. The sorted ore thus milled was obtained by mining three tons of vein-matter, of which two tons were left in the stopes as waste-filling and the remaining ton of about equal portions of sorted quartz and vein-matter was sent out of the mine as mill-feed. Because the pre-mining system as carried out has left no control over the quantity of waste mixed with ore, the mill-feed for the new mill during 1917 averaged a gold assay-value of 87.5c., or 3.74c. less than the gold assay-value of the mill-feed to the pilot mill for the year 1916. This lack of control has resulted in sending such a large proportion of waste with ore to the mill that of the rock over 12 inches in size fed to the mill, probably 90% has been straight waste, as distinguished from low-grade vein-matter.

To overcome this waste dilution and thus place the property on a profit-earning basis, an installation is being made, as outlined in the accompanying report of the general superintendent, to mechanically reject as much coarse waste as possible between the Blake and gyratory crushers. Also a new stope is being opened on another section of the vein where physical conditions promise a dilution of less waste with the ore and consequently a higher grade of feed for the mill. Up to March 10, 1918, this new stope had been cut out in vein-matter for an area of 25,482 sq. ft., with an average gold assay-value for that area of $1.56 per ton.

In June, 1918, the company decided to start the old pilot stamp-mill, as the new plant could not be run economically on a 1,000-ton basis. The process was to crush coarsely, stamp the ore, convey it from stamps to tube-mills in the new plant, side-stepping the ball-mills.

During 1918, new work in the mine amounted to 5,501', mostly on No. 3 and 4 levels, preparing No. 410 stope. The assay-value of all development and preparatory mining work 'muck' samples (6921) taken between January, 1913 and December, 1918, averaged $1.041 per ton. Including 409 moiled samples taken since 1912 the average becomes $1.075.

An endeavor was made to force the mill to its rated capacity during January and February, 1918, but the best daily average was 3,832 tons, less than half of that expected. As wholesale mining and treatment was unprofitable at that time, sorting of the ore was done in March, April, and May; but because the 400 stope produced a lower grade and sorting was on so small a scale, there was no resultant economic advantage, therefore this work was stopped. The daily average during these three months was 1,828 tons of 70.5-cent ore. During the next five months, when better ore was available, milling was reduced to the quantity of this material that could be mined with the labor available. The average daily run was 747 tons of $1.414 ore. The 50-stamp mill was incorporated into the flow-sheet, doing the work of the ball-mills. The stamps produced a ¼-inch product, which went to the tube-mills. Many improvements were made during this period. In the last three months of the year, when the 410 stope was yielding more ore, 1,094 tons of $1.08 ore was treated daily. On December 4 the mill resumed work with three shifts. Alterations to the plant are to cost $500,000; these are expected to bring the daily capacity to 8,000 tons.

During 1918 there was spent $104,675 on the new mill, $30,508 on the power plant, and $10,806 on the stamp-mill.

Production: from the old and new mills—

Year	Tons	Value	Recovery, %	Costs
1918	574,285	$0.875	....	$1.1329
1917	.....	.....	....	.....
1916	180,113	0.9124	71.4	2.7363
1915	179,892	1.4797	80.0	2.8530
1914	60,026	1.4326	80.9	.....

The Alaska Juneau, like Alaska Gold has proven that gold ore cannot be mined by the large scale methods, used by the Porphyry Coppers.

ALASKA METALS CO. **ALASKA**

Idle. **Mine office:** Bruce, Prince of Wales Island, Alaska. Harry Corbin, supt., at last accounts. Property on the west coast of Prince of Wales Island, formerly known as the Corbin mine, and the Copper Mountain mine. No recent returns secured. Slightly developed.

ALASKA MEXICAN GOLD MINING COMPANY. (See Alaska Treadwell Gold Mining Co.)

ALASKA MINES CORPORATION **ALASKA**

Address: Box 1853, Seattle, Wash.

Officers: Jas. Gayley, pres., 81 Broadway, New York; T. S. Cram, v. p.; W. S. Reed, sec.-treas., with August Heckscher, M. W. Newton, Louis Eisenlohr and E. E. Powell, directors. John H. Miles, mgr.

Inc. June, 1916, in Virginia. **Cap.** $10,000,000; $1 par; $3,743,818 outstanding. Transfer office Empire Trust Co., New York. Stock listed on New York and Boston Curbs.

Property: about 2,200 acres of mineral land at Nome, owned outright and partly controlled by option to purchase. Diamond drill operations reported to have proved the existence of a large yardage of gold-bearing gravel.

Equipment: includes electric power plant, machine and repair shop, and two dredges. Property was examined in 1919 by the Hammon Engineering Co., of San Francisco. No production figures are obtainable.

ALASKA PITTSBURGH GOLD MINING CO. **ALASKA**

Office: 702 Arrott Bldg., Pittsburgh, Pa. **Mine office** Valdez, Alaska.

Officers: B. C. Wiltse, pres.; A. L. Miller v. p.; O. A. MacVay, sec ; Wilber Galbraith, treas., with V. H. Chlebus and W. E. Flick, directors.

Inc. in Delaware. **Cap.** $1,000,000; $1 par. 425,000 shares outstanding. Annual meeting, first Tuesday in March.

Property:. 8 claims, 160 acres, known as the Dailey-Bennett mine, on Bettles Bay, Prince William Sound, Alaska. Ore, carrying gold and silver, occurs in a porphyry dike, cutting through slate. Course is northerly, with dip of 20°. The orebody has been opened up for about 5,000′ at surface, showing galena, sphalerite and arsenopyrite, also free gold. Mill tests reported to average $13.59 p. t. Developed by 400′ tunnel. Ore reserves estimated by management at 18,000 tons. Probably idle.

ALASKA STANDARD COPPER MINING CO. **ALASKA**

Office: suite 921; 115 Broadway, New York City. M. L. Hewitt, pres.; John L. Steele, mgr. Mail returned unopened.

Inc. in South Dakota. **Cap.** $2,000,000; $1 par; 700,000 shares issued. Security Transfer & Registrar Co., N. Y., transfer agents and registrar. Company held a 3½-year lease, with option to purchase at $500,000, on the Standard mine of the Standard Copper Mines Co., at Landlock Bay, Prince William Sound, about 30 miles from Valdez.

Property: 7 patented claims and a mill-site, 150 acres, said to carry a 6′ vein of copper-gold-silver ore.

Development: by 3 tunnels to depth of 430′, reported to have proved 300,000 tons of 4% ore and 10,127 tons of 8% ore. Fourteen men employed at last accounts. Is a Marcus L. Hewitt promotion. One thousand shares were sold at auction in New York on July 16, 1919, for $23 the lot.

ALASKA TIDEWATER COPPER CO. **ALASKA**

Office: 602 Alaska Bldg., Seattle, Wash

Officers. W. E. Hall, pres.; F. G. Swann, v. p.; R. C. Hill, sec.-treas., with W. W. Sweet and Roy Whitcomb, directors; R. W. Sweet, Craig, Alaska, supt.

Inc. 1916, in Washington. **Cap.**, $1,000,000; $1 par; 532,184 shares outstanding.

Property: 8 claims, 5 owned and 3 held under lease in the Ketchikan mining district, Prince of Wales Island. Ore carries a quartz vein, traversing diorite and limestone, having a pay shoot of chalcopyrite ore 3-7′ wide, said to carry gold, silver, copper and iron values, with average assays of 7.5% copper.

Development: by 700′ tunnel, 120′ vertical shaft and drifts. Equipment includes an aerial tramway and compressor plant. Production in 1916 amounted to 134,949 lbs. copper, averaging 7.17%. Shipments were made to the Tacoma smelter. Management reports property idle since 1917, but was planning sale of more stock and resumption of work during 1919.

ALASKA MEXICAN GOLD MINING COMPANY, ALASKA TREADWELL GOLD MINING COMPANY ALASKA UNITED GOLD MINING COMPANY, } ALASKA

The affairs of these three Douglas Island companies are so interlocked that to be logical, they must be discussed together, particularly so since April 21, 1917, when the Treadwell, 700, and Mexican mines were flooded by the sea, leaving only the Ready Bullion mine intact. This disaster is described in the account of the Alaska Treadwell mine. Financial particulars of the three companies are given under the respective titles, but mine development will be considered as a whole. The report of F. W. Bradley, president of the three companies, made October 23, 1918, says:

"Future developments in the Ready Bullion mine will determine the fate of the others. It is 3,600′ east of the flooded workings, with a direct connection with them on its 1,350′ level, but was saved from flooding by a strong concrete bulkhead. Unlike the other mines of the group, the Ready Bullion workings extend beyond the shore-line and are under the deep water of Gastineau channel. In order to remove all risks it was decided to fill with waste the cavities left in the mine as the broken ore and caved pillars were drawn and hoisted for the mill. In order to secure waste for this purpose, an Alaska Juneau type of caving stope was cut above the 450′ level, 600′ inland from the shore line. It cost $120,000 to prepare for this waste filling, and filling will continue at a cost of 15c per ton of waste. The shaft was sunk and a cross-cut started for the 2,800′ level. Development continues at 2,600′, the stopable area being 29,025 sq. ft., averaging $2.59 per ton. This compares fairly well with the 14 levels above it. Ore reserves in the Ready Bullion total 2,300,000 tons to the 2,800′ level. Of these, 1,400,000 tons will be recovered, giving 5 years' supply to the mill, or 3 years with the Mexican mill. If the 2,800′ level finds an orebody of profitable size and value, the shaft will be deepened to 3,000 and 3,400′. If this last level should also open ore, it will be driven westerly along the ore-channel to prospect any continuation in depth of the Treadwell-700-Mexican lodes. If these were of sufficient value, the high tides of Gastineau channel would be dammed off from the break on surface, and the workings pumped out. This may be in 5 to 10 years' time. The combination shaft is in solid ground, and could be used for future operations in the Treadwell-700-Mexican orebodies."

The Ready Bullion mine is now working at a profit, that for September, 1918, being $7,298. From Jan. 1, 1917, to Sept. 30, 1918, the output was $724,686 from 328,990 tons. The cost was $826,819, including $54,692 for shaft sinking, shaft-house, and head-frame; also $126,429 spent in safeguarding the mine against saltwater leaks.

In an effort to secure new mining property tributary to Douglas island, many prospects were examined. Finally a molydenum deposit was taken up at Shakan, Prince of Wales island, 180 miles by water from Treadwell. Reserves were estimated at 100,000 tons of 1.58% and 6,270 tons of 2.28% MoS_2 ore. The 2-ton Heroult electric furnace at Treadwell is to be used in making ferro-molybdenum from the Shakan ore.

The three hydro-electric plants on Douglas island have been tied-in with the steam plant of the Alaskan Juneau company on the mainland opposite. The revenue from this source was $62,687 in 1917 and $15,494 for first half of 1918.

Dismantling and marketing saleable equipment continues, the quantity sold to June 30, 1918, being $294,398, with $209,950 awaiting sale. All three companies benefit from this salvaging. The mercantile department of the Treadwell makes a good profit, supplies on the above date being valued at $538,039.

The following table gives the results of the interlocked operations of the three companies during 1917 and the first half of 1918:

	1917 (full)			1918 .(half)		
	Mexican	Treadwell	United	Mexican	Treadwell	United
Receipts	$212,924	$2,370,800	$771,554	$35,033	$441,719	$190,499
Expenditures	149,680	1,999,179	861,789	37,934	418,006	284,622
Profits	63,243	371,621	.....	.....	23,712	.....
Loss	.....	.....	90,235	2,900	.....	94,123

Alaska Mexican Gold Mining Co.

Address: Mills Bldg., San Francisco, Calif. **Mine office:** Douglas Island, Alaska. Under same management as the Alaska Treadwell, which see.

Inc. April, 1892, in Minnesota. **Cap.** $1,000,000 in 200,000 shares, $5 par; 120,000 of which went to pay for the Alaska Mexican Gold Mine, and 60,000 were issued to the public by the Exploration Co., Ltd., of London. Annual meeting in May. Registration & Security Co., of San Francisco, registrars.

Comparative General Balance Sheet:

Assets—

Year	Property & Plant	Cash	Reserve Fund	Bullion Suspense	Accounts Rec., etc.	Ore Subject to Depletion	Total
1918 (June 30)	$606,459	$56,884	$93,909	.....	$188,873	$986,923	$1,933,049
1916	733,235	47,775	$93,909	.....	143,798	.....	2,046,896
1915	674,195	5,175	93,909	15,314	146,332	.....	934,926
1914	785,692	6,955	93,909	20,532	12,298	.....	919,386

Liabilities—

Year	Capital Stock	Accounts Pay., etc.	P. & L. Account	Ore Surplus	Total
1918 (June 30)	$900,000	$10,233	$35,893	$986,923	$1,933,049
1916	900,000	12,079	74,426	.....	2,046,896
1915	900,000	24,736	10,190	.....	934,926
1914	900,000	8,572	10,814	.....	919,386

Comparative Income Account (for later years see joint statement):

	Total Income	Operating Constr'n, etc.	Net Profit	Divid's	Deprec.	Balance
1916	$330,654	$266,417	$64,236	.....	.....	$74,426
1915	401,761	302,284	99,477	$90,000	$10,101	10,190*
1914	513,318	343,298	170,020	144,000	25,451	10,814*
1913	496,007	324,210	171,797	180,000	21,552	10,213*

* Including balance from previous year.

Property: Located on the east side of Douglas Island, between the 700′ claim of the Alaska United on the west and the Ready Bullion mine of that company on the east. For a general description see Alaska Treadwell Gold Mining Co.

Development: includes the 1,570′ Mexican shaft, devoted to general use, while all ore is hoisted through the 2,817′ Central shaft, on the 700′ claim of the Alaska United, adjoining on the west. The orebody has been opened by levels from the 110′ level to the 2,300′ level; distance between levels is 110′.

During 1916 development work done by the A. M. Co. amounted to 776′ on its own property, 10′ on the adjoining 700′ claim of the A. U. Co., and 3,714′ done jointly with the A. T. and the A. U. Cos.

Samples totaling 1,592, taken on five levels, averaged $1.63 per ton. From the 1,100′ downward ore has assayed as follows: $3.60, $3.02, $2.63, $1.23, 64c, $1.23 and 79c per ton, the last being at 2,100′.

On July 27, 1916, surface evidences of a hanging-wall subsidence near the Treadwell—700 Ft. Claim boundary became apparent, and to protect the Treadwell, 700 Ft., and Mexican mines, heavy drawing of reserves of caved and broken ore was stopped. The Mexican mill only worked 279 days. From Aug. 1, 1916, the 240-stamp mill and half of the 300-stamp mill of the Treadwell was stopped. Salt water began to flow into the mine, and due precautions were taken. In April, 1917, the Mexican, Treadwell, and 700 Ft. mines were flooded and shut down indefinitely. For details see the Alaska Treadwell.

Ore reserves: Estimated Dec. 31, 1916, 157,000 tons ore in sight, average grade $1.80 per ton; against 1,188,866 tons of $1.87 ore in 1915.

The company has a 120-stamp mill that, in 1916, operated 34% of the time with steam power and 66% of the time with water power. Duty per stamp per day was 5.24 tons, 1 lb. of chrome shoe crushed 2.31 tons ore, and 1 lb. of Treadwell die crushed 5.15 tons ore. Mill sands are used for filling stopes.

A cyanide plant is owned and operated jointly by the Alaska Mexican, Alaska Treadwell and Alaska United G. M. Cos., the A. M. Co. owning 20% of the plant. Power plants are in conjunction with those of the Alaska Treadwell, which see.

Average number men employed daily in 1916 was 122, with average wage paid each $3.61. Miners received $3.50 per day.

Production and profits since 1909 are as follows:

	Tons Crushed	Yield Free Gold	Concentrates Tons Treated	Concentrates Yield	Total Yield p. Ton	Oper. Costs p. Ton	Oper. Profits p. Ton	Div. Paid
1917†.....	.....	.....	.....	.....	....	....	....	....
1916.....	175,476	$119,163*	4,398	$155,860	$1.57	$1.51	$0.06	....
1915.....	216,428	190,980	4,769	188,816	1.75	1.29	0.46	10%
1914.....	233,457	238,756	3,340	270,267	2.18	1.45	0.73	16%
1913.....	227,112	225,369	4,795	264,327	2.15	1.39	0.76	20%
1912.....	233,299	307,951	4,956	371,169	2.91	1.58	1.33	25%
1911.....	227,081	323,965	5,150	353,442	2.98	1.84	1.14	14%
1910.....	218,960	390,198	4,166	375,523	3.50	1.76	1.74	38%

† Mine flooded since April.
* Including $27,855 from copper plates.

Costs per ton for 1916 were: Mining, 91c; milling, 39c; cyaniding same as Alaska Treadwell. Mining costs include charges for 1.050′ of development at $21.38 per ft., and stoping 69,285 tons at $1.04 per ton. Milling costs include crushing, 5.7c; tramming, 1.7c; stamping, 23c; concentrating, 8.7c.

As the Mexican may not produce any more ore, its total output may be given from 1894 to 1917; 4,445,807 tons, averaging $2.61 per ton at cost of $1.67. Out of profits, $4,161,657, dividends absorbed $3,507,381, or $19.47 per $5 share.

Alaska Treadwell Gold Mining Co.

Address. Mills Bldg., San Francisco, Cal. Mine office: Douglas Island, Alaska. **Officers:** F. W. Bradley, pres.; A. B. Davis, v. p.; F. A. Hammersmith, sec.-treas. Preceding officers: E. W. Hopkins, H. S. King, directors; P. R. Bradley, cons. eng.; R. G. Wayland, gen. supt.

Inc. June 1, 1890, to take over the property of the Paris mine on Douglas Island, where operations had been conducted since 1882. Purchase price was $5,000,000 in fully paid shares. **Cap.** $5,000,000; shares $25 par. Metropolitan Trust Co., New York, registrar and transfer agent.

Comparative General Balance Sheet:

Assets—

	Property & Plant	Cash	Other Current	Supplies	Other Assets*	Total
1918 (June 30)	$3,531,054	$275,695	$1,347,162	$538,039	$7,886,262	$13,578,212
1916.....	3,942,947	245,023	956,034	789,012	8,439,607	14,372,623
1915.....	3,775,173	365,365	603,961	565,337	308,618	5,618,454
1914.....	3,685,306	295,587	558,053	599,471	309,965	5,448,382

* Ore subject to depletion.

Liabilities—

	Capital Stock	Accounts Pay, Etc.	Draft Account	P. & L. Account	Ore Surplus	Total
1918 (June 30)	$5,000,000	$280,365	$4,239	$411,575	$7,886,262	$13,578,212
1916.....	5,000,000	474,224	9,885	498,209	.....	14,372,623
1915.....	5,000,000	524,926	3,438	90,090	.....	5,618,454
1914.....	5,000,000	394,520	5,182	48,680	.....	5,448,382

Comparative Income Account (for later figures, see joint account):

	Earnings Gross	Earnings Net	Other Income	Construc. & Repair	Divid's	Deprec.	Balance
1916.	$1,604,737	$658,119	$90,090	.....	$250,000	.....	$498,208
1915.	1,828,723	706,610	177,399	$24,822	650,000	$167,777	41,410
1914.	2,367,562	1,314,933	67,813	31,343	1,100,000	250,953	450
1913.	2,358,423	1,286,498	62,592	38,599	1,000,000	487,261	176,770†

† Deficit.

Dividends to Jan., 1917, aggregate $78.93 per share.

Property: The Treadwell group of mines, consisting of the Alaska Treadwell, the Alaska Mexican and the Alaska United, which operates the 700′ mine and the Ready Bullion, are under one management and are located on the east side of Douglas Island near the shore of Gastineau Channel. The A. T. property is farthest west. Geological conditions are the same in the mines of the 3 companies. Hanging wall of Treadwell is 1,000′ distant from present shore line, while that of the Ready Bullion lies for the most part under tidal water. Though several orebodies have been found, the mines are all situated on the same lode and ore is practically of identical origin throughout. In the Alaska Treadwell, 700′, and Alaska Mexican mines, the lode has been developed continuously for 3,500′. Between the Mexican and Ready Bullion mines is an undeveloped interval of 2,500. Width of orebodies is from 300′ to 400′.

Geology: the orebodies consist mainly of mineralized albite-diorite occurring in the form of intrusive dikes in black slate, whose structure they closely follow. They strike N. W.-S. E. and dip 50 degrees toward the N. E. The slates are metamorphosed shale. The ore-bearing dikes belong to a series of intrusives that appear interruptedly along the strike for a distance of about 3 miles in a zone 3,000′ wide. Next to the shore of Gastineau Channel the border is defined by a heavy bed of greenstone that forms the hanging wall of both the orebodies and the intrusion zone. Many of the dikes of albite-diorite at a distance from the hanging wall have been greatly altered and impregnated with pyrite and no workable orebodies have yet been found in them. The ore consists mainly of rock impregnated with sulphides, principally pyrite, and in part shattered and filled by veins of calcite and quartz, which also contain sulphides. The ore-bearing dikes are considerably mineralized throughout, and often the whole mass can be mined. The characteristics of the deposit are believed to indicate that it was formed by ascending waters, with little, or no subsequent secondary concentration. If this is correct there is little doubt that the ore will continue to a much greater depth than has been reached, and the limit of mining will probably depend finally upon increased costs, attendant upon operating at great depth.

The production, condition of the property, its history, development, equipment, etc., are fully described in Vol. XIII of this work. The mine has been flooded since April, 1917, and is practically a total loss.

Alaska United Gold Mining Co.

Address: Mills Bldg., San Francisco, Calif. Mine office: Douglas Island, Alaska. Under same management as the Alaska Treadwell.

Inc. Aug. 6, 1895. **Cap.** $1,000,000, shares $5 par, issued $901,000.

Comparative General Balance Sheet:

Assets—

	Property & Plant	Cash	Reserve Fund	Bullion Suspense	Accounts Rec., Etc.	Ore Subject to Depletion	Total
1918 (June 30)	$880,773	$9,129	$106,327	$.....	$289,022	$2,141,206	$3,426,647
1916.....	910,120	7,991	201,810	4,296	28,921	2,654,222	3,807,361
1915.....	726,180	10,192	201,810	50,245	3,900	.....	992,327
1914.....	634,000	4,663	201,810	51,924	34,171	.....	926,572

Liabilities—

Year	Capital Stock	Accounts Pay., Etc.	P. & L. Account	Ore Surplus	Total
1918 (June 30)	$901,000	$384,442	$.....	$2,141,206	$3,426,647
1916.....	901,000	$243,236	8,902	2,654,222	3,807,361
1915.....	901,000	55,312	36,015	.....	992,327
1914.....	901,000	10,411	15,160	.....	926,572

Comparative Income Account (see later figures see joint account).

	Total Income	Operating Constr'n, Etc.	Net Profit	Divid's	Deprec.	Balance
1916..	$1,111,697	$1,094,749	$26,947	$54,060	.....	$8,902
1915..	1,072,412	705,162	367,250	252,280	$94,115	20,855
1914..	975,329	727,391	247,938	162,180	81,153	4,605
1913..	1,054,018	668,953	385,065	414,460	30,050	59,445 (d)

(d) Deficit.

Dividends to Jan., 1917, aggregate $11.35 per share.

Property: Located on the east side of Douglas Island, includes the 700' mine, lying between the Alaska Treadwell and the Alaska Mexican properties, and the Ready Bullion mine east of the property adjoining the Mexican.

As the mine is flooded and property apparently lost, further description is not needed. See Vol. XIII of Mines Handbook for full description of property.

Recent production: (1) Ready Bullion mine, (2) 700-ft. Claim mine.

	Tons Crushed	Yield Free Gold	Concentrates Tons Treated	Concentrates Yield	Total Yield p. Ton	Oper. Costs p. Ton	Oper. Profits p. Ton	Div,% (a)
			(1)					
1917-18.... (21 months)	328,990	.....	.....	$724,686	....	....	....	...
1916.....	286,078	$237,715	6,630	338,534	$2.11	$1.52	$0.59	6%
1915.....	252,154	272,274	5,621	249,638	2.07	1.31	0.76	28%
1914.....	233,100	282,036	5,700	252,370	2.29	1.47	0.82	18%
1913.....	222,992	268,444	5,651	242,947	2.29	1.45	0.84	46%
1912.....	216,454	317,970	6,128	300,188	2.85	1.50	1.35	36%
1911 (b)...	223,663	278,034	5,461	241,248	2.32	1.71	0.61	9%

(2)

1917†.....	.....	.....	.....	.....	....	....	....
1916.....	262,850	$180,603	5,342	$260,375	$1.73	$2.37	$0.64(c)
1915.....	281,265	263,319	5,934	256,943	1.85	1.31	0.54
1914.....	225,214	230,509	4,409	200,874	1.91	1.62	0.29
1913.....	225,435	284,097	4,495	248,055	2.36	1.44	0.92
1912.....	234,339	282,180	4,704	294,951	2.46	1.38	1.08
1911(b)...	224,968	284,430	4,477	244,193	2.35	1.56	0.79

† Mine flooded since April.

(a) Total for both mines. (b) Dec. 16, 1910-Dec. 31, 1911.

(c) Loss, due to heavy development charge.

Costs per ton for Ready Bullion mine in 1916 were: Mining, $1.00; milling, 34.4c; cyaniding, same as Alaska Treadwell. Mining costs include charge for 2,366′ of development work at $12.66 per ft., and stoping 377,547 tons at 44.7c. per ton. Milling costs include crushing, 2.6c.; tramway, 2.2c.; stamping, 22.6c.; concentrating, 7c. Costs per ton for 700-Foot Claim in 1916 were: mining, $1.81; milling, 39.4c.; cyaniding, same as Alaska Treadwell. Mining costs include charges for 7,771′ of development work at $20.40 per ft., stoping 284,566 tons at 81.7c. per ton. Milling costs include crushing, 5.8c.; tramming, 1.8c.; stamping, 24.2c.; concentrating, 7.6c.

Alaska United is the only mine now being operated on Douglas Island. On April 21, the 700-Foot Claim, Treadwell, and Mexican mines were lost by flooding. The Ready Bullion mine is some distance away from these mines and escaped. From 1898 to 1917 the 700-Foot Claim yielded 2,400,868 tons of $2.05 ore, at a cost of $1.66 per ton, giving a profit of $946,259. The Ready Bullion produced 3,967,135 tons of $2.08 ore at a cost of $1.56 per ton, and total profit of $2,049,406. Of combined profits, $2,995,664, $2,045,270 was paid in dividends.

ALASKA UNITED COPPER EXPLORATION CO. **ALASKA**

Office: 551 Coleman Block, Seattle, Wash. **Mine office:** Dan Creek, Copper River district, Alaska.

Officers: L. C. Dillman, pres.-gen. mgr.; Jas. A. Munday, v. p.; E. V. Dillman, sec.; W. A. Mears, treas, with A. Ingraham, W. Hughes, Frank L. Huston, Jas. J. O'Keane and Thos. M. Dunn, trustees; C. C. Jones, cons. engr.

Inc. Nov. 14, 1906, in Washington. **Cap.,** $12,500,000. $1 par. Debentures, $150,000 6% bonds. Annual meeting, first Monday in January.

Property: 23 claims, 460 acres, comprising the Finch, Dillman and Porcupine groups, five miles from the Copper River railroad, on branches of the Chitina and Nizina rivers, in the Copper River district, Alaska.

Exploratory work has been done on the various groups by small tunnels and numerous trenches and open cuts, showing copper ore (bornite and chalcocite), said to average 35%.

The company is primarily a holding company, prospecting and developing properties in its possession for sale to other parties.

Company controls the Alaska Westover Copper Co., which see.

ALASKA WESTOVER COPPER CO. **ALASKA**

Office: 551 Coleman Block, Seattle, Wash. Mine, 18 miles from Copper River railroad in the Chitina district.

Officers: L. C. Dillman, pres., W. A. Mears, sec.-treas., with F. B. Whiting, F. J. Perine, F. B. Chandler, trustees.

Property: the Westover group on Boulder creek, title to which was transferred from the Alaska United Copper Explor'n Co., 23 claims, about 460 acres, covering a contact between limestone and greenstone. The contact lies horizontally and the ore outcrop is from 6 to 14′ thick and 43′ long in a perpendicular bluff at 4,990′ elevation.

Development: 1,000′ of tunnels. One tunnel started at the south end is reported to have shown 4 to 20′ of ore for 45′ in a S. E. direction, and a crosscut on the ore body shows 2′ of glance claimed to assay 50% copper. It widens to 14′ for about 36′; is then cut off by a fault, but continues about 12′ to the north. Bornite, chalcocite and chalcopyrite have replaced limestone along irregularly distributed fissures.

ALASKA ZINC & COPPER CO. **ALASKA**

Office: Green Bldg., Seattle, Wash.

Officers. M. O. Goodner, pres.-treas.; A. Goodner, v. p.-sec.

Inc. Jan. 3, 1917 in Washington. **Cap.** $1,000,000, $1 par; 800,000 issued; 650,000 in escrow for two years with H. C. Loup & Co., New York. U. S. Corporation Co., agent. Listed on New York Curb.

Property: a prospect, showing zinc, copper, gold and silver ores in claims on Prince William Sound, Alaska.

ALICE MINING CO. **ALASKA**

Address: Valdez, Alaska.

Property: consists of the Alice mine, situated at sea level on west side of Shoup bay, 1½ miles N. W. of the Cliff mine. The vein, found in 1910, is a well-defined fissure, strike N. 60° W., dip 70° S., width from a few inches to 2½′. Ore minerals include gold, pyrite, chalcopyrite, arsenopyrite, and sphalerite. The country rock is composed of graywackes, slates and green schists.

Development: by 247′ tunnel, a two-compartment shaft, 170′ deep, and 100′ of drifting at the bottom of the shaft.

Equipment: includes 100 h. p. boiler, 3-drill air compressor, 50-light dynamo, 5 h. p. steam engine, steam hoist, pumps, blacksmith shop, mess house and bunk house.

Small shipments were made in 1913 and 1916. Assessment work only done in 1915 and 1916, but nothing reported since. See U. S. G. S. Bull. 622 and 662.

ANCHORAGE GOLD MINES CO. **ALASKA.**

Officers: Byron Bartholf, pres.; Sidney Anderson, v. p.; E. N. Culbertson, treas.; A. G. Thompson, sec.

Cap. $100,000, shares $1 par.

Property: prospects in Archangel creek, Willow creek district (developing).

AUK BAY MINING & DEVELOPMENT CO. **ALASKA**

Address: P. J. Wiley, mgr., Juneau, Alaska; Henry Brie, sec.-treas.

Property: 19 claims, 380 acres, at Auk Bay, 12 miles N. of Juneau, Harris mining district, said to show a contact vein in diorite, containing gold and silver values. Has a small testing mill of 12 tons daily capacity. Property idle on account of high cost of supplies and materials.

BANGOR CREEK DREDGING CO. **ALASKA**

Address. Union Construction Co., 604 Mission Street, San Francisco; or Nome, Alaska.

Property: placer ground near Nome, carrying gold bearing gravel.

Equipment: includes a dredge with 3½ cu. ft. buckets, run by semi-Diesel engines.

BEATSON COPPER CO. **ALASKA**

Entire property, assets and liabilities acquired by the Kennecott Copper Corporation, and company dissolved Oct. 4, 1915.

BEAVER MOUNTAIN MINING CO. **ALASKA**

Idle. **Mine office:** Sulzer, Prince of Wales Island, Alaska. Henry Miller, pres.; George Comer, mgr., at last accounts. Lands: on the southern side of Beaver mountain, Hetta inlet. Development: by tunnels, showing ore carrying copper, nickel and cobalt. Operations confined to annual assessment work.

CACHE CREEK DREDGING CO. **ALASKA**

Address: Seattle, Wsah., or Thos. D. Harris, Marigold, California.

Inc. Feb., 1914, in Washington. **Cap.** $150,000, $1 par.

Property: a lease on placer ground of the Cache Creek Mining Co., on Cache Creek, Yentna mining district. A 7′ bucket dredge has operated with good results, reported showing as high as 75c. per yard.

Company also owns a coal mine 2 miles from dredging property.

CAMERON-JOHNSON GOLD MINING CO. **ALASKA**

Reorganized in 1916 as Valdez Gold Co., which see.

CHICHAGOFF MINING CO. **ALASKA**

Chichagoff Island, Alaska. Controlled by Hugh C. Wallace and W. R. Rust of Tacoma, Wash. James L. Freeburn, supt.

Property: the Chichagoff mine, 60 miles from Sitka, 170 miles from Juneau, carries high-grade, free milling quartz.

Equipment: 30-stamp mill with tube mill section and daily capacity of 110 tons of ore. A flotation unit was recently installed. Company has hydro-electric plant with dam at Rust Lake. 150 men employed. See U. S. G. S. Bull. 504, p. 22.

CHITINA KUSKULANA COPPER CO. **ALASKA**

Louis Kleyle, mgr.

Property: War Eagle group, near the North Midas, Kuskulana, Copper River district. Ore is chalcopyrite.

Development: by tunnels on War Eagle and Calcite claims.

Equipment: 120 h. p. boiler, 100 h. p. steam engine, electric generator and air compressor.

COLUMBIA RED METAL MINING CO. **ALASKA**

Office: 1109 First Ave., Seattle, Wash.

Officers: Wm. Uder, pres.-treas.; A. D. Thompson, v. p.; O. Roberts, sec., with W. E. Smith, C. C. Elwood, gen. mgr., C. H. Voll and R. J. McChesney, directors.

Inc. 1917 in Wash. **Cap.** $3,500,000; $1 par; divided into 1,500,000 shares common, all issued and paid to owners for property, and 2,000,000 preferred, outstanding 222,650 shares.

The secretary reported July 1, 1919, that 272,000 shares had been sold at 5, 10, 15 and 20c., and a 30c. price was to take effect July 15th. Company has no debts and with funds due on stock contracted for and under option, sufficient funds will be available for present requirements.

Property: 9 claims, on Glacier bay, Prince William sound, 8 miles from tidewater, Valdez district. Management reports a vein averaging 16′ in width, showing chalcopyrite, in greenstone, varying from concentrating ore to 24% smelting ore, with some gold and silver.

Development: by tunnels. Reserves are estimated at 50,000 tons.

Equipment: includes sawmill of 12,000′ capacity, cable, supplies, cabins, tents and 20-ton tug-boat. A tractor and trailers are required. Ten men employed.

Company issued a statement made by five stockholders just returned from the property, that they "found the ground as good, if not better, than represented. We found three big ledges which contain immense quantities of shipping ore . . ."

CONSOLIDATED ALASKA CO. **ALASKA**

Idle. Is a successor of Alaska Bonanza Mng., Trading and Trans. Co., reorganized 1900. Owned property at Nome, Alaska.

CRYSTAL GOLD MINING CO. **ALASKA**

Owners, Bernard Heins, and partners, Snettisham, Alaska.

Property: 6 claims near Snettisham, containing gold quartz veins in diorite, course S. E., dip 40°. Ore shoots are 4½′ wide, 60-70′ long. Ore averages about $8.50 per ton as sulphides.

Development: by shaft and 400′ tunnel; underground workings, total 4,000′.

Equipment: includes 5 stamp mill and 2 Frue vanners.

Stated to have produced about $67,000 to date.

CUBE MINING CO. **ALASKA**

Jeff Devinney and M. F. Hendrickson, Valdez, have a bond on the Three-in-One claims, Port Valdez district, one mile W. of Gold Creek. The country rock is schistose graywacke, and argillite, cut by quartz vein running N. 30° W., with dip 50° to 80° W. It averages 2′ wide and contains chalcopyrite, sphalerite, galena, and arsenopyrite, with gold values.

Development: by 800′ tunnel on vein, 11′ wide, with raises, giving depth of over 1,000′.

Equipment: 3 semi-Diesel engines, Hardinge conical mill, amalgamation and concentration plant. Employs about 15 men.

CYMRU COPPER CO. **ALASKA**

Idle. Mail returned unclaimed in 1919, from former office, 117½ South Tenth St., Tacoma, Wash. Mine near Baldwin, Prince of Wales Island, Alaska. J. M. Miller, Jr., pres.; F. P. Hicks, v. p.; Frank D. Nash, sec.-treas.

Inc. 1905, in Washington. **Cap.** $50,000, $1 par.

Property. 6 claims, 100 acres, on Moira sound, shows 3 lenticular orebodies, reported by company as of 40′ aggregate width, assaying 6 to 10% copper, 4 to 6 oz. silver and $2 gold per ton, mainly from chalcopyrite ores. Mine has a 100′ shaft and a 187′ tunnel, with hoist and a 6-drill air compressor. A 4,000′ surface tram conveys ore to a 1,000-ton ore bin.

Shipments in 1906 were 3,000 tons of copper ore, returning 4½% copper and $1.25 in gold and silver. Idle since 1907, owing to litigation among the stockholders; last reported under bond to a stock company organized by Geo. V. Bland, of Ketchikan, Alaska.

DICKEY, W. A. COPPER CO. **ALASKA**

Taken over by Ladysmith Smelting Co., which see.

EAGLE RIVER MINING CO. **ALASKA**

Address: care B. L. Thane, Crother Bldg., San Francisco, Calif. G. T. Jackson, mgr, Amalga, Alaska.

Property: the Eagle River, a group of gold quartz claims 4 miles from Echo Harbor and 25 miles from Juneau, Alaska, has been consolidated with the Yankee Basin adjoining and on the same belt as the Cottrell group. Ore occurs in 8 small shoots in black slate zone, broken by an elaborate faulting system and reported to average $20 per ton.

Development: by tunnel, 2,000′ long, that tapped ore at a depth of 700′. In 1915, 2,000′ of diamond drilling in 7 holes was done. Property worked since 1903, producing upwards of $500,000, according to reports. Only annual assessment work has been performed of late due to abnormal conditions.

ELLAMAR MINING CO. **ALASKA**

Office: 211 American Bank Bldg., Seattle, Wash. **Mine office:** L. L. Middlekamp, supt., Ellamar, Prince William Sound, Alaska.

Officers: F. M. Jordan, pres.-treas.; C. S. Packer, sec., with W. R. Rust and Chas. de Steigure, directors.

Inc. 1900, in Washington. **Cap.,** $10,000,000; $100 par. Reorganized in 1916 with $2,500,000 capitalization; shares $5 par. Controlled by F. M. Jordan, Seattle.

Property: 14 claims, patented, known as the Ellamar mine, at Ellamar, on Virgin Bay, 20 miles S. W. of Valdez.

Ore: occurs in a lens 80x200′ and lies wholly within the slate, pinching out 30′ below the 500′ level. Ore is mainly chalcopyrite associated with pyrite, pyrrhotite, and sphalerite in a gangue of slate, graywacke, and quartz, assaying from 3 to 25% copper, 3 oz, silver, and up to $50 gold. Mine was the first copper producer in Alaska, beginning shipments in 1901. A cofferdam has been built to permit mining orebody outcropping on the beach, below sea-level, and from 1910 to 1913 mining was confined to that part of orebody between surface and 200′ level. Geology fully described, p. 90, U. S. G. S. Bull. 605, 1915. During 1916, the water level had been lowered to the 500′ level. Ore is mined by underhand stoping.

Development: by 600′ three-compartment vertical shaft, with levels at 100′ intervals, and 3 miles of workings, said to block out about 250,000 tons of ore for stoping.

Equipment: includes 300 h. p. steam plant, with 3 boilers 1,200 cu. ft. Nordberg compressor, a 12x25″ Nordberg engine, and 60 h. p. hoist. In 1914 a 200-ton per hour aerial tram and new loading dock were completed. The tram conveys ore from mine bunkers a distance of 2,200′ across shallow water to the loading dock, having 25′ of water at low tide. Buildings include a machine-shop, smithy, laboratory, mess-house, and 12 other buildings.

Costs are said to be about $3 per ton, for ore loaded on vessels, with about $3 transportation charges to the Tacoma smelter.

Production:

Year	Tons	Copper, %	Gold, oz.	Silver, oz.
1918	27,184	2.03	0.14	0.52
1917	54,759	1.74	0.17	0.70
1916	46,000	2.83	0.15	0.60
1915	36,000	2.18	0.17	0.61
1914	31,000	....	....	....
1913	25,000	....	....	....
1912	22,000	2.50	0.30	0.90
1911	16,000	6.00	0.24	0.80

By June, 1919, monthly output was 2,000 tons; 40 men employed.

FAIRBANKS GOLD MINING CO. **ALASKA**

Property. placer ground on Fairbanks creek, Fairbanks district. During 1918, reported to have ordered dredge.

FAIRHAVEN POWER & MINING CO. **ALASKA**

Address: H. L. Mead, care John Hays Hammond, 120 Broadway, New York City.

In Sept., 1919, it was reported that a syndicate had been formed to underwrite 200,000 shares. Company has a placer property in Alaska, endorsed by the above engineer.

FIDALGO-ALASKA COPPER CO. **ALASKA**

Address: Ellamar, Alaska. Thos. Donahue, pres.; L. A. Levensaler, mgr.; E. D. Reiter, supt.

Property: 24 claims, about 15 miles from Ellamar and one-half mile east of Irish cove, on the southern side of Fidalgo bay, an inlet of Prince William sound.

Development: includes a 650′ main tunnel following a well-defined fracture zone, in slate, carrying 2 lenticular ore-shoots, said to be 5x50′ in cross-section, cut at 200′ and 300′ from portal, with many small stringers. Report good ore in outcrops about 300′ W. of the old workings.

Ore: mainly chalcopyrite, said to give average assays of about 10% copper, occurs as cementing material of fractures, irregular stringers, disseminated grains and as lenticular replacements of country rock, the fracture zones being very erratic in size and extent.

Equipment: includes 1,000′ aerial tram, ore bins and wharf, besides several mine buildings. During 1916 installed a 36″ Pelton wheel operating under 400′ head, driving single-stage air-compressor. Company employing 16 men at last reports and management plans further development. Shipped several hundred tons of ore during 1916. Geology described on page 118, U. S. G. S. Bull. 605.

FISH CREEK MINING CO. **ALASKA**

Office: 558 Empire Bldg., Seattle, Wash.

Officers: W. R. Tonkin, v. p.-treas., Seattle; W. J. Palmer, sec., New York city, with J. Arthur Hall, directors.

Inc. 1918, in Washington. **Cap.,** 600,000 shares; par 25c; 300,000 shares in treasury.

Property: 17 claims with two mill-sites about 7½ miles from tidewater, on same mineralized zone 1½ miles south of the Premier mine, and on U. S. side of the International boundary.

Ore: contains silver sulphides accompanied by a little galena and chalcopyrite, occurring in 4 well-defined veins.

Development: by several tunnels aggregating 1,000′, with greatest depth of 250′.

Production: several small shipments of ore mined in development work, sent to Tacoma smelter, varied from 78 oz. silver per ton, with 10% lead, $10

gold and 1½% copper, up to 200 oz. silver, $20 gold, 16% lead and 2½% copper.

Is a very promising prospect.

FORTY MILE POWER AND DREDGING CO. **ALASKA**

Office: Chas. L. Peabody, v. p., 10 Wall Street, New York City.

Officers: John A. Stedman, pres.; Chas. L. Peabody, v. p.; E. R. Hollenbeck, sec.-treas. Satterly, Canfield & Stone, 49 Wall St., attorneys. Wallace G. Clark, 149 Broadway, cons. engineer. E. R. Cooper, mgr.

Inc. 1918 in Del. **Cap.** $5,000,000, $1 par; about 3,500,000 issued.

Property: report controlling 119 miles of gold placer ground on Forty mile river in Alaska and Yukon Territory, from which $152,000 was recovered in 149 days by dredging, also state having sunk 5,000 test pits, proving a block of 1,500,000 cu. yds. averaging 60c. with other extensive areas of pay gravel. Both dredging and hydraulicking used.

FREE GOLD PIGOT BAY MINING CO. **ALASKA**

Address: W. R. Millard or C. B. Smith, Valdez, Alaska.

Inc. Aug., 1919. **Cap.** $350,000, $1 par.

Property: on Pigot bay, Prince William Sound, Alaska.

GALENA BAY MINING CO. **ALASKA**

Offices: 540 Orchestra Bldg., Chicago, Ill., and L. C. Smith Bldg., Seattle, Wash. **Mine office:** Valdez, Prince William Sound, Alaska.

Officers: J. B. Carter, pres.; Albert Barge, sec.; J. S. Jurey, asst. sec.; L. J. Rusk, treas.; Chas. Simenstad, supt.

Inc. 1906, in Washington. **Cap.** $500,000, $1 par, 486,001 outstanding. Trustees: J. B. Carter, Arthur W. Cutten, E. C. Badenoch, R. E. Tearse, B. G. Proctor, L. J. Rusk, C. A. Hayes and John S. Jurey. Annual meeting, second Tuesday in October.

Property: controls the Nikolai Mining Co. The company's holdings proper, acquired in 1907, are all on Galena Bay, about 30 miles from Valdez, and include the Sunnyside, Copper Crown, Starvation, Sheep Run, Vesuvius, and 15 other claims, all patented.

Development: by 2,200′ adit on the Starvation, 400′ on the Sunnyside, with only surface work and diamond drilling on the Copper Crown and Sheep Run Claims. Ore occurs in lenses of chalcopyrite, pyrrhotite, quartz and calcite, 4-5′ long and up to 14″ in width. On the Copper Crown a 4′ vein of solid sulphide ore was opened up in a N. E. shear zone, assaying $3-$4 gold per ton. Geology fully described, p. 100, U. S. G. S. Bulletin 605. Only necessary assessment work done since 1912.

GOLD BULLION MINING CO. **ALASKA**

Operated by Willow Creek Mines, which see.

Address: M. D. Leehey, Alaska Bldg., Seattle, Wash.; A. J. Budd, mgr.; N. D. Bothwell, supt., Wasilla, Alaska.

Property: 8 claims the Willow creek mines on the S. E. wall of Craigie Creek valley, 4 miles above mouth of creek, in Willow Creek district, south-central Alaska.

Ore: gold quartz in vein from 2′ to 14′ wide.

Development: by several tunnels. Vein is said to be proven for a length of 3,500′.

Equipment: includes 2 aerial tramways, the longest 3,253′, with a rise of 850′; 12-stamp mill and small cyanide plant. Plan installation of Dorr continuous decantation plant. Water power is used. Aerial tram 1 mile long connects mine and mill.

Operating costs in the Willow Creek district are high, due to short season of 100 to 150 days each year, and the isolated location of property. District will be made accessible by the Government railroad from Seward to Fairbanks, now being built. See U. S. Geol. Survey Bull. 607, pp. 66, 71.

GOLD CORD MINING CO. **ALASKA**

Address: 602 S. Kingsley Drive, Los Angeles, Calif., and Willow Creek, Alaska.

Control purchased during 1918 by Frank Bartholf, of Billings, Mont., John Smith, pres., Los Angeles, Calif., and J. B. Swan, of Henrietta, Okla. William Martin of Anchorage, operating under a short term lease.

Ore: gold values in vein said to be 10′ to 14′ wide. Mill test on 40 tons reported to have yielded $70.46 per ton and tailings assaying $12 were reduced to 80 cents in the cyanide plant.

GOLD KING MINING CO. **ALASKA**

Probably dead. Described, Vol. XII.

GRANITE GOLD MINING CO. **ALASKA**

Valdez, Alaska. **Officers:** B. F. Millard, pres.-treas.; W. R. Millard, 1st v. p.; O. S. Larsen, 2nd v. p.; Miss Shanstrom, sec., with Jafet Lindeberg, directors.

Inc. 1913, in Alaska, upon purchase from original locators for $50,000. **Cap.** $500,000, $1 par; outstanding, 430,000 shares. Annual meeting, first Tuesday in October. **Transfer office:** Alaska Bldg., Seattle, Wash.

Company claims to have spent $330,000 to March, 1916, on the property, and to have had a total production of $277,000. Surplus March 1, 1916, $21,000. Initial dividend, 2 cts. per share, paid April 10, 1916, and 2 cts. paid in May.

Property: 3 claims, 60 acres, unpatented, on the west side of Port Wells, on the coast between Hobo Bay and Harrison Lagoon. Two veins course N. 60° W., dip 58° N. Country rock consists of interbedded slates, graywackes and argillites cut by large masses of granite. Present development is said to show a third vein on the 210′ level. Metallic ore minerals are gold, and the sulphides of iron, zinc, lead and antimony. Ore said to run from $6 to $50 with average of $12 per ton. See U. S. G. S. Bull. 622, pp. 136-138.

Development: 200′ incline shaft and tunnels, with 4 levels opened up from 300′ to 700′ in length. Total underground workings, over 5,000′, all worked through 800′ tunnel at mill level. Three stopes in ore, April, 1919.

Equipment: former machinery sold with exception of 10-stamp Hendy mill, crushers and concentrators, as company plans installing 160 h. p. hydro-electric plant to furnish power.

Production: 1916, averaged 60 to 70 tons per day, yielding about $20,000 gross per month.

Reported, May, 1917, that mill had closed down on account high cost of material; intends to resume when costs become lower. A mistake seems to have been made in estimating ore reserves, and further development was being done to open ore. The last 7 months' production was reported to have been $70,000.

GREAT BRITAIN GROUP **ALASKA**

Owned by a Vancouver and Victoria syndicate. Property: at Whalebone Cove, on the western shore of South Valdez Island, Alaska, comprises 4 claims, showing bornite, tetrahedrite and chalcocite ore, occurring in the contact between limestone and altered lime.

Development: by 3 tunnels, showing 4 to 12% copper ore. Ore blocked out estimated at 1,800 tons by F. J. Crossland. Shipments of 700 to 800 tons have been made to the Tacoma smelter, said to average 3% copper. A 500-ton bunker was being erected on the beach for loading shipments on vessels. No recent information. Probably idle.

GREAT NORTHERN DEVELOPMENT CO. **ALASKA**

Operating office: Valdez, Alaska. **Mine and works office.** Philips, Alaska. Also controls the Regal Mines Co., which see.

Officers: Jas. Phillips, Jr., pres.; E. F. Gray, v. p.; Walter M. Briggs, sec.-treas.; Edwin F. Gray, gen mgr., with J. C. Fairchild, H. F. Knoblauch and H. I. Gaskill, directors.

Inc. 1906, in Maine. **Cap.** $1,000,000. $10 par; issued, 70,100. Is a holding company. Annual meeting, first Tuesday in November, Petley, Morse & Co., auditors, 43 Exchange Place, New York.

Property: a solid tract of about 165 claims, about 3,000 acres in process of patenting, on the south bank of the Kotsina river, below the mouth of Roaring

Creek, near the Copper River Railroad, and about 60 miles from the Bonanza mine of the Kennecott Co. Ore is greenstone containing chalcopyrite in small amount.

Development: work totals 8,000′, and is said to have opened up a large tonnage of low grade ore.

HEMPLE COPPER MINING CO. **ALASKA**

Valdez, Alaska. **Mine office:** Landlock, Alaska. **Officers:** S. A. Hemple, pres., treas. and gen. mgr.; S. I. Hemple, sec., with Arthur Lang and I. J. Devenney, directors.

Inc. March, 1910, in Alaska. **Cap.** $1,000,000, $1 par.

Property: 6 claims, 4 patented, 120 acres, with a 2-acre mill site, all timber, near the Standard and Three Man mines, at Landlock Bay. Shows greenstone, slate and quartzite, carrying 3 veins with 5 or 6 shoots, said to be 24′ wide in places and traceable for 3000′, carrying chalcopyrite, giving average assays of 3 to 6% copper. Mine is opened by tunnels of 50′, 300′, 575′ and 800′, with about 3,000 of workings. On 350′ level, vein showed width of 24′ in 3 crosscuts. The vein has also been opened at depth of 800′. There is no power plant, but property has 6 buildings and gasoline engine. Working two shifts, 1919, in the expectation of opening up the orebody on the 700′ level.

HOUGHTON-ALASKA EXPLORATION CO. **ALASKA**

Company dissolved and property sold. Fully described in Vol. XII.

HUBBARD-ELLIOTT COPPER CO. **ALASKA**

Offices: 35 N. Dearborn St., Chicago, Ill.; 10 Wall St., New York; 657 New York Blk., Seattle, Wash; Elliott Creek, Chitina district, Alaska.

Officers. H. P. Elliott, pres.; R. Reichardt, 1st v. p.; T. J. Dolan, 2nd v. p.; A. J. Elliott, sec.; J. T. Evans, treas.; L. G. Hinckle, supt.

Inc. Jan., 1911, in Washington. **Cap.** $3,500,000, $1 par; 1,500,000 shares issued in exchange, share for share, for stock in the old Hubbard-Elliott Copper Mines Development Co. of Alaska; 2,000,000 shares treasury stock.

Property: 35 patented claims, 5 mill sites with U. S. government titles and 84 unpatented claims, over 2,500 acres, covering 6 miles in Elliott Creek valley. Acquired an 8-12 interest in the adjoining U. G. I. group of 8 claims, 1917. Elliott creek is an affluent of the Kotsina river, about 15 miles above junction of the Kotsina with the Copper river.

Geology: Copper ore occurs in fissure veins and associated replacement orebodies in greenstone, with limestone beds above it. The prominent outcrops are practically all on the north side of Elliott creek, near the contact, which runs N. 75° W. and dips 80° N. All outcrops are in the greenstone underlying the limestone beds except on the Leland and Lawton claims, which are in a well-defined porphyry dike. Above the limestone is found a heavy capping of conglomerates.

The principal ore minerals are bornite, glance and chalcopyrite. The total absence of surface oxidation due to glacial action is notable, and sulphides occur in a calcite matrix in the veins and with a greenstone matrix.

Development: by tunnels.

Equipment: includes compressor, drills, etc. Hydro-electric power plant and concentrating mill.

A stockholders' meeting to be held at Seattle on February 2, 1920, will act on an agreement with the "Hubbard-Elliott Development Syndicate." This proposed syndicate is to have a capital of $500,000 in 5 series of shares at $100,000 par for each, to exploit and develop the property. When operations reach the productive stage, the Syndicate will either continue or will organize a new company to be called the Elliott Creek Copper Co., in Delaware, with a capital of not less than $8,500,000, nor more than $10,000,000. In 1920, $100,000 is needed for transportation, equipment and development.

INDEPENDENCE GOLD MINING CO. **ALASKA**

Seward, Alaska. **Property:** 5 claims and a mill site, in process of patent, in Fishhook Creek Valley, on the east slope of Granite Mountain, Willow Creek mining district. Mine located in 1907, and formerly owned and operated by the Alaska Gold Quartz Mining Co., show 2 veins. The Granite Mtn., or

main vein, from 2″-4′ thick, occurs in quartz diorite, showing native gold, pyrite and chalcopyrite; strike N. 14° to 20° W., with dip 2 to 20° S. W. Developed by open cuts, stopes and several tunnels, longest 386′ follows vein for 265′, and at the face has an incline 480′ deep on the vein. The Independence, or upper vein, 620′ vertically above and running parallel to the Granite Mtn., has strike N. 12° W., with average dip of 42° W., averages 12″ thick and is only slightly developed.

Equipment: includes 3-stamp mill, with one Nissen stamp and concentrator, 2 aerial trams connecting mine and mill. Production in the past has been mainly from the Granite Mtn. workings. Probably idle since 1917.

JOSEVIG-KENNECOTT COPPER CO. **ALASKA**

Address: W. H. Seagrave, mgr., L. C. Smith Bldg., Seattle, Wash.

Officers: D. K. McDonald, pres.; J. B. MacDougall, v. p., with M. E. Hay, W. L. Gazzam and J. W. Roberts, directors.

Inc. in Washington. **Cap.** $2,500,000, $1 par.

Property: 19 lode claims, 1 placer claim, 7 miles from Kennecott, Alaska. Glowing reports were made regarding this property by the promoters, which appear to have been a misrepresentation of fact. One statement is said to have claimed that the mine was superior to the Kennecott Copper Corporation. More conservative estimates made by the consulting engineer give a very small tonnage of ore, averaging about 3¼% copper. Due to location, transportation difficulties, small amount and grade of ore, etc., the future of this property is very uncertain. No work being done now on account of litigation and internal dissension between the promoters and the board of directors. Investors brought suit against the promoters for misrepresentation, and in April, 1918, were offered a settlement of 37½ cents a share for stock sold by subscription between Nov. 26 and Dec. 13, 1916. Stricken from New York Curb May, 1918. On October 3, 1919, G. F. Rowe, D. McDonald, G. E. Snyder, W. B. Hancock, J. P. Gearon and Christian Josevig, all of Seattle, were indicted by the Federal Grand Jury on charges of having used the mails to defraud and of conspiracy. These men are alleged to have sold worthless shares, receiving $400,000 therefrom.

JUALIN ALASKA MINES CO. **ALASKA**

Company is a subsidiary of the Alguncian Development Co. Jean Vanophem, pres., 16 Rue de Turin, Brussels, Belgium; C. G. Titus, mgr., Juneau, Alaska.

Property: 30 claims on the north shore of Berners Bay, in the Juneau region, developed by 360′ main shaft, crosscuts and drifts. A drainage-tunnel to be 7,800′ long when completed has been driven 2,000′.

Ore reported to be 90% free milling.

Equipment: includes 5½-mile tram, connecting the mine with the wharf, 450-h. p. compressor and hydro-electric plant and 4 semi-Diesel engines of 150-h. p. each. Plans are under way for increasing the mill capacity from 40 to 150 tons daily.

Production. under former owners said to total 50,000 tons of $11.20 per ton gold ore. Property was closed in Aug., 1914, but reopened in May, 1915. To May, 1917, the output was 22,366 tons of $11.10 ore. Reported production in 1918 of $200,000 from ore extracted in driving the tunnel and treated in the 10-stamp mill.

KENAI-ALASKA GOLD CO. **ALASKA**

Jas. Hayden, mgr., Seward, Alaska. **Property:** on Great Falls Lake, adining the Skeen-Lechner, shows a 2′ vein, cut on the 260′ level, which is said to carry ore mining better than $25 per ton.

Developed: by 1,700′ of tunnels and stopes.

Equipment: includes 5-stamp mill, and 8,000′ aerial tram connecting mine and mill.

KENNECOTT COPPER CORPORATION **ALASKA**

Office: 120 Broadway, New York.

Officers: W. C. Potter, chairman; Stephen Birch, pres.; W. P. Hamilton, v. p.; C. T. Ulrich, sec., with S. J. Clarke, H. O. Havemeyer, Seward Prosser, E. A. and H. F. Guggenheim, directors; E. T. Stannard, gen. mgr.; E. S. Pegram, treas.; J. N. Steele, gen. counsel; E. R. Reefs, purch. agent. J. C. Lane, met. supt.

Inc. April 29, 1915, in New York. **Cap.** $6,000,000; increased May, 1915, to $15,000,000, in 3,000,000 shares; 2,787,059 5-13 outstanding Jan. 1, 1919. There were 20,000 shareholders early in 1920.

Bonds: authorized (June 1, 1915), $10,000,000 6 per cent, 10-year convertible sinking fund gold bonds. In April, 1917, all outstanding bonds of this issue had been converted into stock.

On Mar. 21, 1917, company issued $16,000,000 of two-year, 6% notes, to finance purchase of more Utah Copper shares. Of this amount, $7,150,000 had been retired by Dec. 31, 1917, and $12,000,000 a year later, leaving $4,000,000 outstanding. This amount was due Mar. 21, 1919.

On Mar. 1, 1919, a new issue of $12,000,000 one-year 6½% notes was authorized, in order to finance further development, to enable the company to carry its accumulation of copper, over 50,000,000 lb. at that date, and to retire the $4,000,000 notes due.

On January 25, 1920, company sold $15,000,000 of 7%, 10-year, convertible notes, secured by 500,000 shares of Utah Copper Co., now $75 each.

D. A. Crockett, 149 Broadway, transfer agent; Bankers' Trust Co., New York, registrar. Annual meeting first Tuesday in May. Stock listed on New York Stock Exchange.

In 1918, Kennecott secured control of the Mother Lode Coalition Mines Co., whose property adjoins it.

Statement of Assets and Liabilities Dec. 31, 1916.

Assets.

	1916	1917	1918
Property Accounts:			
Mining property, net book values	$17,578,355	$27,002,050	$20,744,877
Less depreciation	392,248	745,694	1,136,927
	$17,186,107	$26,256,356	$19,607,950
Construction and equipment	1,463,407	2,371,249	2,632,077
	$18,649,514	$28,627,605	$22,240,027
Investments:			
616,504 (182,000 added in 1917) Utah Copper shares	$33,160,787	$51,994,081	$50,606,947
2,565,691 (1,041 added in 1917) Braden shares	39,456,154	39,472,813	39,475,890
500 Katalla shares	57,459	57,459	.....
$23,020,000 par C. R. & N. W. Ry. bonds	9,801,417	8,653,608	8,078,108
48,174 C. R. & N. W. Ry. shares	1	1	1
23,854 1-8 Alaska S. S. shares	2,385,412	2,385,412	2,385,412
500 (490 added in 1918) Alaska Dev. and Min. Co. shares	5,021	5,021	62,480
	$84,866,251	$102,568,395	$100,608,839
Current and Working Assets:			
Metals on hand	$9,648,513	$1,619,441	$2,421,485
Ore and concentrates	137,089	112,292	128,739
Materials on hand	438,397	766,030	935,600
Accounts collectible	1,893,105	3,342,400	2,389,185
Deferred accounts	30,073	56,482	67,064
Marketable Securities	2,970,000	1,359,236	2,336,591
Cash	4,117,934	4,024,914	2,695,534
Total current assets	$19,235,111	$11,280,796	$10,974,198
Grand total	$122,750,877	$142,476,795	$133,823,064

Liabilities.

Stock (without nominal or par value):			
Authorized	3,000,000	3,000,000	3,000,000
Unissued	213,320 12/13	212,971 12/13	212,940 8/13
Outstanding	2,786,679 1/13	2,787,028 1/13	2,787,051 5/13
	1916	1917	1918
Stated capital	$15,000,000	$15,000,000	$15,000,000
Capital surp. (from conv. bds. and ex. of stk)	86,687,146	86,703,085	86,706,162
Prop. surplus (from mines acquired, less cap. distributed)	.....	21,421,922	15,847,833
Total	$101,687,146	$123,125,007	$117,553,995
Notes payable	.....	8,850,000	4,000,000
Current Liabilities:			
Accounts payable	165,830	187,197	224,909
Accrued taxes and deferred accounts	624,108	730,562	603,133
Treatment, refining and delivery charges (not yet due)	924,154	590,660	1,045,172
Total current liabilities	$1,711,092	$1,508,419	$1,873,214
Development reserves	437,411	396,927	396,496
Undivided profits	18,915,228	8,596,444	9,999,360
Grand total	$122,750,877	$142,476,797	$133,823,065

Income Account—Year Ended December 31.

Operating Revenue:	1916	1917	1918
Copper	$28,042,396	$15,372,765	$14,418,357
Silver	710,462	653,340	662,569
Total	$28,752,858	$16,026,105	$15,080,926
Operating expense	6,292,338	4,208,909	5,649,635
Net operating profit	$22,460,520	$11,817,196	$9,431,292
Misc. income at mines	79,917	9,016	loss 41,156
Net income for period	$22,540,437	$11,826,212	$9,390,136
Operating Expenses Detail:	1916	1917	1918
Mine and mill	$1,595,452	$1,317,500	$2,162,033
Freight to smelter	2,695,573	1,574,771	1,646,938
Smelting and refining	1,506,522	864,657	1,110,910
Selling commission	287,065	158,635	143,313
Marine insurance	159,451	97,044	72,798
General expense	48,275	196,302	140,966
Delivery on refined copper	.....	.....	372,676
Total as above	$6,292,338	$4,208,909	$5,649,635
Other Income:			
Utah Copper Co. dividends	$4,854,048	$7,147,801	$4,777,906
Alaska Steamship Co. dividends	941,858	190,833	238,541
Interest, discount, etc	216,266	118,634	265,689
	$6,012,172	$7,457,268	$5,282,136
Total income	$28,552,608	$19,283,481	$14,672,272

Deduct:			
Accrued taxes, interest on bonds, adm'n...	667,985	1,318,579	898,307
Net income	$27,884,623	$17,964,902	$13,773,965
Undivided Profits			
Balance forward.....	$6,573,797	$18,915,227	$8,569,444
Net income for year.....	27,884,623	17,964,902	13,773,965
	$34,458,420	$36,880,129	$22,370,409
Less depletion charge.....	.....	11,552,539	.....
Net income	$34,458,420	$25,327,590	$22,370,409
Depreciation of plant.....	222,909	353,446	541,232
Dividends	15,320,283	10,311,665	5,574,089
Depletion	.....	6,066,036	6,255,728
Balance forward.....	$18,915,226	$8,596,444	$9,999,360

The net revenue in 1919 was $6,293,000.

Dividends: initial on Mar. 31, 1916; $5.50 in 1916; $5.70 in 1917; $4 in 1918, and $2 in 1919. The grand total is $46,936,613.

Property: Alaskan holdings include the Kennecott and Beatson mines; also 17 patented claims, 216 acres, at Latouche, and 11 lode claims bought in 1916. During 1918, 39 new claims were located.

The **Kennecott** group, 3 miles from Kennecott, on the C. R. & N. W. R. R., includes the Bonanza and Jumbo mines, with 23 additional patented lode claims and 14 patented placer mines, 2.314 acres.

The **Bonanza** mine had one of the most remarkable ore bodies ever found by a prospector. A great mass of high-grade ore, much of which carried over 60% copper, outcropped on the crest of precipitous mountain overlooking the Kennecott river, a tributary of the Chitina, which flows into Copper river.

There were no large masses of oxides or carbonates present, as glaciation and active erosion prevented the formation of an oxidized capping. The ore outcrops were massive chalcocite averaging about 50% copper and 0.2 oz. silver to each per cent. copper.

Geology: the claims show Nicholai greenstone, consisting of a number of basaltic flows of lava, a hard close grained rock considerably altered and in places amygdaloidal, overlaid by massive beds of Chitistone limestone of Triassic age, with bedding planes parallel to the flow planes of the lava, the limestone being of a bluish color, weathered to gray at the surface. There also are diabase and andesite intrusions and dikes.

Ore occurs in irregular replacement masses more or less parallel to vertical planes of a fault zone, ore following to some extent, minor fault planes, as well as the bedding planes of the limestone making stockwerks and irregular masses in the crushed limestone. The outcrop is 20 to 40′ wide, and over 400′ in length, the southern half showing 2 nearly parallel bands of chalcocite, 4 to 10′ in width, separated by about 10′ of limestone. At the northern end of the outcrop the chalcocite bands give place to stringers and interlacing seams of ore which thin out northward and fade into barren limestone.

In addition to the Bonanza outcrop there was a large amount of ore in the talus, or slide rock, broken off from the outcrop. This mass of broken ore and rock was about 300′ wide, extending for about 500′ or more down the slope from the outcrop, varying from 3 to 20′ in depth. A number of test-pits, sunk to the outcrop, showed an average of 4′ depth, with an average assay of 13% copper, this including both boulders of chalcocite up to 200 lbs. in weight and barren limestone. Ore is extracted from the slide by a system of cuts. Two grades of ore were mined, with 70% and 15% copper, respectively.

Further notes on the geology, ore, and mining were published in "Min. and Sci. Press," June 8, 1918, and Jan. 11, 1919.

Development: to depth of 1,130′ is by tunnels.

Underground openings at all the company's mines during 1916 were extended 15,340′; 10,770 ft. at Kennecott in 1917, and 11,790 ft. in 1918.

The most important recent developments includes the discovery of orebodies on the 600-ft. level of the Bonanza mine, and on the 900-ft. level of the Jumbo mine, both about 400 ft. northwest of the main fissuring. In 1918-19 a new two-compartment shaft was completed to 800 ft. at the Bonanza, and at the Jumbo a two-compartment incline was sunk to 500 ft. Orebodies on the 500′ lowest level are larger and higher grade than on the upper levels.

The Bonanza mine is connected with the mill at the lower camp by a Bleichert aerial tram, in 2 sections, the upper of 7,000′ and the lower of 8,000′, with a drop of 4,000′. The tram line has 40 towers, longest span 1,500′, with ore bins at both terminals, and has an estimated daily capacity of 600 tons. A 5,000-ft. aerial tram has been erected to connect the Jumbo mine with the Glacier mine, so that ore from the latter will be available for the mill. The lower camp has the mine buildings, power plant, and mill.

Equipment: includes steam plant and air compressor. Buildings include a bunk house, mess-house, assay office and 10,000′ sawmill.

The 700-ton concentrator is equipped with Blake and Symons crushers, Hancock jigs, bull jigs, rolls, Wilfley and Deister tables, and 600-ton ammonia leaching plant. (Described by L. Eddy in "Eng. & Min. Journ.," June 28, 1919.)

Guggenheim interests constructed the Copper River & Northwestern railway, at a cost of about $20,000,000, this line of 195 miles length starting at Cordova, on the sea, and ending at the lower camp. Results have been as follows:

Year	Revenue	Profit
1918	$1,846,585	$581,329
1917	2,496,670	1,210,304
1916	2,911,207	1,768,671

The Alaska Steamship Co. is also controlled by Kennecott. It carries ore to the smelter at Tacoma and returns with supplies for the mines. Recent results are as under:

Year	Revenue	Profit	Dividends	Surplus
1918	$3,733,938	$429,190	$450,000	$176,530
1917	4,018,667	979,524	360,000	513,239
1916	3,816,087	1,366,666	1,740,000	130,216

The **Beatson** mine comprises 17 patented claims, 268 acres, about 3 miles from the northern end of Latouche island, within one-half mine of tidewater, where there is a good natural harbor. Mine was located, July 4, 1897, by the late Andrew K. Beatson, and began shipping, 1903. Country rock is slate; ore is chalcopyrite, pyrite and pyrrhotite, occurring in brecciated portions of the country rock. The orebody is a large lens; total length developed is about 800′ with an average width of 100′. Ore assays up to 30% and as shipped returns 7.23% copper and 2 oz. silver per ton.

Development: includes over 20,000′ of underground workings. The ore is mined in an open pit and dropped through to the main tunnel level. Mine and mill are connected by an aerial tram. A 700-ton concentrator, employing oil flotation and completed Feb., 1915, was enlarged in 1918 to treat 1,500 tons a day. Buildings include rooming, mess and change houses, office, store and a hospital.

Situation, geology, ore, mining and milling methods and leaching of copper tailings with ammonia, were briefly described by H. M. Lawrence in the "Eng. & Mng. Journal," Nov. 3, 1917. A 300-ton plant was erected 1917, and one of 800-ton capacity is under construction. Four 30′ diam. leaching tanks with dome tops, hold 500 tons of tailing per charge in a depth of 15′.

The following figures show past production, costs and profits of the two Alaska companies prior to their acquisition by the Kennecott Corporation:

Kennecott Mines Co.:	Net Lbs. Copper	Cost per Lb. (a)	Profit
1916	101,410,000	5.10c.	$20,525,384
1915 (5 months)	14,240,412	4.00c.	1,522,747
1914	13,988,273	5.78c.	1,104,645
1913	14,621,834	5.48c.	1,424,635
1912	22,366,478	4.43c.	2,633,568
1911 (9 months)	21,007,096	4.19c.	1,656,205
Beatson Copper Co.:			
1916	6,872,000	5.10c.	$1,390,893
1915 (9 months)	1,970,947	11.41c.	122,504
1914	5,286,667	8.75c.	241,895
1913	5,178,629	8.36c.	353,239
1912	3,254,858	9.74c.	221,116
1911 (9 months)	3,078,444	7.44c.	163,939

(a) Includes selling.

Production:

Year	Bonanza and Jumbo Ore, Tons	Bonanza and Jumbo Copper, %	Beatson Ore, Tons	Beatson Copper, %
1916	48,855	67.90	184,411	2.30
	19,271	15.60	6,608	7.23
	229,717	8.49		
1917	265,579	13.78	273,523	2.44
1918	262,377	10.59	397,851	2.02

Summary of Operations

	1916 Kennecott	1916 Latouche	1917 Kennecott	1917 Latouche	1918 Kennecott	1918 Latouche
Ore, etc., to smelter, tons	48,855 19,271 703	6,608	89,799	49,141	71,888	52,427
Copper, per cent	67.9 15.6 9.9	7.23	38.57	11.48	36.09	12.42
Ore milled, tons	229,717	177,803	206,252	253,805	218,819	395,524
Copper, per cent	8.49	2.12	8.92	2.06	7.82	2.00
Concentrate, tons	29,949	20,701	29,559	29,423	27,174	49,915
Copper, per cent	53.6	14.29	53.52	14.20	53.00	12.80
Recovery, per cent	82.27	78.91	85.98	80.28	84.19	80.70
Tailing leached by ammonia, tons	62,450	.....	98,074	.....	132,304	.....
Copper, per cent	1.48	.....	0.90	.....	0.94	.....
Recovery, per cent	.....	.....	.....	.....	73.5	.....
Copper, pounds	.....	108,372,785	.....	78,211,429	.....	60,994,757
Average price, cents	.....	25.88	.....	27.02	.....	24.43
Silver, ounces	.....	1,101,733	.....	933,573	.....	684,779
Average price, cents	.....	64.48	.....	95.85	.....	95.29
Cost of copper sold, cents per pound	.....	5.1	.....	7.4	.....	9.2
Metallurgical efficiency (copper in ore and products shipped) per cent	.....	.....	94.65	84.53	93.33	80.91

Output for 1919 was 40,700,000 lb.
Rich ore and concentrates are sent to Tacoma, Wash., for reduction and refining.

Copper production was at its highest by mid-1916, when the yield was 10,750,000 lb. in July. From then on, there was a steady drop to 5,500,000 in Sept., 1918. After that, the published output includes Braden with Kennecott, thus concealing individual outputs. Despite the depletion of its very rich ores, Kennecott has a profitable future in the treatment of low grade ores. (The Braden and Utah companies are described under their respective titles.)

KENSINGTON MINING CO. ALASKA

Address: Juneau, Alaska.

The Kensington has been idle for years.

KNIGHTS ISLAND ALASKA COPPER CO. **ALASKA**

Address: J. J. Dieringer, Valdez, Alaska.

Property: on eastern arm of Drier Bay, Knights Island district.

Geology: a sheared zone, 20′ to 50′ wide, crosses greenstone, with a strike N. 15° E. shows slight mineralization with chalcopyrite, sphalerite and pyrrhotite for several hundred feet.

Development: by a 650′ crosscut tunnel, with three short drifts and some shallow surface pits.

LADYSMITH SMELTING CO. **ALASKA**

(Formerly the W. A. Dickey Copper Co.)

Office: 31 Nassau St., New York. **Mine office:** Ellamar, Alaska. W. A. Dickey, pres.-gen. mgr.; Duncan Edwards, v. p.-treas.; H. C. Bryan, sec.

Cap., $50,000. Is a close corporation.

Property: 2 miles from tide water at Irish Cove, Prince William Sound, is developed by tunnels and over 1,000′ of workings. Ore contains chalcopyrite in lenses along shear zones, in greenstone, with gold and silver; lenses of gold ore have been developed to a depth of 300′. Shipping ore said to average 12% copper. Last shipment to Tacoma smelter was made April, 1916. Now idle, awaiting improved shipping conditions.

Company bought the Mason-Gleason group, on Fidalgo Bay, for $15,000. The latter group shows high-grade ore, but nearest shipping point is Irish Cove, 3 miles distant.

LAKINA KENNECOTT MINING CO. **ALASKA**

(Formerly owned by the Lakina Copper Co.)

Address: E. A. Patrick, v. p., Eagle Bldg., Spokane, Wash.

Directors: E. A. Patrick, J. J. Kinnan, E. J. Hurley, E. E. Younge, T. A. Brady, V. C. Hill, J. S. Ross, and T. E. Coleman.

Cap. $2,000,000; $1 par; 770,000 outstanding; 750,000 owned by Lakina Copper Co. of Idaho.

Reported sold under a six-year bond for $500,000; 25% of all ore shipped to apply on purchase.

Property: 30 claims and a millsite on headwaters of Lakina river, Chittina district, S. E. Alaska, about 12 miles from the holdings of the Kennecott Copper Corporation.

Geology: a well-defined shear-zone in greenstone, running N. 10° W, dip 70° W. has evidences of leaching and is traceable up the mountain for a distance of over 1,000′ vertically. The ore is bornite, although chalcocite occurs along fracture planes with a calcite gangue. Some native copper is also found. See U. S. G. S. Bull, 662, page 161.

Development: by 235′ tunnel driven near the mouth of Mill creek, elev. 2,100′, and by numerous open-cuts.

LAKINAW TAGISH AND MOIRA MINES CO. **ALASKA**

Address: Carcross, Y. T. and Cymru mine, Moira Sound, via Ketchikan, Alaska. Holds bond on Cymru mine (which see) and on Portland (or Westlake King) group. Company is working the Yukon properties, formerly held and operated by the Conrad Consolidated Mines, now dead.

At the Cymru a 100′ shaft has been sunk and the mine equipped with 3-drill compressor and gasoline hoist. A mile long tram with gasoline motor connects mine and shipping wharf.

The Portland Group, near Mineral Lake, is 1½ miles from the Cymru. It shows a 4′ vein carrying silver-zinc-lead and copper values, zinc being predominant.

Development: by 130′ shaft. The ore is transported by 1,000′ aerial tram to Mineral Lake, from there by scows to the Cymru. No recent returns.

LANDLOCK BAY COPPER MINING CO. **ALASKA**

Office: Valdez, Alaska. **Mine office:** Landlock, Alaska. Dr. W. A. Rystrom, pres.-mgr.

Inc. 1907. **Cap.** $1,000,000; $1 par; 750,000 issued.

Property: 7 claims, 140 acres, on a small peninsula, with tide water on both sides, has 2 tunnels on the western side, besides a shallow shaft, 500′ of

drifts, a winze and raises, showing chalcopyrite, sphalerite and pyrrhotite ore assaying 7½% copper. Only assessment work done during 1916. Geology fully described, p. 97, Bull, 605, U. S. G. S.—1915.

LATOUCHE COPPER MINING CO. **ALASKA**

Address: Latouche, Latouche Island, Alaska. George Barrach, mgr.

Property: 7 claims, about one-half mile N. of the Beatson-Bonanza mine of the Kennecott Copper Co., at the northern end of Latouche Island. The vein has been traced about 750′, by trenches and pits, and is developed by a 750′ tunnel, showing chalcopyrite, associated with pyrite and pyrrhotite, having small gold and silver values. There is an 1,175′ ground tram to a shipping wharf.

Was under development by W. A. Dickey, 1917. Shipment of 300 tons of sorted ore, August, 1917, reported made to the Tacoma smelter.

LATOUCHE ISLAND COPPER MINING CO., LTD. **ALASKA**

Office: 330 Burke Bldg., Seattle, Wash. **Mine office:** Latouche, Latouche Island, Alaska.

Officers: Jas. A. Murphy, pres.; L. G. Wheeler, v. p.; A. E. Fraser, 2nd v. p.; C. P. McCormick, sec.; A. L. Cohen, treas., Tenning Carlson and H. J. Jacobs, directors.

Inc. in Washington. **Cap.** $5,000,000; $5 par.

Property: 42 claims, with about 4 miles of tidewater frontage, on the N. E. shore of Latouche Island, 60 miles S. of Valdez. The mine has 3 practically parallel N.-S. shear-zone veins in graywacke of 5 to 15′ estimated average width, with dip of 65°, proven by trenches for about 3 miles.

Ore carries bornite and chalcopyrite, with quartz gangue, averaging about 4% copper, with some gold-silver values. It closely resembles that of the Beatson mine, and is said to be amenable to flotation.

Development: by shallow shaft and 4 short tunnels.

Equipment: includes small hydro-electric plant with water wheel and an air compressor.

Little progress has been made during the past few years, but considerable development is planned for 1920.

LONDON AND CAPE CO. **ALASKA**

Property: 14 patented claims near Trail creek, Chitina district, S. E. Alaska. Copper stains found along fracture planes in quartz diorite in 245′ tunnel. Property reported idle for several years.

LUCKY STRIKE MINE **ALASKA**

John Hirshey, owner, Hope, Alaska.

Property: on the Kenai peninsula.

Ore: free gold, occurs in quartz fissure vein, averaging $75, per ton. Amalgamation recovers 60%.

Development: by 400′ of tunneling.

A 400-lb. prospectors' stamp-mill is used.

MABEL MINING, MILLING & POWER CO. **ALASKA**

Fully described Vol. XIII. Succeeded by New Mabel M. M. & Power Co., which see.

MAYFLOWER MINE **ALASKA**

Address: G. F. Johnson and J. McConnell, Strelna, Alaska.

Property: 3 claims, 60 acres, 2½ miles above foot of Kuskulana glacier and 18 miles by wagon-road from Strelna on Copper River railroad, shows a quartz vein in greenstone, cut by a prominent fault. Main copper exposure is 1,000′ above the glacier, on east side of a deep gulch. Copper minerals are bornite and glance.

Development: by 75′ tunnel, opening 100 tons of 30% copper and 18 oz. silver ore. A prospect. See U. S. G. S. Bull. 662, p. 159.

McKINLEY PLACERS **ALASKA**

(See Valdez Creek Placer Mines Co.)

MINERAL CREEK DEVELOPMENT CO. **ALASKA**

Property: Hercules and Millionaire claims on Mineral creek, Port Valdez district, Prince William Sound. Country rock is graywacke. Numerous short tunnels with drifts have opened up a vein about 20″ wide carrying gold,

galena, sphalerite, pyrite. Strike N. 80° W., dip 70° N. A small mill has been built to treat the ore. Season is short, from March to October.

MOHAWK MINING CO. **ALASKA**

Reported driving tunnel 200′ long, 1,000′ below upper tunnel.

MOTHER LODE COALITION MINES CO. **ALASKA**

Offices: 120 Broadway, New York, and Kennecott, Alaska.

Officers: Charles Earle, chairman of board of directors; John K. MacGowan, pres.; Judd Stewart, v. p.; C. T. Ulrich, sec., and F. W. Hills, treas.

Inc. Apr. 17, 1919, in Delaware. **Cap.** 2,500,000 shares of no par value, of which Kennecott Copper Corporation interests receive 1,275,000, equal to 51% and Mother Lode Copper Mines Co., 1,225,000, or 49%. The directors consists of 4 and 3, respectively, from these companies. Shares exchanged on basis of 1 ($10 par value) of Mother Lode Copper Mines for 1.63 in the Coalition Co. The Coalition Co. paid off the Mother Lode Copper Mines Co.'s $500,000 bonds, and provides working capital not exceeding $1,000,000, to develop the property on a large scale. The Coalition Co. has a contract with the Kennecott Copper Corporation for the treatment of its ores, and is to have the benefit of the same milling, smelting, refining, freight and selling charges enjoyed by the Kennecott Copper Corporation.

The property owned by the Mother Lode Copper Mines Co. was deeded May 20, 1919, to Mother Lode Coalition Mines.

Property: 83 lode and placer claims, about 1,640 acres, including the Smith-Haglund Sall group, adjoins the Bonanza Mine of the Kennecott Copper Corporation, in the Copper River district.

The Houghton-Alaska Exploration Co.'s property to the east and adjoining the Jumbo mine of the Kennecott Corporation was acquired in Nov., 1916. It consists of 12 lode and 1 Association placer mining claims.

Geology: conditions at this property, according to Herman Keller, are similar to those at Bonanza mines. The base of the mountain is formed of amygdaloidal basalt, highly altered and called the Nicolai greenstone. This is covered by thick beds of Chitina limestone, dipping north. The ore-shoots occur in the limestone, and exploration has shown that contrary to general belief, the ore does not occur along the greenstone contact, but in a favorable bed 90′ above it, and then only in connection with the Bonanza fault, or shear-zone. This shear-zone, 20 to 24′ wide, cuts both greenstone and limestone and the ore is found in chimneys, and as irregular bunchy masses along the zone and as impregnations in the limestone walls. The ore consists of nearly pure glance with minor and unimportant amounts of covellite and very little malachite, etc. Principal copper mineral is chalcocite. Like the Bonanza ore, it carries gold and silver.

Development: Nov. 24, 1918, consisted of 12,789 ft. of tunnels, shafts, crosscuts, raises, etc. A 1,400-ft. tunnel has been driven to connect the Mother Lode and Kennecott workings. Electric locomotives are used on this level to haul ore to the Kennecott tramway.

Property has been fully and favorably reported on by Herman A. Keller, Arthur W. Jenks, and Alan M. Bateman, and is a prospect of merit. Under the new arrangement profits and costs should be satisfactory.

MOTHER LODE COPPER MINES CO. OF ALASKA **ALASKA**

Merged into the Mother Lode Coalition Mines Company, which see.

MOUNT ANDREW IRON & COPPER CO. **ALASKA**

Former Office: Empire Bldg., Seattle, Wash. W. J. Rogers, supt., Ketchikan, Alaska, at last accounts.

Property: held under lease from the Mount Andrew Mining Co., on Kasaan Peninsula, Prince of Wales Island, Alaska.

Geology: ore carries chalcopyrite disseminated in magnetite, with hornblende gangue, and is practically unaltered at surface, masses of sulphide ore even showing glacial striations. Ore averages about 3.75% copper and $1 to $1.60 per ton in combined gold and silver values. The orebody has been stripped

for about 2 acres and is developed by tunnels of 300′ and 700′, with a 70′ blind shaft from the tunnel, and 10 small glory-holes, opened upwards to surface from the tunnels.

A 4,600′ aerial tram of 40 tons hourly capacity leads from a 50-ton loading bin at the mine to a shipping bunker 500′ from tide water.

Equipment: includes two 50 h. p. boilers,with 5-drill and 7-drill air compressors. Buildings include office, boarding house, bunk-house and smithy.

In Sept., 1917, reported shipping 1,000 tons high-grade copper ore per month to the Tacoma smelter.

NEW MABEL MNG., MLG. & POWER CO. ALASKA

Office: Loveland, Colo.

Officers: Carlton E. Clark, pres.; J. J. Henderson, v. p.; L. R. Rinker, sec.; J. R. Handy, treas., with F. G. Barthold and Mary B. Sutherland, directors.

Inc. 1917, in Colorado. **Cap.** $100,000; par $1; in treasury, 25,000 shares. Annual meeting, Sept. 1.

Property: 4 claims, 82 acres in Willow Creek mining district, formerly owned by Mabel M. M. & Power Co., described Vol. XIII.

Ore: occurs in vein in granite, dipping 45 degrees, and said to yield $46 in gold per ton. Developed by 132′ tunnel. Continuing development work, 1919.

Production: $12,000 in 1916, and $10,000 from May 28 to June 26, 1917. Seasons are short, with probably not over 120 days available for surface work.

NIBLACK COPPER CO. ALASKA

Niblack anchorage, Prince of Wales Island, Alaska. A. A. Wakefield, agent. Property formerly worked by the Niblack Copper Development Co. afterwards the Niblack Copper Co., is reported to have reverted to the Geo. M. Wakefield Mineral Land Co. Fully described in Vol. VIII, Copper Handbook. No work done on the property since 1912 and 1913 save annual representation. Niblack Copper Co. is said to still have a corporate existence.

NIKOLAI BUTTE COPPER MINING CO. ALASKA

Officers: Harry F. Goetz, pres.; Fred E. Grimmer, v. p.; H. G. Twomey, sec., Old Natl. Bank Bldg., Spokane, Wash.; Gus F. Eilers, treas., with A. P. Witherspoon, directors. C. A. Bode, gen. mgr., McCarthy, Alaska. E. F. Wann, cons. eng.

Inc. Dec. 15, 1916, in Washington. **Cap.** $2,500,000; par $1; 1,500,000 issued. Annual meeting, July 25, in Spokane, Wash.

Property: 20 claims on Dan creek, Chitina district, about 15 miles S. E. of Kennecott Copper Corp. High grade copper ores carrying bornite, chalcocite and chalcopyrite said to occur at contact of greenstone and limestone.

Development: in February, 1917, commenced a tunnel to open up ore body stated to be 18′ wide, averaging 35% copper. No recent return.

NORTH MIDAS COPPER CO. ALASKA

Office: 50 Congress St., Boston, Mass. **Mine Office:** Strelna, Alaska.

Officers: Willis D. Rich, pres.; F. A. Ball, v. p., James F. Crane, sec.-treas., with A. S. Nye, W. L. Hall, J. E. Kelley, and G. M. Wheeler, directors.

Inc. 1915 in Maine. **Cap.,** $1,500,000; $1 par; 1,250,000 outstanding; no funded debt. Stock listed on Boston Curb. Annual meeting first Tuesday in June. Old South Trust Co., Boston, transfer agents.

Property: copper, gold and silver claims, including 16 lode and 7 placer claims with mill site, near the Kuskulana river, in the Chitina district, Copper River region. Twelve mile wagon road connects with the railroad at Strelna on the Copper River and Northwestern R. R., 146 miles from the terminus at Cordova. Silver-gold occurs in 5′ vein in porphyry, dip 45°, said to average $35 gold per ton. The copper claims have not developed much ore. Principal mineral is chalcopyrite; gold and silver occur with iron pyrite.

Development: by 5 tunnels and incline shaft, aggregating 2,300′. No. 1 tunnel cut a series of alternating limestone beds and porphyritic intrusions. Cupriferous pyrite in small quantity appears in the tunnel face. Above this, another tunnel has exposed copper pyrite. A tunnel N. E. of the others has

been driven 555′ and an open cut below it shows quartz 1 to 4′ thick, said to assay $35 per ton in gold and silver. Ore reserves reported at 200,000 tons, averaging $30.00.

Equipment. includes compressor, 4500′ aerial tram, 10-ton cyanide plant, water power, etc. Twenty men employed.

NORTHLAND COPPER-GOLD GROUP **ALASKA**

Letters returned from last address, 518 Hinckley Bldg., Seattle, Wash., in 1917. See Vol. XIII.

PANDORA GROUP **ALASKA**

Address: Ellamar, Alaska. Geo. Valentine, Chas. Wallace, James McPherson, owners.

Property: 6 unpatented claims, on Bay of Isles, Knights Island, Prince William sound, showing small lenses of chalcopyrite ore in a sheared zone 2′ to 20′ wide in greenstone, said to assay 3% copper. Developed by 90′ shaft with 400′ of workings. Developing only, owing to lack of funds.

PARDEE-MEIER COMPANY **ALASKA**

Address: Fairbanks, Alaska.

Property: 14 claims on Steel creek, 14 miles from Fairbanks. Several narrow veins showing scheelite, a tungsten mineral and molybdenite with copper, lead, gold, silver and antimony.

Development: by open cuts and short tunnels. Strike of lode system N. 20° W., dip 30° E.

Reported idle since Feb., 1918.

PATTEN CO-OPERATING CO. **ALASKA**

Address: Valdez, Alaska. W. E. Patten, mgr.

Cap., $100,000; $100 par.

Property: 23 claims, 475 acres, in Valdez mining district. Ore occurs as contact deposit in shale and bornite, carrying gold, silver and nickel values.

Development: by 400′ of underground workings.

Equipment: includes compressor, steam power, pump, tramway. Management plans installing electric power and erecting a 150-ton smelter.

PEABODY ALASKA COPPER CORPORATION **ALASKA**

Office Chas. L. Peabody, Room 707, 10 Wall St., New York City.

Property: 33 claims known as the Addison-Powell group, on Sulphide Gulch, Valdez district, 4 miles from Lowe River, near Granby Cons. M. S. & P. Company's property. Said to have shear zone 1,000′ wide of green schist impregnated with chalcopyrite.

Development: by short tunnels and prospect pits.

Reported optioned to an English syndicate; if sold, the corporation will be dissolved.

PEABODY DEVELOPMENT CO. **ALASKA**

Office: Chas. L. Peabody, 10 Wall St., New York City.

Inc. 1913 in Del. **Cap.**, $700.000: par $1; fully paid.

Property: several unpatented claims on Passage Canal, Valdez district, stated to contain a gold quartz vein 3′ wide, in slate and graywacke.

Development: 113′ tunnel and crosscuts.

Reported in litigation.

PETERSON MINE **ALASKA**

Address: P. O. Box 198, Juneau, Alaska, or Amalga, Alaska.

Owners: Mrs. J. G. Peterson, Miss I. M. Peterson, Miss M. W. Peterson.

Property: 12 unpatented claims, 40 miles N. W. of Juneau, in the Harris mining district. Gold associated with arsenopyrite occurs in streaks in a 20′ vein in gabbro. Ore averages $6 gold per ton.

Development: 60′ vertical shaft with tunnels 127′ and 360′ long.

Equipment: 4 mile tramway, small 3-stamp mill, Wilfley concentrator, etc. Concentrates reported to assay $86 per ton. Examined by H. S. Brockunier.

PIONEER MINING CO. **ALASKA**

See Pioneer Mining & Ditch Co.

PIONEER MINING AND DITCH CO. **ALASKA**

Formerly Pioneer Mining Co.

Office: 509 Balboa Bldg., San Francisco, Cal., and Nome, Alaska.

Officers: Jafet Lindeberg, pres.-mgr.; E. O. Lindblom, v.p.; J. E. Chilberg, sec.; G. W. Campbell, treas., with W. H. Metson and J. L. Hagelin, directors.

Inc. Dec. 27, 1901, in Washington. **Cap.**, $2,500,000; $1 par; all issued.

Profit for year ended Dec. 1, 1916, was $242,904, of which $100,000 was paid as No. 17 dividend. Surplus at end of year was $240,153. No recent returns.

Dividends: 8% in 1902; 11% in 1906; 12% in 1907; 3% in 1908; 9% in 1909; 6% in 1910; 3% in 1911; 2% in 1915, and 4% in Jan., 1917; a total of 58% or $2,900,000.

Property: placer areas in the Nome district, Alaska, worked by hydraulicking since 1899. They are fully equipped and plant stands in accounts as worth $57,428. Company controls the Miocene Ditch and United Ditch companies.

RAE-WALLACE MINING CO. **ALASKA**

Address: Don S. Rae, mgr., Anchorage, Alaska. Mine in the Willow Creek district, Alaska, reported under development, Sept., 1917.

RAMSEY-RUTHERFORD GOLD MINING CO. **ALASKA**

Valdez, Alaska. Inc. in Sept., 1913.

Property: 10 miles N. E. of Valdez at an elevation of 3,500′; trail to the mine goes over Valdez glacier, making transportation difficult.

Ore: free milling gold quartz in fissure veins in graywacke.

Equipment: includes several gasoline engines, air compressor and a 5-stamp mill, which cannot be operated during the winter. In 1916 company employed 20 men on development work and stoping on the 100′, 150′, 225′ and 300′ levels, and was reported to have considerable ore blocked out. Mill closed from January to May on account of weather. See U. S. G. S. Bull, 642, p. 190.

READY BULLION MINE **ALASKA**

Address: Hollis, Prince of Wales Island, Alaska, formerly called the Puyallup mine.

Ore: free milling, occurs in quartz vein, averaging width 6″ to 7″ and in places 3′ wide, having well defined walls, inclosed in quartz-diorite.

Development: by three tunnels about 300′ feet long and 1160′ tunnel driven along vein, stoped for length of 1,000′, to an average height of 150′ to 250′

Equipment: includes Pelton wheel, compressor, electric-light plant, 5-stamp mill. See U. S. G. S. Bulls. 642 and 662, pp. 79 and 65.

Produced both bullion and concentrate.

READY BULLION MINE **ALASKA**

See Alaska Treadwell Gold Mining Co.

REGAL MINES CO. **ALASKA**

Subsidiary of the Great Northern Development Co., which see.

Office: 77 Franklin St., Boston, Mass. **Mine Office:** Kennecott, Alaska.

Officers: Walter M. Briggs, pres.; H. I. Gaskill, sec.-treas.; James Phillips, Jr., C. Hartman Kuhn, Chas. S. Farnum, Mulford Martin, E. F. Gray, W. M. Briggs, J. M. Satterfield, directors; E. F. Gray, gen. mgr.

Inc. 1912 in Maine. **Cap.** $250,000; $5 par; issued $28,011. Annual meeting, November 2.

Property: 17 claims, unpatented, 340 acres, near Kennecott, Copper River district. Developed by 115′ shaft sunk on a contact between limestone and greenstone and showing copper glance ore. Assessment work only in recent years.

REYNOLDS-ALASKA DEVELOPING CO. **ALASKA**

Office: 1182 Broadway, New York. **Mine office:** Latouche, Latouche Island, Alaska.

Officers: Marvin F. Butler, pres.; H. M. Coffin, v.p.; J. Frank Birdsell, sec.-treas.; preceding, with A. E. Austin, Hon. J. G. Brady, F. A. Reynolds, W. C. Gilbert, John Yule, O. C. McGilvara, Geo. K. Hinds and G. B. Wrigman, directors. F. A. Hancock, Latouche, supt.

Inc. 1903 in Washington. **Cap.** $3,000,000; $1 par; in $1,000,000 cumulative 6% preferred stock and $2,000,000 common stock. Authorized March 3,

1908, a $500,000 twenty-year 6% gold bond issue; issued, $125,000. Annual meeting, first Tuesday in April.

Property: 102 claims, about 2,000 acres, in Valdez district, Prince William Sound. Company was in receiver's hands until June, 1910, when discharged by court order. Former management fully described in Vol. X, Copper Handbook.

The Boulder Bay group of 31 claims, 620 acres, is on the mainland at eastern side of Prince William Sound. Claims shows a contact deposit between greenstone and slate, carrying chalcopyrite said to assay up to 11% copper and $3 gold per ton, but averaging 2 to 4% copper. Developed by 2 tunnels. Equipment includes a 60 h. p. boiler and a 5-drill air compressor.

The Iron Mountain group of 62 claims includes the Duchess and Duke properties, on Horseshoe Bay, Latouche Island. The footwall in both properties is black slate; graywacke forms the hanging wall. The ore consists of chalcopyrite with pyrite and pyrrhotite. The Duke mine has a 4′ vein of ore, formerly claimed to average 7% copper, slightly developed by a shaft now filled with water.

The Duchess mine, last worked in 1911, when 400′ of drifting was done on the lower tunnel, is developed by 2 tunnels, the upper a 375′ drift tunnel, and the lower having 500′ of drifts on the orebody, which has an average width of 25′. This group shows massive sulphide ore, estimated by the management to average about 3% copper. Assessment work only has been done since 1911.

In 1916 the Duke shaft was unwatered and sunk to depth of 110′ and the orebody reported to show a maximum width of 27′ along a length of 140′ of undeveloped ore. Drifts are 300′ below the lower Duchess tunnel. Ore is of similar character and value to that in the Duchess. Estimated ore opened above this tunnel is said to be over 600,000 tons, averaging 2% copper, $2 gold, 40% iron and 43% sulphur; maximum width of orebody in last completed crosscut was 124′, with average width of 25′ for a developed length of 500′.

Equipment: includes a 200 h. p. hydro-electric installation, with a flume and steel pipe leading from Big Falls Creek to a Pelton wheel, direct-connected to two 40 k. w. generators; a 50 h. p. hoist and 2 air compressors, of 5 drills aggregate capacity, with 6 air drills and 10 electric drills. See U. S. G. S. Bull. 662, pp. 206-208.

RICH HILL MINE **ALASKA**

Owner and Operator. Henry Andrews, Kasaan, Alaska.

Property: 5 claims containing a fissure vein in lime and granite, developed by 54′ shaft and 130′ tunnel. Ore is chalcopyrite with some gold and silver. Gross production 1918, $14,036; expenses, $6,548.

RUSH & BROWN MINE **ALASKA**

Address: Kasaan, Prince of Wales Island, Alaska. U. S. Rush, owner and operator.

Property: 9 claims, 180 acres and two 5-acre millsites, near the head of Kasaan Bay, 8 miles N. W. of Kasaan. The claims show greenstone intruded by granodiorite and carry three orebodies, 2 in E. W. shear zones in the greenstone, the third orebody along the greenstone-diorite contact. The latter carries magnetite-chalcopyrite ore in a body of unknown extent, but opened for 200′ in length, width of 63′ and to a depth of 120′.

One shear zone contains the sulphide body. The ore occurs as massive chalcopyrite in stringers, bunches and lenses, and also as a commercial impregnation of the greenstone and chloritic schists. The massive chalcopyrite, without waste, assays 20% to 30% copper, with $12 to $18 gold. The lenticular shoots of the clean ore run with the shear zone, and are as much as 7′ thick. Pyrite, quartz and calcite are practically absent. The sulphide body, in which this ore occurs has an average width of 14′, varying from 8′ to 20′ between walls, with dip of 55°.

On the footwall side, and at a distance of 30′ from the hanging wall, a parallel vein, evidently in the same shear zone, has been exposed for 45′ on the 200′ level.

Development: includes 177′ vertical shaft connecting by drift with incline shaft to 440′ depth, with drifts at 50′ intervals. On 400′ level drift is 260′ long.

Equipment: includes a steam plant with hoist, necessary mine buildings and 528 cu. ft. compressor. Ore is taken over a 3-mile private railway of 42" gauge to Venus Bay.

Production: for 1918, 403,512 lbs, copper, 3,460 oz. silver, 609 oz. gold. Mine considered promising.

RUSSELL BALL COPPER CO. **ALASKA**

Property: a group of claims on the south side of Drier Bay, Knights Island.

Geology: a vein of solid sulphides about 8" thick, occurring along an iron stained shear zone in greenstone, developed by a short tunnel. The shear zone varies from 10" to 10' in thickness with a strike of N. 10° W. and dip of 70° E. Minerals present, are chalcopyrite, chalmersite, pyrrhotite with quartz. Property believed to be idle.

SALT CHUCK MINE **ALASKA**

Owner: J. E. Chilberg, 1414 Alaska Bldg., Seattle, Wash. F. Chapman, mgr.; C. H. Bannerman, supt., Kasaan, Alaska.

Property: located on Kasaan Bay, Ketchikan district. The ore contains bornite and chalcopyrite with epidote in a gabbro country rock.

Equipment: includes 150 h. p. hydro-electric plant, 60-ton mill, consisting of crusher, ball mill, drag classifier and flotation unit. First shipment, Jan., 1918, reported assaying 44% copper, 2 oz. gold, 14 oz. silver and some platinum.

SEA COAST MINING CO. **ALASKA**

Holdings taken over by Alaska Hercules Mining Co., which see.

SEATTLE-ALASKA COPPER CO. **ALASKA**

Office: 638 New York Blk., Seattle, Wash. **Mine office:** Latouche, Latouche Island, Alaska.

Officers: E. Sparks, pres.; Geo. W. Terwilliger, v. p.; Geo. J. Hodge, sec.; Jos. Bjorn, treas., and O. B. Hess, directors.

Inc. in Washington. **Cap.** $1,000,000; $1 par.

Property: 35 claims, about 700 acres, near Montgomery Bay, in the southern and central part of Latouche Island. Claims are in 2 groups, one of 10 claims on tide water, with another of 25 claims about a mile from the harbor, latter said to carry the extension of the Beatson-Bonanza vein.

Development: by 287' tunnel, on the Delta claim, showing a vein of 4 to 6' width; ore, when sorted, assays 11 to 22% copper. The Santa Clara No. 1 claim has a 101' shaft, with a 140' tunnel and an 85' crosscut, showing 2 veins, one of 4' width. Ore is chalcopyrite with gold occurring in shear zone in greenstone.

Equipment: includes steam power, Pelton wheel and air compressor. Shipments were intermittently made to the Tacoma smelter. Mill dismantled in 1916 and only 3 men were said to be working.

SHELIKOF MINING CO. **ALASKA**

Address: Kodiak, Alaska, and 701 New York Blk., Seattle, Wash.

Officers and directors: Z. T. Halferty, pres.; F. S. Golding, v. p.; Carroll Hendron, sec.-treas.

Inc. Jan., 1916, in Washington. **Cap.** $500,000; $1 par; 105,000 issued. Annual meeting in April.

Property: 7 claims, 154 acres, on Alaska peninsula, in the Katmai reservation. Claims show a contact deposit, carrying copper in granite and diorite. Shoots said to be 10' wide, assaying 36% copper. Openings by tunnels.

SNOWSTORM GROUP **ALASKA**

M. B. Anderson, owner, Ellamar, Alaska.

Property: 6 claims, at Unakirk Bay, Prince William Sound.

Ore: occurs in quartz vein in limestone, carrying gold, silver, copper and some zinc. A 65' tunnel has opened ore to a depth of 40'. A prospect.

STANDARD COPPER MINES CO. **ALASKA**

Idle. **Office:** 68 William St., New York. **Mine office:** Landlock, S. E. Alaska.

Officers: Morris B. Mead, pres.; John L. Steele, v. p.-engr.; E. F. Bourke, sec.; J. O. Molander, treas.; Jas. A. Bourke, gen. mgr., with Thos. R. Manley and Chas. Williams, directors.

Inc. Feb. 2, 1906, in New Jersey. **Cap.**, $300,000; $100 par; issued $220,000. Bonds, $300,000 issued. Is operated as a close corporation. Annual meeting, third Saturday in December.

Property: 13 claims, at Thorn Arm, on Landlock Bay, Prince William Sound. The lands, which are very precipitous, show country rock of greenstone, reported to carry 17 fissure veins, of which 4 carry lenticular shoots of ore estimated to average 6% copper, 1 oz. silver and 90 cts gold per ton.

Development: by shaft and tunnels of 290′, 175′, 85′ and 660′, with about 1,300′ of workings, said to show 20,000 tons of ore with 12,000 tons blocked out for stoping.

The mine is connected with 500-ton ore bunkers on a wharf at tide-water by a 3,300′ aerial tram, in 2 sections, 1 of 912′ and 1 of 2,526′ length.

Was reported leased for four years to the Alaska-Standard Copper Mining Co.

SWEEPSTAKE MINING CO. **ALASKA**

Property: Harriman Fiord, Port Wells district, Prince William Sound. reported developing during 1917 and completing a two-stamp mill.

TALKEETNA MINING CO. **ALASKA**

Address: Wasilla, Alaska. Reported under lease to W. R. Hocking, of Seattle, Wash.

Officers: D. M. Fulton, pres.; E. H. Barthoff, v. p.; C. T. Hatcher, sec.; K. I. Fulton, mgr.-treas., with H. McGregor, directors.

Inc. Sept. 25, 1915, in Washington. **Cap.** $1,000,000; $1 par; 800,000 issued. Annual meeting 1st Monday in October.

Property: 8 claims in Willow Creek district, about 40 miles N. of Anchorage, said to show a 2′ quartz vein in diorite, carrying gold ore assaying $10-$200 per ton.

Development: by several tunnels, longest 130′.

Equipment: includes 2 aerial tramways and 15-ton mill. Further development planned. Reported 1918 production, $10,000.

TEIKELT GOLD MINING CO. **ALASKA**

Address: E. E. Ritchie, Valdez, Alaska.

Is a development company working on a small scale.

THOMAS-CULROSS MINING CO. **ALASKA**

H. H. Cowley, trustee, Port Wells, Alaska.

Property: on Culross Island, Port Wells district.

Developed by two shallow shafts and a 150′ crosscut tunnel, with 250′ of drifts. A Lane mill installed in 1916 to treat the gold ore. Employs five men.

THREE MAN MINING CO. **ALASKA**

Office: 31 Nassau St., New York. Mine office: Landlock, Prince William Sound, Alaska.

Officers: W. A. Dickey, pres.-gen. mgr.; H. C. Bryan, sec.; Duncan Edward, treas.; officers are the directors.

Inc. in New York. **Cap.** $1,000; $100 par; fully issued. Is a close corporation, having only 3 shareholders.

Property: 43 claims, 10 patented, 812 acres, on tidewater, at Landlock Bay, in the Valdez mining district of Alaska, giving the company nearly a mile along a great shear zone, only one end of which has been developed. The property, which has been under continuous development since 1903, is said to show 10 orebodies with a general E.-W. strike, occurring as fissure veins and as replacement deposits in shear zones in greenstone and slates. Orebodies reported to average 8′ in width and to carry chalcopyrite ore in lenticular shoots averaging 10% copper. Low-grade ore is continuous, with rich ore found mainly on the footwall in paystreak of 1 to 8′ width, the largest shoot carrying massive chalcopyrite, assaying 10% copper, 1 oz. silver and 50 cts. gold per ton. The quantity of low-grade ore of concentrating tenor is very much greater than that of the smelting ore, but it is not available for present use.

Development: by tunnels, with 6,000′ of workings. Six levels have been opened up on one orebody, giving a little over 600′ of stoping depth on the ore. Another orebody has been opened up on 3 levels, giving about 500′ of stoping depth. No stoping has been done, all ore produced having been extracted from levels and upraises. Company claims to have over 200,000 tons of 3% copper ore developed.

The mine has no machinery or power equipment, owing to development by tunnel, but has 14 buildings, with ore bunkers on a wharf at tidewater, connected by a short ground tram with the portal of the 5th level.

Production: about 600 tons of 10% ore were shipped, 1910, to the Tacoma smelter, yielding 120,000 lb. fine copper, and over 3,000 tons of 10% ore yielding 610,000 lb. fine copper in 1912. No shipments were made in 1913, 1914 and 1916, but in 1915, 300,000 lb. copper was produced. Over 5,000 tons of 10% ore have been shipped. Total production to date is about 1,000,000 lb. copper, shipments being under name of W. A. Dickey and not the company. Property considered promising.

UNITED METALS CO. **ALASKA**

See Alaska Metals Co. Property is the Corbin mine, near Coppermount.

VALDEZ CREEK PLACER MINES **ALASKA**

Office: 705-8 Newport Bldg., Boston, Mass. Mine office: McKinley, Alaska.

Officers: G. W. Sias, pres.; F. E. Nye, v. p. and sec.; R. B. Griffin, treas.; also trustees.

Inc. Nov. 1, 1911, as Express Trust Co., in Massachusetts. **Cap.** $2,500,000; shares of no par value, non-assessable; 2,408,186 issued. Bonds: $500,000 authorized, of which $454,100 are outstanding.

Property: placer claims on Valdez Creek, headwaters of Susitna River, Alaska. Examined by Forbes Rickard and Pierre Bouery. A large quantity of gravel awaits hydraulicking, for which ditches, piping, power plant, etc., have been constructed. The property is in a remote district and the cost of securing supplies is high, 4.8 cents per lb. from Chitina, a distance of 240 miles. The season is short also.

Production: in 1916 was 36,000 cu. yds. of 62-cent gravel. Since company acquired property it has yielded $69,880. Prior to this about $300,000 was recovered by simple methods.

Reported Jan., 1919, to have defaulted on payment of interest on $500,000 bonds and on $731,481 notes. Company to be re-organized as the McKinley Placers. Present bond holders to get $560,000 in 8% preferred stock in exchange for their bonds and coupons thereon up to Jan. 1, 1919. In exchange for notes held, it is proposed to issue a second 8% pfd. stock. Shareholders to get one share of common stock, par $5, for every 5 shares of Valdez Creek stock. Henry A. Cutter, Nashua, N. H., is counsel.

VALDEZ GOLD CO. **ALASKA**

Formerly Cameron-Johnson Gold Mining Co.

Office: Yakima, Wash., and Valdez, Alaska.

Directors: Geo. S. Rankin, W. A. Bell, Geo. Ker, Alex. Miller, Chas S. Mead, J. M. Bruce, and H. Y. Saint. J. D. McDougall, supt.

Cap. $750,000; 50c par; $600,000 outstanding January, 1919.

Property: 26 claims on the right side of Shoup Glacier, N. W. of Valdez, which show fissure veins in graywacke and argillite.

Ore: free milling gold quartz. About 3% of the ore is said to be sulphides of iron, lead and zinc.

Development: several hundred feet of tunnels. The upper workings are mainly on the Treasury Note vein, said to show from 3″ to 36″ ore. Lower workings are chiefly on the Mazuma claim, said to have the largest vein, as well as lowest grade on the property.

Equipment: includes a 3,850′ aerial tram, 5-stamp mill, a 7′ Lane mill, concentrator and bunkhouse. Power is supplied by a No. 3 Pelton water wheel operating under a 240′ head. Fifteen men are employed on the property. See U. S. G. S. Bull. 662, p. 192.

VICTORY COPPER MINING CO. **ALASKA**

Inactive, and letters returned from company's last office, 817 Alaska Bldg., Seattle, Wash. Mine office: Ketchikan, Gravina Island, Alaska.

Officers: M. McTernan, pres.; E. D. Fisher, v. p.; Maurice D. Leehey, sec.; J. R. Kelley, treas. Dr. C. O'Connor, C. J. Cronin and E. F. Tiernan, directors.

Inc. March, 1901, in Washington. **Cap.** $1,500,000; $1 par; fully issued. Annual meeting, first Monday in September.

Property: 14 claims, 99 patented, 260 acres, on Seal Bay, Gravina Island, 22 miles S. of Ketchikan, extends from sea level to 4,000′ above the beach. Lands show granite, greenstone and limestone reported to be cut by 11 veins of which 4 were developed by 2,100′ tunnel.

WILLOW CREEK DEVELOPMENT CO. **ALASKA**

Mine office: Anchorage, Alaska.

Officers: Chas. Herron, pres.; Judge David, treas.; T. Bedell, sec.

Organized 1917.

Property: a bond on the Isaacs group, on Reid creek, Willow Creek district.

WILLOW CREEK MINES **ALASKA**

Office: 620 Alaska Bldg., Seattle, Wash. **Mine office:** Wasilla P. O., via Seward, Alaska.

Officers: L. C. Thompson, pres.; H. Doheny, v. p.; Archibald Beck, treas.; M. D. Leehey, sec.; N. B. Bothwell, mgr.

Company leases and operates the Gold Bullion mine (which see), one of the largest gold producers of the Willow Creek district.

ARIZONA

Arizona leads all other states in copper production. In 1918, the mines of the state yielded: 777,000,000 lb. copper; $5,550,000 gold; 13,000,000 lb. lead; 6,800,000 oz. silver; and 1,800,000 lb. zinc. The output of copper and gold was increased, that of the other metals, especially lead and zinc was less. Dividends paid amounted to over $45,000,000. For 1919, there will be a large decrease in metal production due to a general curtailment of operations. Dividends were nearly $27,000,000 in 1919.

Mines are arranged by counties and under principal districts.

COCHISE COUNTY.

AJAX METAL MINING CO. **ARIZONA**

Office: 312 Cooper Bldg., Denver, Colo.

Officers: Nat. P. Wilson, pres.; W. H. Wilson, v. p.; S. O. Foxworthy, sec.-treas., with C. S. Campbell, M. E. Peters, directors. M. H. Wilson, mgr., 1440 Stanley Ave., Hollywood, Calif.

Inc. Oct., 1916, in Arizona. **Cap.** $1,500,000; par $1; issued $824,897. Transfer office and registrar: Peters Trust Co., Omaha, Nebr. Annual meeting, first Tuesday in October.

Property: 24 claims, totalling 498 acres, California mining district, Chiricahua Mountains, Cochise county. Said to show "disseminated" ore occurring in a porphyry dike 220′ wide. Values reported to average 8% copper, 9% lead, 6 oz. silver.

Development: by 210′ shaft and 3000′ of workings; will sink to a depth of 650′ in near future.

Equipment: includes electric hoist, compressor and pumps. Management proposes to erect a flotation mill.

ARIZONA COPPER SHIPPING MINES CO. **ARIZONA**

Officers at last accounts: E. E. Wiseman, pres.; C. E. Cummings, v. p.; C. F. Elliott, sec.-treas.

Inc. 1910. **Cap.** $1,000,000; $10 par; issued $620,000.

Property: 8 patented claims, 160 acres, 2 miles N. E. of Dragoon, Cochise county, shows limestone crossed by numerous veins, averaging 2 to 12′ in width,

said to carry 4 to 7% copper, 1 to 6 oz. silver and a trace of gold.

Development: by several pits and shallow shafts, deepest 130', with about 600' of workings. Is a prospect. Idle and apparently dead.

ARIZONA GOLD & COPPER MINING CO. **ARIZONA**

Clerk's office: Burlington, Vt. Mine office: Gleeson, Ariz. L. V. Hastings, v. p.; Hamilton S. Peck, sec.

Inc. July 28,1911, in Vermont. **Cap.** $100,000; $5 par; as successor of the Vermont & Arizona Copper Co.

Property: 11 claims, 220 acres, 4 miles from Gleeson, Cochise county, in the Turquoise district, on the western slope of the Dragoon mountains, show 2 gold and silver veins and several copper veins, giving average assays of $6 gold and 3% copper per ton.

Development: by 230' main shaft and 2 tunnels, longest 125'. Company claims to have developed a large body of low-grade milling ore.

Equipment: includes steam power and 12 h. p. hoist. Property idle, owing to lack of funds.

ARIZONA & MICHIGAN DEVELOPMENT CO. **ARIZONA**

Mail returned unclaimed, March, 1919. Property taken over August, 1919, by Mines & Development Co., which see.

ARIZONA MIDDLEMARCH COPPER CO. **ARIZONA**

Office: Middlemarch, Pearce, Ariz.

Officers: W. A. Potter, pres.; D. E. Wellcome, v. p.; E. D. Elson, sec.-mgr., with F. C. Austin, Judge D. R. Weller, H. H. Bones, A. Sidney Jones, T. H. Powell, J. W. A. Off, all of Los Angeles, Calif., directors. B. M. Snyder, cons. engr.

Inc. Dec., 1916, to take over the property of Middlemarch Copper Co., under lease and bond. Has since acquired eight additional claims adjoining. **Cap.** $1,000,000; $1 par; 700,000 shares issued April 1, 1919.

Property: 43 claims, over 860 acres, in Dragoon Mts., 9 miles west of Pearce. Sedimentary rocks are intruded by granite stocks and quartz porphyry dikes of great width, making contact zones of garnet, epidote, pyroxene, etc., with limonite, hematite, copper oxides and carbonates. Most of such outcrops are undeveloped, but commercial ore is shown on the Cobrelona and Missouri claims.

Development: the Cobrelona workings show a contact vein between granite and slate, with commercial ore along a drift over 200' in length. Vein is 2 to 6' in width. Principal development is on Missouri claim, which shows a chimney of contact metamorphic ore, increasing in area with depth. Stopes on fifth level are 40 to 50' in diameter. Oxidized ore was high-grade, but below a thin zone of enrichment primary chalcopyrite ore of approximately 2% copper was encountered. A 250' incline shaft has drifts at 50' intervals; a 300' vertical shaft is sinking. High silver values were encountered on the seventh level

Equipment: includes compressor, hoist and steam pump. Mill is a straight flotation plant of 125 tons daily capacity erected in 1917 and operated as steadily as the limited water supply would permit. Water now sufficient for operating mill part time.

The ore is crushed to 1½" max., then fed to 6' by 6' ball mill in closed circuit with an Akins classifier, pulp going to 2 Launder flotation machines. A K. & K. flotation machine is used as a cleaner. Tailing from roughers goes to a Dorr thickener for recovery of water. Power for mill and 25 k. w. alt. current generator is obtained from a 200 h. p. oil engine. Mill makes recovery of 90% of copper content, concentrates averaging 16% copper and 6 oz. silver per ton.

Shipments to April, 1919, total 51 cars concentrate and 3 cars crude ore. Enlargement of mill contemplated when mine development warrants.

Management appears to be energetic and capable.

ARIZONA SMELTING & POWER CO. **ARIZONA**

Office: Benson, Cochise county, Arizona.

Officers: C.E. Goetz, pres.; Martin Fishback, gen. mgr.-sec.; R. L. Lee, supt.

Inc. in Arizona. **Cap.** 100,000 shares; $5 par. Company was organized to purchase the old lead-silver smelter at Benson, and engage in the reduction of copper-silver-gold ores from nearby districts.

Property: 60-acre site formerly occupied by a smelter that was operated 30 years, treating ore from Mexico, sent in via Nogales. These operations produced 75,000 tons of neutral slag, now available for resmelting by this company. It carries 5 oz. silver, 50 cents gold, and 15 lb. copper, equal to $8 per ton. The net profit on this slag is estimated at $3 to $5 per ton.

Equipment: modern 200-ton blast-furnace for copper ore, 32 by 100 in. at tuyeres; a No. 7 Connersville blower, 250-ton mechanical sampling plant of the Vezin type to handle car lots, crushers, boilers, engines, water-supply, etc.

Ore supply for the plant is principally from Johnson, 27 miles east; Rosemont and Helvetia, 27 miles west; Patagonia, 60 miles south, and several other smaller centers. It is reported that the ore already developed and available in these places will necessitate expanding the plant to 1,000 tons daily capacity in less than 3 years. A local smelter is needed for these districts, as they have heretofore been unable to find a market. The position of the smelter with respect to rail connection, labor supply, water, and other conditions, is said to be favorable. Future earnings are estimated at $10,000 per month, mostly from the slag mentioned.

This seems to be a project whose weak point is that the company has no mines of its own on which to fall back for a steady supply of ore. The plant was ready to be blown-in early in September, 1919.

ARIZONA UNITED MINING CO. **ARIZONA**

Office: 1420 Chestnut St., Philadelphia, Pa. **Mine office:** Johnson, Cochise county, Ariz.

Officers: Alfred S. Miller, pres.; Alfred C. Harmer, Jr., v. p.-gen. mgr.; David H. Ross, treas.; Alfred H. Miller, sec., with Chas. B. Cox, Geo. E. Barnett, M. D. Brown, W. M. Houston, J. N. Stetson, J. K. Kane, G. M. Jones and Earl P. Mendenhall, directors. J. M. Libby, mgr. Kirby Thomas, cons. engr.

Inc. Aug. 12, 1910, in Arizona, as successor to Arizona United Mining Co. of Delaware. Cap., $5,000,000; $1 par; $2,500,000 outstanding.

Dividends: 1% quarterly, begun October, 1916. Company is a close corporation.

Treasurer's statement, Jan. 1, 1919, for year 1918, showed total receipts of $208,247, including $161,541 from ore shipments. Disbursements totalled $192,270, including $25,000 paid on purchase of lease from Goodrich-Lockhart Co. Cash on hand, Dec. 31, 1918, $15,976.

A 10-year lease on the property given to the Goodrich-Lockhart Co. in 1913, was surrendered July, 1918, for $75,000, property reverting to the company. During the life of the lease the Arizona United paid all debts, including the mortgage, and distributed $100,000 in dividends from its 45% of net earnings received. The $75,000 payment to the Goodrich-Lockhart Co. was also paid out of royalty under the lease. These earnings came from ore containing 4% or more copper.

Property: 45 claims, 30 patented, about 1,000 acres, 7 miles N. E. of Dragoon, in the Johnson mining camp. Land includes the Mammoth, Republic, Copper King and Southern group of claims. Principal development is on the Republic claim, opened by a 1,500′ shaft, with about 1,200′ of workings. The most important ore deposit developed after the company resumed control was between the 900′ and 1,100′ levels, where there has been exposed a deposit 150′ long, 11′ average thickness, 150′ on the dip, with the bottom not reached; assays from this deposit are said to average 6.2% copper. Another deposit, but of lesser importance, has been opened on the 900′ level At the time of suspending operations, Feb. 1, 1919, on account of low price of copper, company states it had enough ore blocked out to give a daily output of 200 tons for sixty days. In addition an ore deposit on the Mammoth claim has been opened up by lessees. The mine has a considerable tonnage of low grade ore opened up.

Equipment: includes a 200 h. p. oil-burning boiler, with hoists at the Republic and Mammoth mines, an electric plant, 4 electric drills and an air

compressor. Transportation is by a standard-gauge railway from Johnson to Dragoon, connecting with the Southern Pacific Railway.

During first 6 months of 1918 lessees shipped 24,902 tons of ore, with a value of $290,216, and in last 6 months the company shipped 18,041 tons, value, $174,223, while the Mammoth furnished 2,480 tons ore with net smelter value of $38,196.

BISBEE AJO COPPER & DEV. CO. **ARIZONA**

Officers: W. E. Holm, representative, Bisbee, Arizona; Ed. Sweeney, pres. and gen. mgr.

Cap. increased during 1917 from $650,000 to $3,000,000.

Property: said to be two groups. The first of 9 claims, 5 miles from the Mexican border, has a shaft 140′ deep; assays are said to have shown from 3% to 73% copper; shales and porphyry predominate. The second group of 26 claims, south of the town of New Cornelia, is undeveloped.

BLACK PRINCE COPPER CO. **ARIZONA**

Office: 420 Gas & Electric Bldg., Denver, Colo. **Mine office:** Johnson, Cochise county, Ariz.

Officers: Robt. N. Bell, pres.-gen. mgr., Denver, Colo.; J. C. Thompson, v. p.; J. B. Wright, sec-treas., with M. A. Hoag and F. T. Henry, directors.

Inc. May 10, 1901, in Arizona. **Cap.** $1,500,000; $1 par; issued 1,320,100 shares. Annual meeting, last Wednesday in May.

Property: adjoins Peabody mine and comprises 8 patented claims, 147 acres, showing replacement deposits in limestone. Mine has a 950′ two-compartment shaft, sunk in limestone and showing copper oxides and carbonates, bornite and chalcopyrite, with silver, on various levels.

Equipment: includes two 100-h. p. boilers, 175-h. p. steam hoist, compressor, gas engine, 3 pumps and electric generator.

BUNKER HILL MINES CO. **ARIZONA**

Owned by the Phelps Dodge Corporation, which see.

BUTTE & ARIZONA COPPER MINING CO. **ARIZONA**

Office: 619 Hennessy Block, Butte, Mont. Mine near Hereford, Cochise Co., Ariz.

Officers: B. H. Dunshee, v. p.; A. S. Nichols, sec.; John C. Adams, treas.; with L. O. Evans, Chas. S. Shoemaker, A. P. Henningson, C. B. Mosely, John E. Corette and D. M. Watts, directors.

Cap. $1,250,000; $1 par.

Property: 14 claims, 11 patented, costing considerably over $60,000, was exchanged for $450,000 stock. Property is in the Huachuca mountains, 35 miles S. W. of Bisbee, and about the same distance north of Cananea.

Geology: claims show an ochrous gossan of 10 to 300′ width, covering a contact vein between syenite and limestone carrying occasional copper oxides, carbonates, pyrite and argentiferous gray copper, and chalcocite of fair tenor, though not in large quantities.

Development: by a long main tunnel cutting several small veins giving assays up to 18% copper with an average of 4.5% tenor, mine having upwards of 3,900′ of workings. Main vein, 350′ from mouth of tunnel, is claimed to show 39′ of 6% chalcopyrite, which is an overestimate.

Nearest railroad is 15 miles, with a fair wagon road. Has steam power and an air compressor. Idle since end of 1908. Company reported to have no debts, considerable treasury stock and is being carried by the directors, who are advancing the money required to pay taxes and maintain the property.

CENTRAL BUTTE MINING CO. **ARIZONA**

Office: Box 973, Douglas, Ariz.

Officers: A. H. Struthers, pres.-mgr.; F. F. Williams, v. p.; Z. T. Phillips, sec.-treas., with A. J. Thompson and Chas. M. Seaman, directors. H. W. Evans, supt.

Inc. 1917, in Arizona. **Cap.** $750,000; 50c par.

Property: 145 acres, in the Pearce mining district, Cochise county, 4 miles south of Pearce. Shaft 180′ deep. Has shipped some copper ore from

the 70′ level, from a stoping length of 42′ on the vein. Ore carries from 1 to 10% copper, with some gold and silver.

Have installed an oil-driven air compressor and expended $25,000 on property.

CENTRAL MINING CO. **ARIZONA**

Address: E. A. Ely, Dos Cabezos, Cochise Co., Ariz.

Inc. 1919 in Arizona.

Property: 16 claims, 18 miles W. of Willcox, adjoining property of the Mascot Copper Co. Surficial exposures are said to be good.

CENTURION ARIZONA MINING CO. **ARIZONA**

Dragoon, Cochise Co., Ariz.

Officers: J. P. Richardson, pres.-gen. mgr.; Samuel Bennett, v. p.; H. A. Morgan, sec.-treas., with H. C. Arnold, J. W. Angle , W. H. Purdy, M. S. Richardson, E. F. Woodworth, directors. Willcox Bank & Trust Co., treas.

Inc. July 26, 1906, in Arizona. **Cap.,** $1,000,000; $1 par; issued 789,186.

Property: 23 claims, 430 acres, in two groups, 1st group about 2 miles N. W. of, and 2d group about 5 miles N. E. of Dragoon, in the Dragoon mountains, shows a contact deposit between pre-Cambrian limestone and altered schist, averaging about 15′ in width and carrying azurite and malachite, associated with hematite. Ores carry an average of 2.7% copper.

Development: by a 660′ incline shaft, several shallow shafts ranging from 40 to 100′ in depth, and a 2,000′ tunnel, with about 4,500′ of workings, estimated by management to show 165,000 tons ore in sight. Work on the 600′ level said to be in 8.12% ore for 50′.

Equipment: includes a 15 h. p. gasoline hoist, good for 800′, a small air compressor, machine shop, smithy and other necessary mine buildings. Water encountered on 600′ level has somewhat retarded development, but shaft is to be deepened when conditions permit. New pumping plant needed. Property considered promising.

COBRIZA MINES DEVELOPMENT CORP. **ARIZONA**

Company had a lease on property of the Arizona United Mining Co., but this was given up in 1918 and company has gone out of business. Described in Vol. XIII.

COMMONWEALTH EXTENSION MINING CO. **ARIZONA**

Mail returned unclaimed from Pearce, Ariz., March, 1919.

Officers: J. S. Metcalf, supt.; C. W. Hicks, pres. Control held in Bisbee, Arizona.

Property: a tract adjoining the Commonwealth mine on the E. and S. E. shows a mineralized contact that carries high-grade ore in the adjacent mine.

Development: a 250′ shaft sunk in andesite with 230′ level, equivalent to 7th level of the Commonwealth and corresponding to the water level of the district.

Equipment. includes steam plant, hoist and compressor.

COMMONWEALTH MINING & MILLING CO. **ARIZONA**

Property: the Commonwealth silver mine, at Pearce, Cochise Co., Ariz., closed down in 1917, and complete 350-ton equipment sold to Commonwealth Dev. Co. Although some rich shoots were found at depth, none persisted, and operations became unprofitable. See Vol. XII for description and other data.

COPPER DOG MINING CO. **ARIZONA**

Mail returned unclaimed Feb., 1919.

Office: A. Graydon, 1649 York St., Denver, Colo.

Officers: A. Graydon, pres.; G. J. Peterson, v. p.; H. J. Potter, sec.-treas.

Cap., $1,000.000, $1 par; issued 500,000 shares.

Property: 12 undeveloped claims in the Huachuca district, Cochise county, held under bond and lease. Ore is gold, with some silver and copper. Values as high as $90 per ton are reported in a narrow vein.

COPPERROX MINING COMPANY OF ARIZONA **ARIZONA**

Office: Mail returned unclaimed June, 1919, from 96 Harris Ave., Providence, R. I. Mine near Courtland, Cochise county, Ariz.

Officers: T. F. Gilbane, pres.; Geo. F. Wordley, 1st v. p.; Thomson E. Going, 2nd v. p.; Hon. G. W. Esterbrooks, sec.-treas.

Inc., Jan. 17, 1910, in Arizona, as successor of the Arizona Copper Syndicate of Providence. **Cap.,** $1,000,000, $1 par.

Property: 28 claims, 18 patented, and 2 mill sites, patented, in the Dragoon Mountains, 3 miles from Courtland.

Development: by 236′ shaft and about 500′ of tunnels on a contact said to be traceable 3 miles, with surface ores carrying gold, copper and manganese, said to assay up to 16.5% copper. President reported, 1916, that a manganiferous "mother-lode" has been opened up by recent work. Company a holding concern that will lease or sell controlling interest.

DENN-ARIZONA COPPER CO. **ARIZONA**

Office: Bisbee, Cochise County, Ariz. **Officers:** Martin Pattison, pres.; Lemuel C. Shattuck, treas.; J. G. Williams, sec.; Byron M. Pattison, Thos. Bardon and H. L. Mundy, directors. Arthur Houle, supt.

Inc., Jan. 14, 1907, in Minn., as successor of Denn-Arizona Development Co. **Cap.,** $3,500,000, $10 par, fully issued; increased June, 1917, to $5,000,000, and 55,000 shares new stock offered for sale, at $10. Listed on Boston Curb.

Property: 13 claims, patented, 200 acres, immediately east of the Junction shaft of the Superior & Pittsburgh. The Dividend fault traverses the company's ground for about 4,500′, and big orebodies have been found on adjoining properties near this fault.

Development: by 1,800′ shaft, started in conglomerate, but penetrating limestone at 840′, with over a mile of workings. The 1,000′ and 1,100′ levels show considerable leached ore, with little commercial ore, though carrying occasional small bodies of rich cuprite. The 1,250′ and 1,350′ levels also show large areas of leached ore, with some low-grade sulphides on the 1,250′ level, and a little native copper on the 1,350′ level. The 1,600′ level has a little ore of 12 to 15% copper tenor. The leached ore bearing zone is about 300′ wide, containing ore in the form of oxides and carbonates.

Management estimates the average tenor of ore developed almost exclusively oxides and carbonates, at 8% copper. Apparently some good orebodies may be developed at 1,800′, or deeper, though the ore is erratic. The mine is wet, and has two 1,000-gal. triple-expansion pumps on the 1,000′ level and five 800-gal. sinking pumps.

In Aug., 1919, No. 11 crosscut at 1600′ had opened chalcocite and chalcopyrite; No. 6 at 1700′ was in high-grade ore, and a new orebody was opened at 200′.

Equipment: includes a 1,600 h. p. steam plant, with 6-drill and 25-drill air compressors and an 18x36″ Ottumwa Corliss first-motion hoist, raising double-deck cages. There is a railroad spur to the mine.

Production: 1909, was 99,222 lb. fine copper and 41 oz. gold. Development work was energetically carried on, despite very heavy pumping expenses, until 1912, when an unusual influx swamped the pumps and the mine was closed down. Operations were resumed in Sept., 1917, and development is proceeding rapidly. Over $1,000,000 has been expended in development work since 1917.

Production from development reported about 2 cars ore daily, more than 300,000 lb. copper per month.

The Denn has an excellent chance of making a big mine, the claims covering an extension of the big ore zone of the camp, but the ore horizon at this point is lower than on the other properties. The deep development of the Junction, C. & A., and Saginaw properties will drain this ground as well as prove it, and further exploration will be easily and cheaply done. There is strong probability that this company and the Shattuck will be merged at some future time. Prop-

erty is a splendid prospect. It may be several years before it makes a mine, but eventually, we believe, will be a very valuable one.

DRAGOON MOUNTAIN MINING CO. **ARIZONA**

Mine office: Johnson, Cochise County, Ariz.

Developed: by 300′ vertical and 400′ inclined shafts. Reported to have shipped 11 cars of ore in Aug., 1918.

EMPIRE COPPER & GOLD MINING CO. **ARIZONA**

Mail returned unclaimed Sept., 1918, from Office: 510 Bradbury Bldg., Los Angeles, Cal. Mine address, Dragoon, Cochise Co., Ariz.

Officers: Leon V. Shaw, pres.-treas.; P. E. Woods, v. p.; Chas. R. Van Tilburgh, sec., with M. J. Gress, H. Hermanson, C. J. Nordquist, R. W. Pigeon, C. R. Lawrence, directors.

Inc. Jan. 31, 1905, in Arizona. **Cap.**, $1,500,000, $1 par; issued 953,814. Annual meeting, second Monday in October.

Property: 3 separate groups of claims, near Johnson and Dragoon, on the Southern Pacific Railway. The Empire group, 16 claims, 2 miles S. E. of Johnson, shows limestones and quartzite cut by porphyry and traversed by N. W. fissures carrying ore.

Development: by the 380′ Empire 2-compartment incline shaft, with about 500′ of drifts, so wet that it was abandoned, temporarily; also the 125′ Bridge, 158′ Copper Whale and a 2,000′ tunnel shaft started. Mine shows auriferous and argentiferous copper ore.

In May, 1913, machinery and supplies were moved from the Empire group 6 miles south to the Princess group, said to have attractive surface showings of iron gossan and copper carbonate and to be opened only by shallow shafts. Company also owns the Cowboy group of 8 claims, partly developed, showing veins in limestone near porphyry contacts.

Equipment: includes a 25 h. p. hoist and 1-drill air compressor. Buildings include an engine house, smithy, bunk house and boarding house.

No recent returns. Probably idle.

EMPIRE STATE MINING CO. **ARIZONA**

Office: 182 Buick Ave., Utica, N. Y. **Mine office:** Bisbee, Cochise Co., Ariz.

Officers. R. E. King, pres.; F. L. Guillaume, v. p.-treas.; E. M. Penny, sec.; W. A. Fenn, Geo. P. Langford, John A. Losee, John A. Urschel, directors. John A. Collins, gen. mgr. and purch agt.; O. P. Zane, cons. engr. and supt.

Inc. June 27. 1904, in Arizona. **Cap.**, $1,000,000. $1 par; 813,000 shares issued. Annual meeting in June.

Property: 11 claims, 230 acres, near the Modern mine, about 5 miles N. W. of Bisbee, is developed by a 1,400′ tunnel, said to show about 150′ of low-grade copper ore, slightly auriferous and argentiferous, estimated to average about $8 per ton. Ore is found in small stringers, typical of the district, and property is not considered well located. Idle since June, 1914.

GREAT WESTERN COPPER CO. **ARIZONA**

Address: Courtland, Cochise County, Ariz. Wm. J. Young, Jr., pres.; Edward A. Young, sec.; C. H. Young, treas., all of Clinton, Iowa; F. J. Gibbons, gen. supt.

Inc. Oct. 22, 1900, in Arizona. **Cap.**, $1,000,000. $10 par; fully issued.

Property: 23 patented claims, 407 acres, in the Turquoise district, acquired 1899.

Geology: Limestone is intruded and altered by monzonite and quartz-monzonite porphyry. The Humboldt, first opened, yielded high-grade ore from the surface to 150′, where it apparently ended. In 1908, good ore was opened in the Mary to 200′, and high-grade ended here also. Five diamond-drill holes during 1918 failed to disclose ore at depth, but a 6th encountered good ore in virgin ground. On this a 265′ prospect shaft was sunk and a 250′ crosscut opened up a body of chalcopyrite and bornite ore. Lessees are mining ore from the Mary, Humboldt, Maine and Chance claims. Sulphide ore was opened in the Mame in 1909, and produced until 1914.

Development: 2,600 of workings from 5 shafts, 310′, 300′, 430′, 200′ and 265′ deep, respectively.

Equipment: includes a 150 h. p. electric plant driven by steam power and having one 150 k. w. generator, a 600 cu. ft. air compressor, 2 electric hoists, electric pump, etc. Additional machinery was put in during 1919.

Production: 1916, 1,197,920 lb., 1917, 1,935,563 lb., and 1918, 1,201,893 lb. In Oct., 1919, the daily output was a carload of ore. There were 30 men employed.

GREAT WESTERN GOLD & SILVER CO. **ARIZONA**

Idle for years. Dragoon, Cochise Co., Ariz.

Inc. about June, 1908.

Property: in the Dragoon Mountains, shows lead and copper ores with gold and silver.

HARTFORD-ARIZONA COPPER MINING CO. **ARIZONA**

Address: Hamburg, Cochise Co., Ariz. Henry Hamburg, pres. and mgr.

In Sept., 1913, the Arizona Corporation Commission authorized the company to incur a $100,000 6% bond issue, for further mine development.

Property: the Wisconsin group in the Huachuca Mountains. Surveyed a line for tramway to wagon-road and planned shipping to Hereford or to a point on Fort Huachuca branch of the El Paso & S. W. R. R. Developed by tunnels, has steam plant and compressor. Company employed 30 men at last accounts. No recent returns secured.

HAYES & GRACEY SYNDICATE **ARIZONA**

M. P. Hayes and T. H. Gracey, Los Angeles, Cal., owners. Succeeds the Dragoon Copper Mining & Smelting Co., now dead.

Property. the Christmas and Eureka claims, carries replacement deposits with silver-lead-copper ores.

Development: by a 550′ shaft.

Equipment: includes steam power and air compressor. Presumably idle as no returns have been secured for years.

HELENS DOME MINING CO. **ARIZONA**

Operating company holding bond and lease.

Owner: T. J. Quillin, Bowie, Cochise Co., Ariz.

Property: 18 claims, 14 miles S. of Bowie in Apache Pass, Paradise district. Ore contains gold, silver and lead with 2% copper. Hoist and small mill on property.

HERSHEL MINING CO. **ARIZONA**

Address: Douglas Gray, mgr., Tombstone, Ariz.

A silver-lead property in the Charleston district which was to ship some ore during 1919. Reported to have shipped some ore worth $5,000 per car. Small mill on property.

The high price of silver has helped this and many other small properties to resume operations.

HILLTOP EXTENSION MINES CO. **ARIZONA**

Office: Box B. B., Douglas, Ariz. **Mine office:** Rodeo, N. M.

Officers: W. E. Hawley, pres.; J. G. Erickson, v. p.; F. H. Fisher, sec.-treas. J. Blumberg, mgr.

Inc. in Arizona. **Cap.,** $750,000, $1 par; 250,000 shares are promotion stock.

Property: the Lily and Whale groups in the Chiricahua Mountains, Cochise county, 18 miles N. W. of Rodeo, N. Mexico, claimed to have the N. W. and S. E. extensions of the Hilltop veins.

Developed by 750′ tunnel, vein said to be 3′ wide, shipping ore carrying 60% lead with 50 oz. silver. Molybdenum is also reported.

HILLTOP METALS MINING CO. **ARIZONA**

R. O. Fife, trustee-mgr., Rodeo, N. Mexico.

Formerly the Hilltop Mines (not incorporated).

Office. 1321 Otis Bldg., Chicago, Ill. **Mine Office:** Rodeo, N. M.

Officers: J. O. Fife, pres.; P. J. Kasper, v. p.-treas. with F. A. Rehm, J. R. Scott, Phil Hoffman, C. H. Putnam, F. J. Kasper, O. Kastrup, Jr., directors. A. C. Jones, sec.

Inc. 1916 in Arizona. **Cap.,** $10,000,000, $1 par; outstanding 2,000,000 shares.

Property: 42 unpatented claims, 800 acres, in California mining district, Chiricahua Mountains, Cochise county, said to show copper-lead-silver ore in quartz veins and contact deposits; strike N. W.-S. E., dip 60° S. W. Ore-shoots reported as 2′ to 50′ wide, and 30′ to 110′ long, averaging 1 to 3% copper and 6 to 10 oz. silver. Examined by L. D. Hutton, Walter Vidler, and Charles Berkey.

Development: by 4 tunnels, 800′, 1,500′, 1,700′ and 2,000′ long; giving a depth of 1,100′ below the outcrop. Total workings, 15,000′. No ore blocked out, but developments show large probable tonnage. No shipments made in 1918. Co-operation with the Hilltop Extension was being arranged late in 1919, and doing considerable development.

Equipment: includes a 300-h. p. engine and an 1,000 cu. ft. compressor. Contemplated construction is a railway from the mine to Rodeo, in New Mexico, there to connect with the El Paso & Southwestern; also a mill and smelter.

It is to be hoped that this heavily capitalized company will actually block out ore reserves before attempting further ambitious equipment schemes.

HILLTOP MINES (not Inc.) **ARIZONA**

Now property of the Hilltop Metals Mining Co., which see.

JOHNSON COPPER DEVELOPMENT CO. **ARIZONA**

Office: Frankfort, Ky. **Mine address:** J. T. Tong, mgr., Johnson, Cochise Co., Ariz.

Officers: Henry S. Krug, St. Louis, Mo., pres.; Ralph R. Wilson, v. p.; E. H. Elliott, sec.-treas.; preceding, with P. S. Head, Hon. A. A. Hazelrigg, Hon. Baily D. Berry, Hon. A. C. Van Winkle, R. O. Duncan, and H. P. Hubbell, directors.

Inc. March 13, 1908, in Arizona. **Cap.,** $2,000,000, $1 par; issued 1,568,000. Annual meeting, second Monday in October.

Bonds: $100,000 5-year 6% 1st mortgage gold bonds authorized, interest payable annually on Dec. 21. Principal due Dec. 21, 1921. $43,000 worth of the bonds have been sold.

Property: 8 claims, 3 fractional, unpatented, 125 acres, known as the Climax group, in center of the Johnson camp, between the Peabody, Peacock, Republic and Black Prince mines. Claims show granite and limestone, with replacement deposits carrying malachite, chrysocolla, bornite and chalcocite, averaging 4% copper and 5 oz. silver per ton for the several thousand tons thus far developed. Orebody has a flat dip, averaging 32°, and is about 2′ wide on the 250′ level.

Development: by 240′ shaft giving a depth of 740′ on the orebody, with total of 2,500′ of workings. Shaft reported to be bottomed in bornite disseminated in limestone. The 100′ level has about 500′ of crosscuts and drifting, much of it in ore, but ground is leached and broken. The 250′ level has N. and S. drifts, 500′ of workings, on a 2′ vein. A 500′ winze was sunk from the S. drift. Development is said to show large bodies of low-grade carbonates near the surface and some sulphides at 400′ depth. A good grade of ore recently on 650′ level. Only work done in 1919 was a crosscutting toward the Republic mine on the 740′ level.

Equipment: includes a 40 h. p. gasoline hoist, 5-drill compressor and 5 buildings.

KEYSTONE COPPER MINING CO. **ARIZONA**

Office: Newton, Kans. Mine at Johnson, Cochise Co., Ariz.

Officers: W. W. Miller, pres.-gen. mgr.; A. Bannow, v. p.; T. C. Miller, sec.; W. J. Trousdale, treas.; Doane Merrell, state agt.; U. R. Miller, supt.

Inc. 1908, in Ariz. **Cap.,** $900,000, $1 par; 823,000 shares outstanding.

Property: the Bannon group, 16 unpatented claims, surrounding the St. George claim and 1½ miles from the Arizona United property, said to show a large deposit of iron ore and to have cut several veins dipping 38°.

Development: by 635′ shaft, to be sunk deeper; 3,000′ underground workings said to block out 500,000 tons of sulphide ore, including orebody 26′

wide and 150′ long, that runs 2% to 10% copper, with about $4 to $5 gold per ton.

A mill was proposed in 1919. Six men were working on 600′ level late in 1919.

KING COPPER CO. **ARIZONA**

Office: W. F. Dreher, sec., 536 First Natl. Bank Bldg., Denver, Colo.

Mine office: Rodeo, N. M.

Officers: N. P. Wilson, pres.-mgr.; C. E. Welch, supt.

Inc. 1917, in Arizona. **Cap.,** $1,000,000, 50c par.

Property: about 1,000 acres in the Paradise district, Cochise county, 12 miles north of Rodeo, N. M. Company says a 200′ dike crosses property, also several fissure veins. Assays as given are 5.2% copper, 8.6% lead, 2.5 oz. silver per ton.

Development: by 2,000′ and 300′ shafts and numerous tunnels. Good grade ore reported on 300′ level.

Equipment: includes 200 h. p. gas engine, 700 cu. ft. compressor and concentrating mill.

LEADVILLE MINING CO. **ARIZONA**

Address: Courtland, Cochise County, Ariz.

Officers: Wm. Holmes, pres.-gen. mgr.; W. D. Monmonier, sec.; Pearce, Ariz.; Calvin Glenn and W. A. Stilson, directors.

Inc. 1905, in Arizona. **Cap.,** $600,000, $1 par.

Property: 13 claims, 199 acres, patented, in the Turquoise district, includes the Leadville and Maid of Sunshine mines, showing contact deposits between monzonite and limestone. Ores are mainly malachite, azurite, and chrysocolla, with some chalcopyrite, and pyrite showing in the Maid of Sunshine mine. The orebodies said to carry an average of about 8% copper. Company is developing the Lower group on the 300′ level. There are 5 shafts, deepest 365′, and a 60′ tunnel.

Equipment: includes a 250 h. p. steam plant, 2 hoists and air compressor. Company resumed active operations, Oct., 1915.

Shipments: about 15 tons of 8% copper ore daily, and management estimates 100,000 tons ore in sight.

Property was under bond, 1916-17, to the Needles M. & S. Co., for $600,000, and extensively churn-drilled, but bond given up in July, 1917. No reports received since then.

LEONARD COPPER CO. **ARIZONA**

Address: Gleeson, Cochise County, Ariz. J. W. Bennie, Clifton, Ariz., mgr.; J. E. Penberthy, supt., Gleeson.

Inc. 1910 by interests closely connected with the Shannon Copper Co. and property is under lease to that company.

Property: the Copper Belle mine, 8 claims, in the Turquoise or Courtland district, is opened by a vertical shaft and about 1 mile of workings, developing several orebodies on 3 different contacts. Ore is nearly solid pyrite, with considerable chalcopyrite and some bornite.

Equipment: includes steam plant with 2 hoists, compressors, repair shop, etc. Output 150 tons per day, loaded directly into railway cars at mine and shipped over the A. E. & S. P. Railroad to Clifton.

LOS CONQUISTADORES MINING CO. **ARIZONA**

Office: Benson, Ariz.

Property: about 14 miles N. of Benson, developed by 3 shafts, 80′, 115′ and 118′ deep. Gold quartz ore, in places, said to be 30′ wide, occurs in diorite, pegmatite and schist dikes. It is stated that 600 tons on the dump will assay from $15 to $50 per ton.

LOUISIANA-ARIZONA COPPER MINING CO. **ARIZONA**

Address: R. A. Clampitt, Bisbee, Ariz.

A silver-lead prospect, 6 miles west of Bisbee, Cochise county.

MANHATTAN DEVELOPMENT CO. **ARIZONA**

Office: Post Office Blk., Houghton, Mich. A. O. Koppes, supt.; J. H. Rice, pres.; W. G. Rice, sec.-treas.

Inc. March, 1905, in Arizona. **Cap.,** $200,000, $10 par; $5.50 paid in.

Property: 37 claims, 600 acres, owned in fee, in the California district, near Paradise, Cochise county, carries upwards of 2 miles of the outcrop of a mineralized zone lying W. and N. of the holdings of the Chiricahua Development Co.

Development: by several shallow shafts, deepest 80′, and a 450′ crosscut tunnel, latter showing leached ore and a little high-grade ore, with indications of persistent values at greater depth.

In 1913, company purchased the Arnold Mining Co. property, near Santa Cruz, Sonora, for $88,000. This property is developed by a 300′ shaft and has shipped 12% ore to the Cananea smelter. The company's previous operations have been mainly in the Yaqui region of Sonora.

MASCOT COPPER CO. **ARIZONA**

Office: Harris Trust Bldg., Chicago. **Mine offices:** Dos Cabezos, Cochise Co., Ariz.

Officers: T. N. McCauley, pres.; R. V. Dixon, A. J. Baldwin, H. J. Gilbert, J. W. Phillips and D. S. Stevenson, directors. J. W. Prout, Jr., supt.

Inc. July, 1907, in Arizona. **Cap.,** $15,000,000, $10 par; outstanding, 1,200,000 shares.

Property: 56 claims, 22 patented, 1,100 acres, about 800 acres being classed as mineral lands, in the Dos Cabezos district. Company also owns a town site near Dos Cabezos, and miscellaneous lands, including placer claims, total holdings over 1,100 acres.

Property shows limestone near a granitic area, intruded by diabase dikes and quartz porphyry with a covering of rhyolite, on part of the ground. The limestone shows in the lower hills on the south. Granite constitutes the two pillars known as Dos Cabezos.

The ore occurs in lenses in contact deposits between altered lime and diabase. In many instances chalcopyrite is found in the diabase magma and shows a metasomatic replacement. Ores carry chalcopyrite in a gangue of contact minerals with 3 to 20% copper, the average being 5%, and small gold-silver values.

Development: by the 450′ Oregon shaft, and 2 tunnels, longest the 1,800′ Consolidated tunnel, connecting with the shaft at the 4th level. Total underground openings aggregate 29,000′, and ore in sight is estimated by the company at about 1,000,000 tons, containing 5% copper. About 30,000′ of diamond drilling has been done in various parts of the property. Recent results reported as good, especially at depth of 700′. Sinking new shaft.

Equipment: includes two 250-h. p. distillate engines, two 12-drill air compressors, machine shop, electric lighting plant, smithy, telephone system and boarding house, with about 80 buildings. The company finished building the Mascot & Western R. R., a 15-mile line connecting the town of Mascot with the S. Pac. R. R. at Willcox, Arizona. A 10,000′ aerial tram, capacity 1,200 tons per day, is used for carrying ore and supplies from mine to railway. A concentrator is contemplated.

Production: 1918, 13,276 tons containing 3% copper and 0.5 oz. silver.

The mine management is good and property is reliably reported as promising. The A. S. & R. Co. relinquished its lease on April 1, 1918.

MASCOT MINING CO. **ARIZONA**

Last address: 1318 Majestic Bldg., Detroit, Mich. Company not favorably regarded. See Copper Handbook, Vol. XI, for full description of properties. Letters neither answered nor returned. Presumably idle.

MIDDLEMARCH COPPER CO. **ARIZONA**

Now Arizona Middlemarch Copper Co., which see.

MINES & DEVELOPMENT CORPORATION **ARIZONA**

Address: Martin Fishback, mgr., Johnson, Ariz.

Property: the Arizona & Michigan Development Co's. group of 7 patented claims, 140 acres in Cochise county, taken over in Aug., 1919.

Principal formations are porphyry and limestone. Claims said to carry 4 orebodies, one opened by vertical and incline shafts and tunnels, showing a 5′ vein with poorly defined walls and impregnations in the limestone hanging and

porphyry footwall. Has a 450′ two-compartment main shaft with 24 openings showing cuprite, malachite and copper sulphides said to give average assays up to 12% copper, 18 oz. silver, and $1 gold per ton.

Equipment: 60 h. p. gasoline engine with double-drum hoist, 200 h. p. boiler and compressor. Company owns a short railroad connecting with the Southern Pacific Railway at Dragoon. In Sept., 1919, announced that a mill would be built.

NEBRASKA & ARIZONA COPPER CO. **ARIZONA**

Mail address: Paradise, Cochise Co., Ariz. W. K. Morrow, supt. at last report.

Inc. Jan., 1910, and merged June 25, 1910 with the California & Paradise Mng. Co., in the California & Paradise Cons. Mng. Co.

NORTH HILL-TOP EXTENSION MINING CO. **ARIZONA**

Address: San Simon, Ariz.

Officers: F. P. Crane, pres.; W. W. Howard, v. p.; G. H. Ebson, sec.; Jas. M. Hall, treas,, with R. D. Hall, J. L. Hill and C. J. Olden, directors.

Inc. June, 1917, in Ariz. **Cap.,** $2,000,000, $2 par.

Property: 30 unpatented claims, in California mining district, 20 miles S. W. of San Simon, said to show silver-lead ore in a number of veins.

Development: several open cuts and test-pits only.

Is a speculative proposition.

OCOTILLO COPPER MINING CO. **ARIZONA**

Office: 502 Corby-Forsee Bldg., St. Joseph, Mo. **Mine office.** Bisbee, Arizona.

Officers: R. A. Grant, pres.; C. A. Blair, v. p. T. G. Sorter, sec.-treas.

Inc. "under the common law" in Ariz. **Cap.,** $2,000,000, $1 par; 1,000,000 shares in treasury. Stock offered the public, 1917, at 35c. a share, either on the installment plan or with a 10% discount for cash.

Property: 16 claims, about 320 acres, 4 miles from Bisbee, Cochise county. Formation said to be lime and granite-porphyry.

Development: a shaft is being sunk on a vein near the lime-porphyry contact on the Lucky Tramp claim. Material is impregnated with iron and carries some gold and copper. Assays of the ore at 10′, 20′ and 40′ in depth are given as $2, $5, and $40 per ton.

Company's prospectus devoted mostly to the big producing mines of Arizona, their dividend records, etc., advises investment in the Ocotillo mine, which, it states, "will prove as good as any of the large paying mines surrounding us, such as the Copper Queen, C. & A., Shattuck, and the Sacramento." Company is "going to spend $650,000, as fast as conservative management can place it. We get the money from London. The price is 50c. a share, but we will raise it to $1 as soon as we hear from the London office again, which will be in one week. . . ." (written in July, 1919). This prospect, for it is not even a near-mine, is in an unpromising area outside of Bisbee. Investors are warned to await results of development to at least 100′ in depth.

PARADISE MINING CO. **ARIZONA**

Paradise, Cochise Co., Ariz., was controlled through ownership of 60% of stock, by Bisbee-Sonora Development Co., fully described in Vol. XII.

PEABODY CONSOLIDATED COPPER CO. **ARIZONA**

Office: 111 Broadway, New York. **Mine office:** Johnson, Cochise Co., Ariz.

Officers: Leo Schlesinger, pres.; Alex T. Wells, v. p.; I. Niner sec.; J. Born, treas., with Jos. B. Mayer, Morgan J. O'Brien, Jr., Herbert R. Limburg, G. M. Minzesheimer and Jas. Muir, directors. John H. Banks, cons. engr.

Inc. in Ariz. **Cap.,** $1,500,000, $5 par. Empire Trust Co., New York, transfer agent. Listed on New York Curb.

Property: 12 claims, 5 patented 230 acres, covering 2,000′ along the ore belt at the Johnson camp, bought of the Bonanza Belt Copper Co., includes the Peabody mine, located 1879. Mine has a contact deposit between diabase and limestone and replacement veins, all within a 100′ belt. Mine is credited with a production of about $411,970. Ore is a mixture of zinc blende and chalco-

pyrite in a garnetized lime gangue and is oxidized to a depth of 200′. The ore shipped claimed to run 4-6% copper, with 5% iron, 15-20% lime and 55% insoluble; silver averages ½ oz. to each percent. copper.

Development: by a 350′ shaft, with crosscuts on the 200 and 300′ levels, No ore reserves reported.

Equipment includes 90 h. p. power plant, compressor and hoist.

Shipments: in 1917, 300 tons per month were shipped to the Cons. Kansas City S. & R. Co. (El Paso smelter), a subsidiary of the A. S. & R. Co., under a 3-year contract.

Prospectus issued by company was regarded as rather unduly optimistic. Property is an old one, having been operated intermittently for 20 years. Presumably idle.

RED MOUNTAIN DEVELOPMENT CO. **ARIZONA**

Office: P. O. Box 3007, Lowell, Ariz.

Officers: Frank Briggs, pres., treas.-gen. mgr.; Wm. Hawley, v. p.; E. J. Briggs, sec.

Inc. Oct. 5, 1908, in Arizona. **Cap.,** $1,000,000. $1 par.

Property: 17 claims, 340 acres, crossed by the Southern Pacific Railway, shows schist, porphyry and limestone, with a vein claimed to be 130′ wide and traceable 2 miles, carrying copper and lead ores, including copper oxides and chalcopyrite.

Development: consists of a 100′ shaft. Idle owing to lack of funds since 1917.

SAN SIMON COPPER CO. **ARIZONA**

Office: Marquette, Mich. **Mine office:** Paradise, Cochise County, Ariz.

Officers: Nathan M. Kaufman, pres.; Hon. Norman W. Haire, v. p.; S. R. Kaufman, sec.-treas., with Thos. F. Cole, John A. Duncan, Wm. G. Rice and Thos. H. Collins, directors.

Inc. 1907, in Arizona, as a reconstruction of the Chiricahua Development Co. **Cap.,** $2,500,000, $10 par.

Property: 40 claims, 7 patented, about 750 acres, 16 miles from nearest railway, at Rodeo, N. Mex., previously operated by Capt. Thos. Burns as a silver mine.

Development: a 750′ crosscut tunnel with a 100′ winze 700′ from the portal, cutting 50′ of leached ore, apparently the apex of a sulphide orebody. Also the 400′ Mars shaft, bottomed in chalcopyrite ore of 2 to 4% copper tenor. The 400′ Planet shaft has drifts on the 4th level.

Equipment: includes two 150 h. p. boilers, two 2,000′ double drum hoists, and a 16-drill air compressor. Idle; only assessment work done in recent years.

SIGNAL POINT MINING CO. **ARIZONA**

Office: 40 First National Bank Bldg., Douglas, Ariz.

Officers: G. E. Hemphill, pres.-gen. mgr.; E. G. Richards, v. p.; Z. T. Phillips, sec.-treas., with E. A. Hemphill and Charles Stephens, directors.

Inc. July 10, 1915, in Arizona. **Cap.,** $600,000, shares 50c par; 800,000 issued.

Property: 19 claims, 12 miles E. of Douglas, near International Boundary.

Development: one shaft 120′, another 150′ deep, equipped with gasoline hoists. No. 1 shaft was sunk on an iron dike, showing traces of copper and silver, and up to $3 gold per ton. This shaft was to be sunk to 300′, followed by crosscutting. No. 2 passed through 40′ of gold, silver, copper, lead ore into a leached zone. Churn-drills are to be used for prospecting other areas. Evidently idle, no recent returns.

STERLING COPPER CO. **ARIZONA**

Mail returned from last address: care Judson A. Elliott, Phoenix, Ariz. Mine office: Dos Cabezos, Ariz.

Officers: J. W. Thomas, pres.; L. C. Elliott, sec.; D. E. Nelson, treas.; with E. A. Congdon and J. A. Elliott, directors. C. H. Bean, supt.

Inc. 1906, in Arizona. **Cap.,** $1,000,000. $1 par; 482,600 shares issued.

Property: in the vicinity of Dos Cabezos, Cochise county, is developed by short tunnels and a 125′ shaft, following a limestone porphyry contact, showing copper and lead ore which is said to average 5% copper. There has been about 1,000′ of work done and $3,000 spent in development. Property is a prospect. No recent returns.

SULLIVAN COPPER DEVELOPMENT CO. **ARIZONA**

Office: care P. H. Nelson, pres., 610 Lonsdale Bldg., Duluth, Minn.

Mine office: Paradise, Cochise Co., Ariz. Geo. H. Crosby, sec.-treas.

Property: 14 claims, 6 patented, 4 miles west of San Simon, Chiricahua Mts., has opencuts, showing leached copper ore and a little very rich ore, and has a 60′ tunnel showing lead ore. Management considered good and property promising. Idle, except for annual assessment work, since 1917.

SWISSHELM GOLD-SILVER CO. **ARIZONA**

Address: 32 South Stone Ave., or P. O. Box 188, Tucson, or Robt. Randell, supt., Webb, Cochise Co., Arizona.

Officers: F. J. Heney, pres.; Ben Heney, v. p.-gen. mgr.; G. H. Smalley, sec.; Byrd Brooks, treas.

Inc. 1907, in Arizona. **Cap.**, $300,000, 50c par; 300,000 shares escrowed; 300,000 in treasury; non-assessable.

Property: over 313 acres in the Swisshelm range, Cochise county, 12 miles by road to railroad, 30 miles N. of Douglas; said to have a contact metamorphic deposit between limestone and andesite, with gold-silver-lead ore.

Development: 300′ incline shaft, 250 and 300′ tunnels, with total workings of 1,750′.. Claims 5,000 tons of ore blocked out, averaging $25 per ton.

Management states that lead content of ore has hindered satisfactory smelter contracts, but in 1918 $6,265 was realized from ore sales. Gross earnings are given as $9,247. A new smelting contract was arranged in Nov., 1919, whereby the C. & A. works at Douglas will take the ore provided it contains over 70% silica. As the El Paso smelter had too much silicious ore, it penalized the excess silica. A saving of $1.50 per ton on freight will be made by shipping to Douglas.

Property has been examined by W. R. Ramsdell and others. He thinks that the above estimate of reserves is too low. The superintendent "considers the ore potentialities or probabilities so immeasurable and so immediate" that he disliked to estimate ore reserves. The circular of Dec. 1, 1919, contains a number of optimistic and extraneous matters.

TEJON MINING CO. **ARIZONA**

Office: Bakersfield, Calif. L. I. Thiers, supt., Gleeson, Cochise Co., Ariz.

Inc. in Arizona. **Cap.**, $1,000,000, shares $1 par.

Property: 8 patented claims, 150 acres, at Gleeson, in the Turquoise or Courtland district, Arizona, adjoining the Copper Belle mine of the Leonard Copper Co. mine, shows heavy bedded limestone dipping steeply eastward into the mountain ridge and cut by intrusive bodies of monzonite and later quartz porphyry. Ore occurs as a contact deposit. Average assays reported at 5% copper, 6 oz. silver, 0.07 oz. gold per ton.

Development: by the 500′ Tejon shaft, and by several old tunnels with extensive drifts and stopes in oxidized ore.

Equipment: modern and complete, includes electric and steam power, compressor, etc. Railway is close at hand. Property appears meritorious and management good. Reported closed down, February, 1919.

TETER-STONE AZURITE MINING CO. **ARIZONA**

Dr. D. W. Teter, pres.

Property: 3 miles south of Dragoon, Cochise county, has a 4 to 10′ contact deposit, between limestone and granite, showing outcrops of azurite and malachite, with some sulphide ore in a tunnel. Operations suspended, 1913, owing to a heavy inflow of water. No later information.

TOMBSTONE CONSOLIDATED MINES CO., LTD. **ARIZONA**

Controlled by Development Co. of America, which see.

TUNGSTEN REEF MINING CO. **ARIZONA**

Officers: A. J. Clark, pres.-treas.; L. E. Porter, v. p.-sec.; G. D. Kislingbury, supt.

Property: group of claims in Huachuca Mountains, 40 miles S. W. of Bisbee, and 16 miles S. of Hereford. Ore is said to contain a high percentage of tungsten with some gold. During the past winter deep snows have hindered work except on construction of a concentrator.

TWO PEAKS MINING CO. **ARIZONA**

Address: Turner, Ariz.

Officers: W. G. Gilmore, pres.; J. C. Akard, v. p.; E. P. A. Larrieu, sec.-treas., with J. S. Trowbridge and T. D. M. Larrieu, directors.

Inc. Jan. 4, 1916, in Arizona. **Cap.,** $2,500,000, $2.50 par; 432,054 issued.

Property: 45 claims, 1,012 acres, at S. end of Whetstone Mts., Cochise county, said to show a contact with a mineralized shear-zone striking S. 48° W., through the overlying monzonite porphyry, below which is limestone. Ore occurs as lenses in sheeting planes and through the porphyry mass, and according to company carries 3.16% copper, 0.034 oz. gold and 2 oz. silver per ton in shear zone. Minerals are chalcopyrite in shear-zone, and bornite and chalcopyrite in contact deposit. Carload in 1916 averaged 4.03% copper.

Development: by shafts 36, 55, 60, and 100′ deep, and by 270 to 280′ tunnels. Workings to depth of 150′; total, 1,500′. No recent information.

WAR HORSE COPPER MINING CO. **ARIZONA**

Mail returned, 1918, from former address, Bacher & Stelsel, 412 Mills Bldg., El Paso, Texas.

Cap., $1,000,000, shares $1 par.

Property: 15 claims in the Tombstone district, Ariz., 23 miles N. W. of Bisbee.

Development: 508′ shaft and other openings. At 265′ there was said to be 5½′ of ore assaying 8% copper, 16 oz. silver and $1 gold per ton. At 400′ the vein was reported to be 27′ wide and considered to run through 6 claims, a distance of 9,000′. Development probably disappointing as no recent returns have been received.

WILLIE ROSE COPPER MINING CO. **ARIZONA**

Mail returned, 1918, from former address, J. W. Sterling, mgr., Bowie, Ariz.

Property: the Willie Rose mine, near Triangle Springs, 13 miles S. of San Simon, Cochise county, Ariz., was operated under 10-year lease from 1914. Developed by 188′ shaft said to be bottomed in a 12′ vein carrying slightly argentiferous chalcocite, of about 2% copper tenor. Ore occurs in lime-porphyry contact, veins running E.-W., showing copper glance at slight depth. Made several shipments of $12 per ton ore to the El Paso smelter.

Equipment: includes hoist, oil engine, compressor and air-drills.

Probably idle.

BISBEE DISTRICT, COCHISE COUNTY

ANACONDA COPPER GROUP **ARIZONA**

Owner: D. W. Arte, P. O. Box 741, Bisbee, Ariz.

Property: 11 claims, 3 patented, in Warren mining district, stated as being on the S. W. contact of lime quartzite, 2,600′ west of the Shattuck, 1,600′ west of the Higgins, and adjoining the Copper Queen on S. E. and N. W. A 35′ shaft has been sunk in the crystallized lime quartzite. Assays along contact reported to carry $1.30 gold and 1.65% copper.

ARIZONA-BISBEE COPPER CO. **ARIZONA**

Mine office: Bisbee, Ariz.

A Phoenix corporation fathered by Mr. Ned Creighton and others formerly interested in the Higgins lease.

Property: 19 claims S. W. of the White Tail Deer property of the Copper Queen. Sinking a two compartment shaft. At 200′ level will explore the fault for ore. Reported to be well equipped with machinery and money for all work planned.

BISBEE COPPER MINING & DEVELOPING CO. **ARIZONA**

Office: Bisbee, Ariz.

Officers: Daniel B. Seed, pres.-mgr.; Joseph Waters, v. p.-supt.; W. Hubbard, treas.; A. H. Livingston, sec.-mgr., with Jack Sheldon, directors.

Inc. 1916, in Arizona. **Cap.,** $1,000,000; $1 par; 600,000 issued. U. S. Corporation Co., transfer office; Empire Trust Co., registrar. Annual meeting, first Saturday in September.

Property: 21 claims, 12 patented, 273 acres in Warren mining district, comprising the Arizona and Winwood group and other claims, located ½ mile north of Lowell and a mile east of Bisbee. Lands are north of the Denn Arizona. They are not near the Copper Queen mines, as has been claimed, but are north of the Dividend fault and lie outside of the recognized ore belt. Claims are said to show iron outcrops and some copper carbonate ore, but the U. S. Geological Survey map shows that schist and a very small acreage of porphyry occur on the southerly claims, but most of the group is covered by the barren Cretaceous rocks.

The tract shows some 2-6½% oxidized ore probably deposited by surface waters, as the Cretaceous rocks do elsewhere in the district, but in such cases the ore is only surficial, and rapidly fades out at a few yards or so in depth. It may be added that company's officers make affidavit to such ore being 50′ wide and going down to bottom of a shaft 12′ deep. Although one drill-hole was down over 892′ July, 1917, sampling of the drill cores failed to show any commercial value.

Equipment: a 10x12 electric hoist.

In our opinion the claims are entirely out of the mineralized area and have little, if any, chance of becoming profitably productive.

A New York Curb house sent out very attractive-looking advertising matter regarding Bisbee and the Bisbee Copper Mining & Dev. Co., which contains many misleading statements. The property is not in the "heart of the Bisbee Copper Camp," and such gross misrepresentation cannot be too strongly condemned. Development on the property is quite insufficient to predict its becoming a "second Calumet & Arizona" and an "early dividend payer," and the public buying stock on such promises is doomed to be disappointed. Apparently the management based all its hopes of developing a mine on its geographical position in utter disregard of geologic conditions.

No work has been done for some months, according to reliable information from Bisbee, late in Oct., 1919, and no pay-ore was found either in the shaft or drill-hole.

BISBEE-SONORA DEVELOPING CO. **ARIZONA**

Company owned several mining locations southwest of Bisbee in 1906-7, but failed to do assessment work and lost property. No meeting was held for over 4 years, and company is insolvent.

H. C. Beumler, pres., Douglas, Ariz., wrote in 1917: "Company out of business." Was the holding company for Badger Hall, Bisbee & Duluth M. & D. Co. and Paradise Mng. Co. Fully described, Vol. XII.

BISBEE-WARREN COPPER CO. **ARIZONA**

Office: Bisbee, Ariz.

Inc. in Arizona. Application for patent made March, 1918, for 12 copper-silver-gold claims, about 200 acres, in the Warren district.

BORAS LEASING CO. **ARIZONA**

Address: care Phelps Dodge Corporation, Bisbee, Ariz.

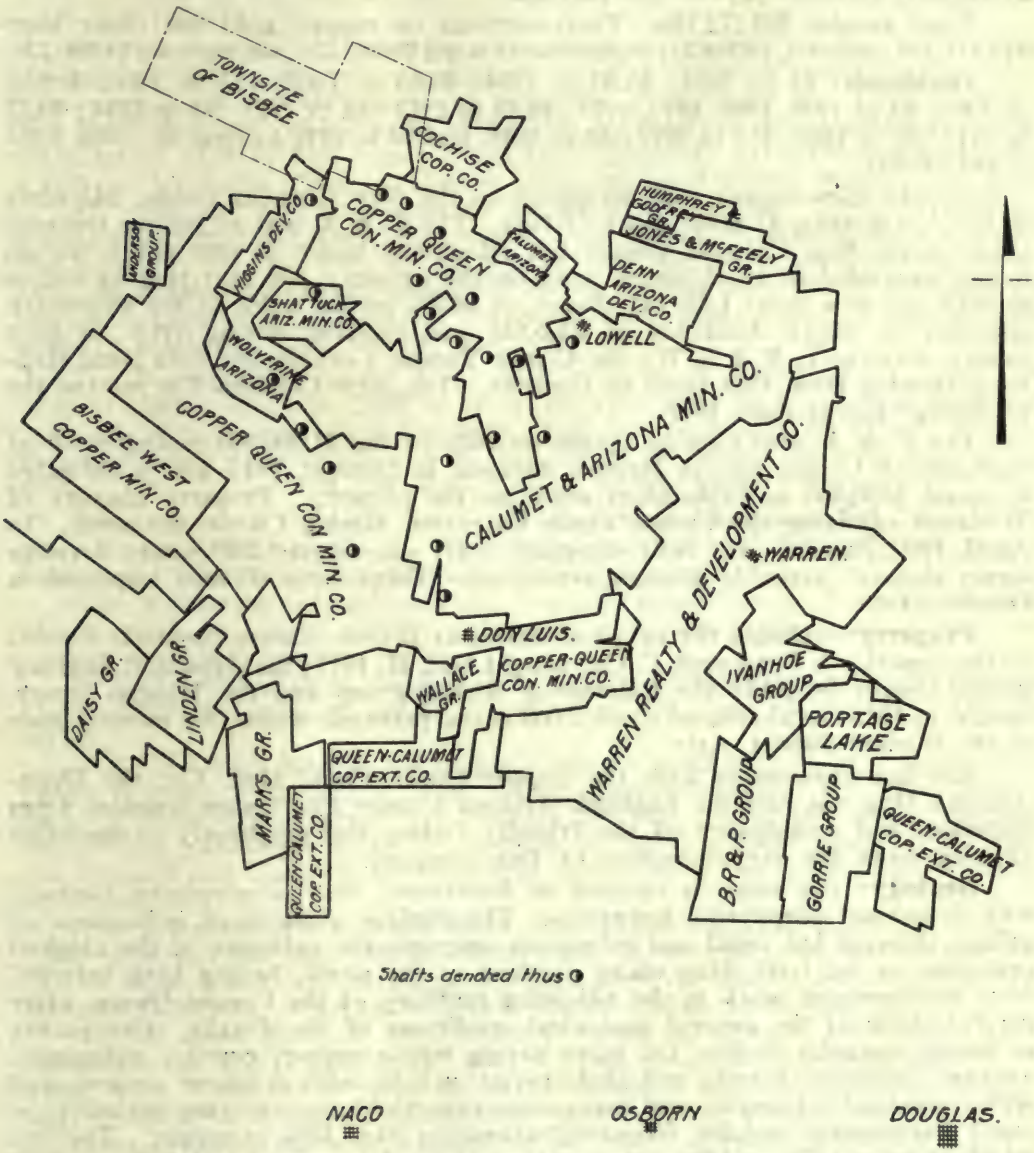
Property, a lease on part of the Copper Queen ground at Bisbee, adjoining the Night Hawk Leasing Co. Work at present is at 300′ depth, where high-grade ore was opened in August, 1919. Six men employed.

CALUMET & ARIZONA MINING CO. **ARIZONA**

Office: Calumet, Mich. **Mine office:** Warren, Cochise County, Ariz. Works office: Douglas, Cochise Co., Ariz.

Officers: Chas. Briggs, pres.; Capt. Jas. Hoatson, v. p.; Capt. Thos. Hoatson, second v. p.; Gordon R. Campbell, sec.; Peter Ruppe, treas.; preceding, with Thos. F. Cole, Walter B. Congdon, Chas. d'Autremont, Jr., William B.

Mershon, and Geo. E. Tener, directors; Henry B. Paull, auditor; John C. Greenway, gen. mgr.; E. E. Whitely, mine supt.; D. M. Rait, asst. mine supt.; H. A. Clark, smelter supt.; R. H. Dickson, engr.; J. B. Rawlings, purch. agt. John Hooper, supt. at Jerome, and M. Curley, supt at Ajo.



PROPERTY MAP OF BISBEE DISTRICT, ARIZONA

Inc. March, 1901, in Arizona. **Cap.**, $2,500,000; shares $10 par, increased Feb. 15, 1911, to $6,500,000; shares $10 par; issued 642,519 shares; held for exchange, 273 shares. The company, which already controlled the Superior & Pittsburgh Copper Co., through ownership of 1,494,333 shares out of a total of 1,499,792 shares issued, in Feb., 1916, took over the property. All S. & P. assets were transferred to the C. & A. Co., effective Dec. 31, 1915, basis of exchange being 3½ shares Superior & Pittsburgh for 1 Calumet & Arizona, and a bonus of $1 per share for quick delivery of stock. American Trust Co., Boston, and Mechanics and Metals National Bank, New York, registrars; State Street Trust Co., Boston, and Bankers' Trust So., New York, transfer agents. Stock is listed on the New York and Boston Stock Exchanges. Annual meeting, second Monday in April.

Balance sheet of Dec. 31, 1918, gave quick assets of $10,116,545, including cash, $3,681,392; copper, silver and gold in process, $2,484,381; notes and accounts receivable, $1,307,052; supplies and items in suspense, $1,291,220; Liberty bonds, $1,352,500; accounts payable are $781,182.

Total surplus $35,272,186. Total earnings on copper, gold and silver were $14,471,130; interest, $509,820; expenditures were $9,905,176; net income, $4,086,238.

Dividends: $2 in 1903; $6.50 in 1904; $8.50 in 1905; $13 in 1906; $16.50 in 1907; $4 in 1908, 1909, 1910, 1911; $4.25 in 1912; $5 in 1913; $3 in 1914; $3.25 in 1915; $9 in 1916; $11 in 1917; $8 in 1918, and $3 in 1919 to Dec. 22. The total is $43,037,837.

In 1911 the company took an option on the New Cornelia claims, 243 acres in the Ajo district, 42 miles south of Gila. The C. & A. was to receive treasury stock of the New Cornelia Copper Co. (described under its own title), for all money expended in development work on the property. It exercised its option in 1913 and now owns 1,229,741 shares, or 68.3% of the stock of the subsidiary company on which dividends of $306,935 was received during 1918. It built jointly, with the E. P. & S. W., the 43 mile Tucson, Cornelia and Gila Bend Railroad, running from Gila Bend to Cornelia. The New Cornelia Co. entered the producing class in June, 1917.

The C. & A. also took an option on 70% of the $1,000,000 capital stock of the Gadsden Copper Co., at Jerome, Arizona, in October, 1916, and is obligated to spend $100,000 in exploration work on the property. Property consists of 39 claims adjoining the United Verde Extension Mining Co. on the south. In April, 1919, property was fully equipped, shaft was down 1,200′ where developments showed favorable geologic conditions. There were 60 men employed in October, 1919.

Property: includes the original claims at Bisbee, claims formerly owned by the Superior & Pittsburgh C. Co., bought Dec. 31, 1915; the American Saginaw group, bought in 1912; the Calumet & Bisbee group and the Higgins group, bought in 1913; total area of about 2,068 acres, patented, within the mineral zone of the Warren district, Ariz.

Side-line agreements with the Copper Queen Cons. Mng. Co., the Denn-Arizona Mng. Co. and the Shattuck Arizona Copper Co., insure freedom from litigation, and continuance of the friendly feeling and neighborly co-operation existing from the very inception of this company.

Geology: the mine is opened in limestone, near a porphyry contact, with occasional porphyritic intrusions. The surface gives small indications of values, showing but small and infrequent outcrops, the existence of the original orebodies in the Irish Mag claim, farthest to the north, having been inferred from underground work in the adjoining territory of the Copper Queen, after careful study of the general geological conditions of the district. Ore occurs in highly irregular bodies, the mine having native copper, cuprite, melaconite, azurite, chalcocite, bornite and chalcopyrite, usually with a talcose gangue, and with considerable hematite and manganese ores, the latter carrying malachite in small disseminated nodules, frequently averaging 10 to 18% in copper. The ore, which is practically self-fluxing, averages about 2 oz. silver and 0.05 oz. gold per ton, as smelted.

Development: diamond-drill borings to depth of 1,800′ have penetrated limestone strata to that depth. The orebodies are extensively developed, but are not largely blocked out, owing to the constant shifting of the ground, caused by the creeping of the mountain above, as is the case at the neighboring Copper Queen mine, requiring very heavy timbering, with frequent bulkheading, and constant care for all openings, which renders it prudent to keep costs down by blocking out ore but a comparatively short time ahead of actual stoping requirements.

There are 6 main working shafts in operation, from which a rhomboidal area a mile long is being actively developed and worked. These shafts are the 1,390′ Irish Mag, 1,375′ Oliver, 1,480′ Cole, 1,630′ Briggs, 1,680′ Hoatson and

1,837′ Junction shafts. Underground work totals about 144 miles, 50% of which is open and in use. New openings in 1918 amounted to 99,355′, including 16,281′ of diamond drill holes. During 1918, it required one foot of development work to open up 8.5 tons of ore. Mines have electric traction on the 1,400′, 1,600′ and 1,800′ levels.

The 4-compartment Irish Mag shaft, sunk on a single 20-acre claim, was the original mine, and the shaft is sunk in hard limestone throughout, except where occasional orebodies were cut, rendering it unusually safe from drawing. The Irish Mag has yielded some of the best copper ever mined, including some entire stopes of 30 to 40% copper. The Irish Mag shaft has a 78′ steel headgear, a 114′ ore bin and a 250 h. p. electric hoist, raising 3-decked cages. The shaft is 1,390′ deep and was retimbered to the 900′ level in 1916. The Oliver shaft, 4 compartments, 1,375′ deep, is equipped with 600 gal. Nordberg electric pump and hoist. It develops both of the Senator and Buckeye claims, cutting ore at 710′. Sulphide ore averaging about 5% copper is being mined from orebodies on the 1,150′, 1,250′ and 1,350′ levels. Oxidized ore is being mined on the 850′ and enriched sulphide ore on the 950′ and 1,300′ levels.

The Powell shaft, started Nov., 1908, is on the line between the Hope and Wagner claims, which lie 2,000′ S. W. of the Irish Mag shaft. This ground was explored by a crosscut from the Irish Mag that traversed 600′ of the Copper Queen ground, stopping about half way across the group, showing nothing of value. This shaft, about 600′ deep, has an electric hoist.

The area below the 1,350′ and 1,450′ levels was diamond drilled, 1911, showing a downward extension of the mineral zone, several hundred feet to the bottom of the limestone, but without disclosing commercial ore.

The Washington, Angel and Old Republic claims lie on the porphyry side of the gulch, and were secured mainly as a possible smelter site, then being considered of little promise for ore.

In 1915, 5,165′ of churn drilling on this group developed a substantial tonnage of low-grade disseminated ore in an irregular body from 170′ to 450′ below the surface.

The Cole shaft handles the output from the southwestern part of the company's holdings. The greater part of the recent production has come from a body of oxide ore of great size between the 800′ and 1,100′ levels. Smaller bodies have contributed sulphide ore from the 1,000′ to 1,400′ levels. This shaft has Prescott and Cameron station pumps caring for a flow of 225 gals. of water per minute.

The Congdon shaft, on the Black Bear claim, only 650′ from the Mag, is 1,267′ deep, but has been out of commission for several years, as the territory can be worked to better advantage through the Cole shaft. Surface equipment includes a 300-h. p. steam plant, with a 12x36″ double-drum hoist.

The Hoatson shaft, on the Del Norte claim, 2,500′ from the Briggs, has 5 compartments, and is 1,680′ deep. Ore is being mined from a large body on the 1,300′ level. This ore is taken by electric haulage to the Junction and Briggs shafts, where it is hoisted. Equipment at the Hoatson shaft includes a steel headgear, double-drum hoist, good for 2,000′ depth. Power plant has 6 boilers.

The Junction shaft has 5 compartments and is 1,837′ deep, being the deepest of any shaft in the Bisbee district. Shaft is concreted to bottom level. The Junction is the main hoisting shaft of the Briggs-Hoatson-Junction division, and virtually the entire production of the 3 mines, about 2,000 tons daily, is hoisted through it. Ore is hoisted in 5-ton skips, crushed in Allis-Chalmers gyratory crusher, and loaded by belt conveyor into railroad cars.

Large bodies of both oxide and sulphide ore have been opened up from the 1,300′ to the 1,800′ levels. Development of the 1,600′, 1,700′ and 1,800′ levels was started in 1915, and valuable orebodies have since been found. The most important recent development is on the 1,400′ and 1,600′ levels from the Junction shaft south towards the Denn where indications are favorable for the development of important orebodies. In addition to the ore of shipping grade developed, immense bodies of solid pyrite, carrying between 1% and 2% copper, have been found on the 1,400′, 1,500′ and 1,600′ levels.

The Junction shaft drains the entire Calumet & Arizona and Copper Queen group of mines. Water pumped during 1918 was 1,664,518,500 gals.

Pumping plant has been much simplified by the installation of a 1,500-gal. electric pump on the 1,800′ level of the Junction. They are now handling 1,500 gals. p. m. from the 1,500′ and 1,900 gals. p. m. from the 1,800′ levels.

Surface plant consists of thirteen 250 h. p. Marine boilers, a 4-cylinder Nordberg, double-reel main hoist, good for 2,500′ depth, and a Sullivan single-drum hoist, used as an auxiliary hoist for handling men and timber.

There is a 5,000′ Nordberg compressor having compound air cylinders driven by a four-cylinder triple expansion steam engine. This machine has an attached air pump and condenser. In addition, there is a 3,500′ Nordberg compressor, having compound air cylinders, driven by a cross compound steam end.

The Briggs shaft, about 3,000′ south of the Junction shaft, is 1,630′ deep and 3,000′ east of the Lowell shaft of the Copper Queen. Large bodies of enriched sulphide ore of much greater horizontal than vertical extent, averaging about 5½% copper, have been developed between the 1,200′ and 1,400′ levels. A substantial tonnage of oxide ore of good grade is being mined from the 900′ to the 1,400′ levels from nearly vertical fracture zones. On the 1,400′ level, 500′ south of the shaft, an important sulphide orebody 300′ long by 30′ wide was developed. Ore from this mine is handled by electric haulage on the 1,400′ level to the Junction shaft and hoisted.

Equipment at the Briggs shaft includes steel gallows frame. Power plant has 2 boilers of 250 h. p. each, burning crude petroleum, with a powerful hoist.

The Campbell shaft, recently started on the Regular Claim, about 2,000′ east of a point midway between the Junction and Briggs shafts, was stopped in 1917 on account of labor shortage. By December 31, 1919, it was 1,400′ deep. This shaft will develop an extensive and hitherto unprospected territory.

The Copper Giant group, at Copper Creek, Graham County, Ariz., includes 35 claims, known as the Scanlon or Clark-Scanlon property, 16 miles northeast of Mammoth. This property, bought Sept., 1908, has been extensively tested by diamond drills, giving good cores, and has a 600′ two-compartment working shaft, with several levels opened, and considerable medium to high-grade sulphide ore is blocked out. A 15-mile railway will be required to render this property a producer.

Equipment: surface equipment is very complete. The original machinery plant was clustered about the Irish Mag shaft, on a steep hillside, where limited room was secured by grading, but the principal plant is now at the Oliver shaft, including five 280 h. p. marine boilers, burning crude petroleum, with storage tanks.

The principal compressor plant, at the Oliver, has a 35-drill Sullivan Corliss cross-compound 2-stage air compressor, with 17x34″ steam cylinder and 20x34″ air cylinder, having a piston displacement of 6,600 cu. ft. of free air per minute. There also are 3 Sullivan straight-line air compressors. Much of the ore is so soft that it can be bored with a breast auger, thus reducing requirements in the way of air for power drills. Electricity is used extensively on surface and also for pumping. The electric power plant at the Oliver shaft has 1,000 k. w., 500 k. w. and 300 k. w. Westinghouse-Parsons 2,200-volt, 60-cycle, 3-phase turbo-generators, two 220 k. w. 2,200-volt 60-cycle 3-phase motors, direct-connected with the steam turbine, a 300 k. w. General Electric rotary converter, transforming a 2,200-volt alternating current to a 550-volt direct current, for operating the street-car line to Warren.

The steel-frame machine shop is divided into two 60x48′ parts, for the machine shop and smithy. Adjoining is a plate shop, 40x128′, of steel frame, with corrugated iron roof and siding. There is a framing mill at the Irish Mag shaft, also a warehouse and office building. A 60x125′ administration building is planned to be erected at Warren, the town site adjacent to the Calumet & Arizona. A hospital with an efficient staff is maintained for the employees, and a model changing house has hot and cold running water, tub and shower baths and lockers for 500 men. Fire protection is furnished by direct pipe lines to

large storage tanks, all hose couplings being made to connect with those of the Bisbee fire department. An automatic telephone system has stations underground and on surface, and is connected with the smelter at Douglas.

The company's smelter is located at Douglas, 25 miles from the mine, receiving ore over the El Paso & Southwestern Railway, at a very favorable freight rate. The original smelter was blown in Nov. 15, 1902, and has been twice enlarged, giving the old works a capacity of nearly 3,000 tons daily.

The Smelter

The new smelter, completed 1913 at a cost of about $2,000,000, was designed by C. H. Redpath and built and equipped with the able assistance of Messrs. Greenway and Wood. It is fully described by Richard H. Vail, in the "Eng. and Min. Journal," Vol. 98, p. 102, July 18, 1914. The works consist of a sampling mill, crushing plant, calcining plant, reverberatory, blast furnace and converter departments and 6 mixing beds, each of 10,000 tons capacity, together with a 5,000-ton coke storage bed.

The crushing and sampling plant, 40x84′ on the ground and 5 stories high, is built of steel and concrete throughout, and is divided into 2 sections, operating independently of each other. Each section has a crushing and sampling department. Ore from the crushers at the receiving bins is delivered over an incline conveyor to the crushing and sampling plant, where the large sizes are screened out for the blast furnaces. The sampling department, equipped with Snyder automatic samplers, cuts the ore 4 times, making a sample weighing 1.6 or 3.2 lbs., as desired, per ton of ore passing through. The plant is flexible and ore may be crushed and screened and discharged at any desired size.

The material from the sampling and crushing plant is passed to mixing beds similar to those in use at the Cananea smelter, there being 3 beds for coarse and 3 for fine ore. The coarse ore mixed with coke is conveyed directly to the coke charge bins over the blast-furnace charge floor, the fine ore going directly to the calciner, or roaster plant.

The roaster plant has twenty-four 258″ Herreshoff roasters, having a capacity of approximately 80 tons of fine ore per day. The plant is equipped with a tile and steel dust chamber, 60x140x70′ high, equipped with baffles and wires and roofed with copper, discharging into a brick-lined steel chimney, 20′ inside diameter by 279′ high.

Twelve of these roasters were completed early in 1917, and are being used in connection with a newly constructed sulphuric acid plant, which is furnishing 200 tons of 60 degree Baume acid to the New Cornelia Copper Co.

A 222x460′ building, of steel frame, sheathed with iron, covers the blast furnace, reverberatory, converter, and copper-casting departments. The blast-furnace department consists of two 48x40′ blast furnaces, and has a steel dust chamber, 60x180x70′ high, equipped with suitable baffles and wires. The gases from the converters will also pass through this chamber and be discharged into a brick-lined steel chimney, 25′ inside diameter by 305′ high. Ore and coke is discharged directly from the bin over the charge floor into cars resting upon platform scales, the charge car being propelled from the scales to the charge doors of the furnace by an electric motor.

The reverberatory department contains 4 reverberatory furnaces, 19x100′ in size, with a foundation and building for a fifth furnace in place. Each furnace is equipped with two 712 h. p. Stirling boilers. Steam at 80 lb. pressure is generated by using waste heat, driving a 3,000 k. w. turbine alternating-current generators. The furnaces are charged directly from the calcine cars running on a track overhead. Matte is tapped into 20-ton pots, and transferred by cranes to the converters, slag being skimmed directly into 25-ton pots, running on tracks underneath and just in front of the skimming end of the furnaces.

The converter department, having a main converter aisle 55′ wide, and two 40-ton electric traveling cranes, has stands for 6 Great Falls type converters. There are also 2 straight-line casting machines and other necessary equipment. The converter slag is poured directly into the reverberatory furnace.

The power house, formerly 80x160′ in size, was increased, 1907, by the building of a transverse section 100x100′ in size, the new building being divided through

the center by a row of columns into 2 bays, each 50′ wide, and each served by a 10-ton hand-power traveling crane. Equipment includes two 14 & 28x36 Allis-Chalmers Tandem Corliss engines, all driving No. 10 Connersville blowers. One 22 & 48 & 52 & 52x48 and one 22 & 42 & 48 & 48x48 Nordberg cross compound Corliss blowing engines, and one 20 & 40 & 44 & 48 Allis-Chalmers blowing engines.

There are also a 750 k. w. and a 500 k. w Allis-Chalmers steam turbine, driving 440-volt, 60-cycle, 3-phase generators, and one 165 k. w. and one 200 k. w. motor generator sets for converting alternating current to direct current for cranes and locomotives.

There are also 2 triple expansion steam pumps, size 8 & 12 & 20 & 22x24, and 3 motor-driven centrifugal pumps for water service; also two 14 & 25 & 2-36x24 Prescott steam condensers. Steam is supplied from the boilers over the reverberatory furnaces and the old boiler plant is closed down.

The smelter plant includes a machine-shop and smithy, both of steel frame, and a considerable number of dwellings. The whole plant is fully described in "Mining and Scientific Press" of August 10, 1918.

A sulphuric acid plant, to produce sulphuric acid for leaching the Ajo ores, was designed by the Process Engineering Co., and put into operation during 1917. K. B. Thomas is supt. It is complete and modern in every respect. Capacity is 186 tons 60% B. acid per day, of which Ajo uses about 75%, the balance finding a ready market with other mining companies and with the farmers. The works were fully described by Courtenay De Kalb in "Min. & S. Press" of March 30, 1918.

The Safety Department, organized in 1915, has been effective, though costly.

Ore reserves: October, 1916, are given as 1,976,815 tons of 4.99% ore, compared with 1,610,264 tons in 1915.

Production: since 1910 is as follows:

Year	Lb. Copper	Oz. Silver	Oz. Gold	Net Cost Copper (a)	Selling Price Copper
1911	49,945,905	453,947	18,114	7.34 cts.	12.49 cts.
1912	53,108,628	594,319	22,881	7.02 cts.	16.25 cts.
1913	52,987,383	880,915	18,989	7.65 cts.	15.57 cts.
1914	52,667,929	922,143	24,122	8.19 cts.	.....
1915	65,268,910	1,381,077	35,264	8.00 cts.	.....
1916	74,898,788	1,863,149	46,377	9.04 cts.	24.70 cts.
1917	62,397,017	1,257,081	37,130	13.00 cts.	.....
1918	51,357,154	1,133,801	33,868	15.50 cts.	.....
1919	46,450,000	.....	.....	.....	.....

(a) Per pound copper, after crediting gold and silver.

During 1918, 676,888 tons of ore were mined, dry weight. There were shipped 105,074 tons of ore to various smelters. Smelter treated 850,894 tons of dry ore, of which 245,443 tons were custom ores.

Production for 1918 was somewhat hampered by labor shortage and a decrease in labor efficiency, estimated at fully 30% less than in normal time. Since the signing of the armistice, production has been greatly curtailed.

New Cornelia is a big property and will pay dividends for years to come.

COCHISE DEVELOPMENT CO. ARIZONA

Address: Bisbee, Cochise county, Ariz.

Officers. Lemuel C. Shattuck, pres.; Chas. L. Jones, v. p.-gen. mgr.; T. O. McGrath, sec.; Jos. M. Muheim, treas.

Inc. Aug. 1, 1905, in Arizona. Succeeding the Cochise Copper Mining Co. **Cap.,** $1,000,000; $10 par. Annual meeting, second Tuesday in January.

Property: 16 claims, 176 acres, abutting on the Holbrook mine of the Copper Queen Consolidated, and lying north of the Dividend fault and Dubacher gulch.

Development: by a 900′ three-compartment shaft. Drifts on the 300′, 600′, and 900′ levels show small bunches of sulphide ore.

Equipment: includes a 100 h. p. boiler, a 10x30" first-motion double-drum hoist, good for 1,200', and a 6-drill straight-line air compressor. Buildings are an engine house, boiler house, 20x40' carpenter shop, 20x30' smithy, and a coal trestle. Idle since 1907.

COPPER QUEEN CONSOLIDATED MINING CO. **ARIZONA**

Company merged into Phelps Dodge Corporation, which see.

HIGGINS LEASING CO. **ARIZONA**

Inc. 1912, to prospect the Higgins property for silver-lead and copper ores. Lease has expired and property reverted to owner, Thos. Higgins, of Los Angeles, in 1916. See Higgins Mine.

HIGGINS MINE **ARIZONA**

(Formerly Higgins Copper Co.)

Owner: Thos. Higgins, Higgins Bldg., Los Angeles, Calif. **Mine office:** Jas. J. Flanagan, mgr., M. F. Ryan, supt., Bisbee, Ariz.

Property: 200 acres in the Western end of the Bisbee district lying between the Copper Queen property on the E. and W. and the Wolverine-Arizona on the S. Shaft is 300' deep. In 1918, lessees were extracting 3 to 5 cars of manganese weekly from surface workings. An important strike of copper ore was made during 1918, dimensions of orebody are given as 8' by 350' by 450', assaying 2.5 to 50% copper. Daily shipments of rich ore to smelter are reported.

Production: copper, 1916, 1,250,452 lb.; 1917, 951,368 lb.; 11 months 1918, 3,013,000 lb.; about 12,000 oz. silver, and about 300 oz. gold yearly.

NIGHT HAWK LEASING CO. **ARIZONA**

Address: James Z. McKenna, supt., Bisbee, Ariz.

Property: a lease, until 1923, on the Night Hawk mine of the Phelps Dodge Corporation, in the Warren district.

Development: under way to depth of 650'. In September, 1919, it was reported that a shoot of rich copper ore had been opened on the bottom level, presumably an extension of that worked at 450'. The main orebody said to average 10%.

Ore is shipped to Douglas for smelting, but no figures are available.

PORTAGE LAKE & BISBEE MNG. CO. **ARIZONA**

Office: care John Funkey, Hancock, Mich. **Mine address:** Bisbee, Ariz. Chas. Lewis, treas.

Inc. April, 1903, in Arizona, succeeding Portage Lake & Calumet Development Co. **Cap.,** $1,000,000; $1 par.

Property: 12 claims, 3 fractional, 191 acres, several patented, 3 miles S. E. of Bisbee, S. E. of Warren Dev. Co., showing limestone, with a porphyry contact. The mine has a 2-compartment 302' shaft, with a small compressor, Worthington pump, 75 h. p. hoist, etc. Inactive many years.

QUEEN CALUMET COPPER EXTENSION CO. **ARIZONA**

Address: 121 So. Central Ave., Phoenix, Ariz., or Bisbee, Ariz.

Officers: Jas. Wood, pres.; P. L. Woodman, v. p.-gen. mgr.; J. F. Cleaveland, sec.; Chas. A. McDonald, treas., with A. K. Stacy, W. W. Perkins and W. W. Searles, directors.

Inc. Dec. 12, 1916, in Ariz **Cap.,** $1,500,000; shares $1 par.

Property: the Don Luis group of patented claims, about 421 acres and the Gold Knob group of 253 acres in the Warren mining district, Cochise county. Structural geological conditions said to warrant drilling.

SHATTUCK-ARIZONA COPPER CO. **ARIZONA**

Office: 120 Broadway, New York. **Mine office:** Bisbee, Cochise county, Arizona.

Officers: Thos. Bardon, pres.; H. L. Mundy, v. p.; Thos. Bardon, Jr., v. p.; E. R. Early, v. p.; Norman E. LaMond, v. p. and sec.; Archibald M. Chisholm, treas.; Lemuel C. Shattuck, gen. mgr.; Arthur Houle, supt.; T. O. McGrath, auditor.

Inc. March 22, 1904, in Minnesota. **Cap.,** $3,500,000; $10 par; non-assessable; fully issued. Company is closely connected, in ownership and management with the Denn-Arizona Copper Co. National Shawmut Bank, Boston,

and Bankers' Trust Co., New York, registrars; Old Colony Trust Co., Boston, and Guaranty Trust Co., New York, transfer agents. Shares listed on the Boston and New York Stock Exchanges. Annual meeting, third Saturday in February.

Dividends: $2 in 1910; $1 in 1911; $1.50 in 1913; $1.50 in 1914; $2.50 in 1915; $4.75 in 1916; $5 in 1917; $4 in 1918, and $1.25 in 1919, making a total of $23.50 per share.

Annual report for 1918 shows net income of $784,658, as compared with $1,477,500 in 1917. Net profits in 1918 were $243,467, compared with $713,641 in 1917. Operations during the first half of 1919 resulted in a deficit of $256,998.

Property: 8 claims, patented, 109 acres, lying in the northeastern portion of the Bisbee camp, about one-half mile south of the original workings of the Copper Queen, and to the north of the Calumet & Arizona. The property shows carboniferous limestone, with intrusive porphyry dikes, and a big fault, covered with a silicious gossan of 30 to 50′ width. Ores carry copper and lead with gold, silver and vanadium values, and are oxidized down to 800′, with low-grade sulphides at depth.

The orebodies occur as irregular replacements along certain bedding planes, and along dike contacts.

Development: the mine is opened by a 935′ three-compartment shaft 15x4′ 6″ in size, connected with the Uncle Sam shaft of the Copper Queen on the 800′ level, with the Powell shaft of the Calumet & Arizona on the 600′ level, and with the workings of the Wolverine & Arizona on the 200′ level. Mining work was begun Aug., 1904, and ore shipments started Sept., 1906, continuing until Nov., 1907, when the panic put a stop to all work for some months. Production was resumed Dec. 4, 1908. The mine is opened by levels at 100′ intervals, from 100′ to 900′ inclusive.

Development during 1918 totalled 15,125′, making 27 miles in all. Work was done on all levels from 100′ to 900′, inclusive, and company's report for that year notes the following results of new work.

On the 100′ level two small orebodies produced a good tonnage of copper ore; one is important because it proves continuation of ore bearing territory in west side of property. Work on 200′ and 300′ levels was mainly to block out low-grade silver lead ores. On 400′ level a body of carbonate ore was found, 4′ to 8′ in width and 180′ long. On 500′ level a new block of ground was opened up with encouraging results. Development work on 600′ level did not open up any new ores of consequence. On 700′ level an ore-shoot was developed that was the most important as to tonnage and copper contents found during the year. Over 900′ of development work on 800′ level did not disclose any ore of commercial grade. No important finds were made on the 900′ level, but between the 800′ and 900′ levels a large body of primary sulphides was exposed, high in iron and sulphur, assaying approximately 2% copper. There is still a large unexplored area of limestone geologically favorable for ore deposition.

The milling plant for low-grade lead ores began operations on a limited scale July 1, 1918. Tonnage milled amounted to 27,851 wet tons, average assay, 6.6% lead, 8.1 oz. silver and 0.07 oz. gold; 3,930 tons concentrates were shipped to lead smelters at El Paso. Recovery did not equal the results obtained from the experimental mill operations. In Jan., 1919, the mill was closed down to wait for a better price of lead. Total expense for construction and equipment of the mill was $294,902. The amount of lead ore available is approximately 1,000,000 tons, assaying 10% to 12% lead and $1 gold and 6 oz. silver per ton. Experiments indicate a profit of at least $4 per ton can be realized on this ore at normal market prices for lead and silver. Many of these orebodies are only partly developed. January 1, 1916, the total and partly developed reserves were estimated as 921,968 tons, containing approximately 56,600,000 lbs. copper, 70,000,000 lbs. lead, and $4,000,000 in gold and silver.

The ore is smelted by the Calumet & Arizona Mining Co., at Douglas, Arizona, under contract in effect to July 1, 1923. During 1918, 550 tons of copper ore was shipped daily, returning about 5% copper, with appreciable gold and silver.

Equipment: 12 mine buildings, includings, including machine shop, carpenter shop, smithy, boiler house, engine house, warehouse, sawmill, and a change house with accommodations for 300 men.

The 750 h. p. steam plant has five 150 h. p. boilers. The main hoist is an 18x48″ duplex double-drum engine, working under 125 lbs. steam pressure, with 2 drums, each carrying 1,500′ of 1⅛″ round steel cable, capable of handling continuously a 15,000-lb. unbalanced load at a vertical hoisting speed of 2,000′ per minute. The air plant includes a 40-drill cross-compound air compressor. Fuel is petroleum, with a normal yearly consumption of about 20,000 bbl.

A 3,300′ aerial tram of 500 tons daily capacity, with average grade of 18%, supported by 14 towers of 12 to 40′ height, built of 12″ timber and set on concrete foundations, leads from a 1,000-ton ore bin near the shaft to the El Paso & Southwestern Railway, the buckets discharging loads direct into 50-ton ore cars.

Recent production:

	Copper Lb.	Lead Lb.	Silver Oz.	Gold Oz.	Copper Cost	Per Lb. Sold
1919.....	2,111,841	4,477,228	.....	.....	22.4	22.2
1918.....	9,081,959	2,420,690	233,925	2,061	14.635c.	25.66c.
1917.....	11,935,317	2,010,145	154,344	1,542	13.242	28.317
1916.....	18,161,763	3,413,445	314,718	4,721	8.71	23.18
1915.....	11,154,211	2,345,342	201,869	3,151	(b)8.44	18.5
1914.....	10,846,918		198,419	2,444	(b)8.47	14.13
1913.....	13,219,756		236,000	2,033	7.22	

(b) Under curtailed production from Aug. 14 to Oct. 23 when shipments were discontinued, resumed in April, 1915.

On Feb. 22, 1919, fire broke out between the 700′ and 800′ levels in the old workings and the mine was flooded to the 700′ level to extinguish the fire; this was finished in May. As a result of this misfortune report for first quarter 1919, shows a deficit of $163,988. Output amounted to 1,000,844 lb. copper, 678,914 lb. lead, 160 oz. gold, and 44,129 oz. silver.

WARREN REALTY & DEVELOPMENT CO. ARIZONA

Property sold in 1917 to Phelps, Dodge & Co., and company liquidated. For description, see Vol. XII.

WOLVERINE & ARIZONA MINING CO. ARIZONA

Office: Calumet, Mich. Marc Bailey, mine supt., Bisbee, Ariz.

Officers: John Daniel, pres.; Paul P. Roehm, v. p.; Edw. Ulseth, 2nd v. p.; W. Frank James, treas.; Chas. Chynoweth, sec., with Jos. Bosch, W. H. Brophy and Fred C. Smith, directors.

Inc. March, 1905, in Arizona, as successor of Wolverine & Arizona Development Co. **Cap.,** $3,000,000; $15 par; issued 118,674 shares, par value $1,457,340, subject to assessment, and 21,792 shares, par value, $326,880, of full-paid stock. Levied 25-cent assessments March 19, 1906; Sept. 17, 1906; June 17, 1907; Nov. 18, 1907. Annual meeting in April.

Receipts for fiscal year ending Sept. 30, 1918, totaled $262,673, including $97,175 from 1917, and $162,004 ore sales; with total disbursements of $119,145, including $58,745 for mining and $29,699 for dividends. Cash on hand, Sept. 30, 1918, $140,861.

Dividends: 10 cts. per share, in Dec., 1914; 25 cts. per share, in Dec., 1915; 25 cts. in 1918.

Property: 9 claims, 152 acres, known as the Cairo, Memphis, Kentucky, Georgia, Louisiana, Chicago, Warren, George and Broken Promise. The Georgia claim lies 600′ from lands of the Calumet & Arizona, and is about 3,000′ from the Irish Mag shaft of that company, and from the Spray and Holbrook shafts of the Copper Queen. The Uncle Sam and White Tail Deer claims of the Copper Queen are adjacent to the Wolverine & Arizona.

Development: claims lie along the high limestone ridge W. of Bisbee, extending westward to the open valley, and the first development was begun on the farthermost side of the group. The Broken Promise shaft, 700′ deep, with

3 compartments, cut mineralized limestone showing considerable iron but no ore in commercial quantity. A drift on the 500′ level, running 850′ toward the Pittsburg & Duluth group (Cal. & Ariz.) cut leached ore and ledge matter, carrying traces of copper. Drifts running in other directions showed leached ore, but not in encouraging quantities, and work in this area was suspended, 1909.

Exploratory work on the western claims proving disappointing, the easternmost claims were prospected in 1906 by diamond drill and a hole 410′ deep passed into 50′ of 4 to 10% oxidized copper ore near the Shattuck mine. This orebody being inaccessible from the Broken Promise shaft, the use of the Higgins tunnel was acquired and the ore opened up from the Bisbee side of the mountain. The tunnel was extended 310′ to the Wolverine boundary and then southerly to intersect the orebody on the Wolverine ground. Orebody proved to be a replacement deposit of rich oxidized ore, lying within the limits of the Warren claim, about 2,700′ from the tunnel portal. After working out the oxidized ore down to the Shattuck boundary, exploration upward was begun and a fine body of sulphide ore was developed in the footwall limestone above the oxidized zone. This was exhausted in 1918.

A tunnel to explore the Shattuck fault, which crosses the property, has been put in. In year ending Sept. 30, 1918, work on Broken Promise claim, amounted to 1,769′, including shaft sinking from 2nd to 4th level, at depth of 386′. Ore from this claim came from an orebody on southeast end line of claim; developments here look promising. Tonnage shipped during the year came from the Broken Promise, and Warren claims, and amounted to 10,597 tons of 6.19% ore.

The mine has been a small but steady shipper of high-grade ore to the Douglas smelter, this ore paying all working expenses and building up a small surplus. It formerly averaged about 10% copper, but the sulphide ore is of lower grade. The mine has about 5,000′ of workings and its orebodies connect downward with great stopes in the Shattuck mine, the deposit being the top of one of the ore-shoots of that property. The mine is connected underground with the Uncle Sam mine of the Copper Queen Co., as well as with the workings of the Shattuck mine.

Equipment: includes a 250 h. p. steam plant, 2 single-drum hoists and a 6-drill air compressor, all at the Broken Promise shaft and all unused for several years.

Production: 2,524 tons, netting $37,962 in 1910; 984 tons, netting $11,873 in 1911; 762 tons, netting $12.861 in 1912. The output for fiscal year ending Sept. 30, 1915, yielded $130,370, or $17.13 per ton. In 1915-16 the output was 1,193 tons, averaging $23.96 per ton, equal to $28,588, and in 1917-18, 10,597 tons, yielding $162,004.

The property is excellently handled.

COCONINO COUNTY

KAIBAB COPPER CO. ARIZONA

Owners: Cyrus A. Phelps, John J. Kamm, Los Angeles, Calif. **Mine address:** Fredonia or Ryan, Coconino county, Ariz.

Property: a copper mine on Buckhorn or Kaibab plateau, north of the Colorado river, about 154 miles from Lund, Utah, the nearest rail point. Freight is taken into Ryan by way of Hurricane, Utah.

In July, 1919, company was remodeling its old mill, buildings, laying pipeline, and preparing to start running. Regarded unfavorably.

NORTHERN ARIZONA MNG & ELECTRIC POWER CO. ARIZONA

Address. Prescott, or Supai, Ariz.

Officers: W. I. Johnson, pres., with Geo. Brookshea, W. P. Burke, W. C. Miller and F. Blucher, directors.

Inc. 1916, in Arizona. **Cap.,** 1,000,000 shares; 50c par; pre-organization stock offered on the installment plan for 10 c. per share.

Property: 5 claims, 100 acres, in Cataract Canyon district, Coconino county, said to show deposits of lead-silver ore, with some vanadium in limestone.

Development: by tunnels, with total workings of 1,000′.

Equipment: includes a 20-ton mill, to be enlarged, giving concentrate assaying 65% lead and 25 oz. silver per ton.

Management claims the water-rights are worth $100,000, that 20,000 tons of lead-silver ore blocked out will net more than $100,000, and that $25,000 in vanadium ore has been opened up, all of which remains to be proved.

UNITED STATES PLATINUM CO. **ARIZONA**

A "war-baby," born in 1918, presumably died the same year.

See Philadelphia North American, for August 22, 1918.

Address: 1006 Land Title Bldg., Philadelphia, Pa.

Officers: Ralph H. Cameron, pres.; H. N. Williams, sec.-treas.

Property: in the Grand Canyon of Arizona. The U. S. Geological Survey in a Press Bulletin, issued in Jan., 1919, says:

"From time to time the supposed presence of platinum ore in the Grand Canyon has received new advertisement, and recently stock in a company organized to exploit the alleged deposits was offered for sale in an alluring prospectus wherein were published assays of the so-called ore that showed as much as 2.4 oz. of platinum to the ton. . . . The supposed platinum-bearing deposits are beds of green and red ferruginous sandstone that constitute a subordinate part of the geologic formation known as the Bright Angel shale, of Cambrian age."

In 1911, F. L. Ransome of the U. S. Geological Survey, and, in 1915, H. G. Ferguson, of the Survey, examined claims near Indian Garden that were being held as platinum-bearing ground. In 1918, Mr. Ransome again examined the supposed platinum deposits. The Press Bulletin says, "As a result of these investigations it may be safely stated that the supposed platinum deposits in the Grand Canyon do not contain platinum—certainly not enough to be of any value."

The ground was also examined by John M. Boutwell, who stated that he made a geologic study and took 275 samples. As the result of careful duplicate and triplicate assays, special chemical work, and duplicate concentration tests, "platinum ore has not been found in the ground examined in form and grade of commercial value."

The U. S. Platinum Co. should now apologize and disband.

GILA COUNTY

ASH CREEK GOLD MINING & MILLING CO. **ARIZONA**

Address: Winkelman, Ariz.

Officers: E. W. Childs, pres.; J. H. Pool, v. p.-mgr.; F. M. Pool, sec.-treas., with Dr. P. M. Butler and E. Rargel, directors, at last accounts.

Inc. in Arizona. **Cap.,** $1,000,000; $1 par; 150,000 shares outstanding

Property: 10 claims, 200 acres, 5 miles E. of Winkelman, Gila Co., Ariz.

Ore: occurs in fissure vein, 4′ wide, in andesite, diorite and diabase, said to show a 30″ shoot of sulphide ore, assaying 0.42 oz. gold and 2,.13% copper.

Development: by tunnels and shaft, totaling 600′. Property reported on by R. W. Hollis, Los Angeles, who recommended development at depth and erection of a small mill.

BISHOPS KNOLL MINING CO. **ARIZONA**

Main and mine office: Payson, Gila county, Ariz.

Officers: E. B. Simanton, pres.; John McCormick, v. p.; Mrs. E. M. Simanton, sec.; A. J. Hammons, treas.

Inc. 1917, in Arizona. **Cap.,** $3,000,000; $1 par; 1,000,000 issued.

Property: 50 unpatented claims, 1,000 acres, 15 miles south of Payson. Ore said to contain copper sulphides, gold and silver in quartz veins occurring in porphyry and diabase; dip 45°.

Company is developing and prospecting the property.

CASTLE DOME DEVELOPMENT CO. **ARIZONA**

Address: 100 Broadway, New York City.

Officers: Mulford Martin, pres.; Garrett Mott, v. p.; E. C. Curnen, sec.-treas., with H. A. Tingley, John Kasser, S. D. Wright and L. B. Pearson, directors. T. R. Drummond, gen. mgr.; J. E. Owen, supt.

Inc. in Maine. **Cap.,** 600,000 shares, $5 par.

Property: 34 unpatented claims, in Castle Dome group; owns 97% of the outstanding capital and has bond and lease on the Inspiration Extension Copper Co. (which see); also owns four adjacent claims, located five miles west of the Inspiration Cons. Copper Co., Miami, Gila county.

Development: by a tunnel and by churn-drills reported to show a diabase intrusion 10′ wide in porphyry, course N. 50° E., dip 18°. Company has developed a substantial deposit of copper ore on its main property. Ore runs from 1 to 3½% copper, with some gold and silver. Further prospecting with churn-drills under way.

CHOLLA COPPER CO. **ARIZONA**

Mail returned unclaimed, March, 1919, from former office: Winkelman, Ariz.

Officers: E. R. Rice, J. F. Shaw, D. R. Williamson, R. J. Rice and A. Williamson.

Inc. Jan., 1917, in Arizona. **Cap.,** $1,000,000; shares $1 par.

Property: Henry Owen group of 12 claims, about 18 miles from Hayden. Values are in copper and gold.

COPPER EXPLORATION CO. **ARIZONA**

Office: 8 West 40th St., New York City.

Officers: David K. Jeffries, pres.; Geo. B. Leighton, 1st v. p.; Chas. E. Finney, 2nd v. p.; J. M. Simonton, sec.; Jacob Schafer, treas. David K. Jeffries, Geo. B. Leighton, C. E. Finney, J. H. Banks, P. G. Cogan, H. D. Critchfield, Wm. L. Detmore, Edward L. Hearn, J. S. Jenkins, R. P. Marshall, Wm. L. Martin, Geo. F. Shurtleff, directors. Transfer agents, Security Transfer & Registry Co., N. Y. Registrars, Metropolitan Trust Co., N. Y. Annual meeting, first Monday in August.

Inc. 1918, in Delaware. **Cap.** $1,000,000 cum. 8% pfd.; $1,000,000 com. shares, $10 par; outstanding $398,340 pfd., and $1,000,000 common.

According to the company statements, the aim is "to purchase an interest in a (mining) corporation, to hold that interest during the period of development, and later to sell with a view to using the money to assist in the development of some other enterprise."

Property: holds stock interests in several mining companies including London-Arizona, Cons. Copper Co., Ball Copper Co., London Range, Owl Copper Co., 100,000 shares Canario Copper Co.; 100,000 shares, Cia Cobre Mexicana, S. A., equal to 80%.

This is evidently a scrambling of various Cameron Michel and outside corporations in which several companies that have failed to make good, are combined with others whose properties show more promise of becoming producing mines.

COPPER STATE MINING CO. **ARIZONA**

Office: 936 Plymouth Bldg., Minneapolis, Minn.

Officers: Martin E. Tew, pres.; John A. Nelson 1st v. p.; E. E. McCarthy, 2nd v. p.-treas.; S. H. Hudson, sec., with Otto Hanson, A. M. Anderson and Walter De La Hunt, directors.

W. C. Steubing, mgr.; Geo. S. Croyle, supt. and electrician; Gilbert O. Tew, store mngr. Mine address: Copper Creek, Ariz.

Inc. 1915 in Ariz., as a successor to the Calumet & Copper Creek Mining Co., the Old Reliable Copper Co., the Copper Creek Mining Co. and other companies. **Cap.,** $7,500,000; $2,000,000 issued. All stock certificates held in trust under a pooling agreement until the financing of the company has been completed.

The president, Mr. Tew, informs us that "all stock is still pooled. No officer or director receives salary or cash commission and all the money raised in 1918-19 has come from business men who have visited the property. The manager is trained both technically and by experience."

Company is controlled (51%) by Chemical Copper Recovery Co. The loss of company's quasi-title to the Sombrero Butte property by adverse decision of the Court, ends that controversy, but does not affect the principal holdings of the company on Copper Creek.

Property: 55 claims, unpatented, including 100 acres mill and smeltersites, and 100 acres miscellaneous lands; also 28 patented claims under option,

making total area 1,500 acres in the Copper Creek, or Bunker Hill district, Graham and Pinal counties, Ariz. Properties are in the Copper Creek basin, on the western slope of the Galiuro Mountains, 31 miles S. E. of Winkelman and Hayden, on the Arizona Eastern R. R. Claims include the Sycamore Flat, Cumberland, Sioux Chief, Silver Reef, American Eagle, Copper Giant and Old Reliable groups.

Geology: country rock in lower basin is diorite, with porphyry intrusion, showing a large number of orebodies, there being several different breccias and oxidized zones carrying mineral, orebodies usually being elliptical, but sometimes occurring in chimneys. Outcrops, of which there are more than 50, are prominent. Oxidized ores, including chrysocolla, are found at and near the surface, sometimes in commercial quantities, giving place, at shallow depth, to sulphides, chalcopyrite, bornite and chalcocite, associated with pyrite, in altered and brecciated diorite, some native copper showing in flakes and grains along shear zones. Company reports that one orebody 300′ wide and 420′ long has been developed to 342′ depth, in a porphyry breccia.

Development: the Old Reliable mine has an orebody with the second largest outcrop in the district, same having a sectional area of 147,000 square feet, or about 3½ acres. Development is by an 800′ upper tunnel, with back of 775′ and 13 crosscuts; a 258′ shaft from the surface to the tunnel; and a lower tunnel 800′, with about 3,800′ of workings, and 2 connecting winzes, estimated by manager to show 250,000 tons of 3% ore on each level. Most of the work at this property has been done on the Old Reliable.

The American Eagle group has 3 prospect tunnels, a 1,025′ working tunnel, and a 300′ three-compartment shaft, with about 3,500′ of workings, showing oxidized ores at surface, with an orebody reported to be developed for about 50x100′. This mine is estimated by company to have developed about 60,000 tons of ore, averaging 3.78% copper and 8 oz. silver, with a trace of gold.

The Prince mine, under option, is developed by a 300′ shaft and drifts on 3 levels. Company claims 300,000 tons of ore averaging 3.56% copper in this mine. On the Globe mine a shaft has been sunk 650′ and 100,000 tons of 3.08% ore are said to be blocked out on the 150′, 250′ and 450′ levels. The Copper Giant mine, said to have an outcrop of nearly 4 acres, has a 200′ shaft connecting at depth of 124′ with a tunnel from which 2 drifts several hundred feet in length have been driven into the ore breccia. In the Silver Reef, Kimbro, Lead Carbonate, Cumberland, Velasquez, and several other claims belonging to the company, copper ore has been exposed by short tunnels and shallow shafts. Hand-sorted ore from these workings has been shipped to smelters, giving returns of 12% to 30% copper and $5.50 to $27 gold and silver per ton.

Equipment: electric hoist, compressors, drills, smithy, machine-shop, etc. A 150-ton concentrating mill was built several years ago. Power plant consists of two 100 h. p. boilers, a 200 h. p. engine, a 160 k. w. 2,300-v. dynamo. A 3-phase transmission line, 4 miles long, supported by steel towers, connects power plant with mill and 3 of the mines. Water supply system includes 5 miles of 2½″ pipe, and a concrete dam 26½′ high and 131′ across the canyon, creating a reservoir holding 8,000,000 gal. of water. Company also owns and operates a 2½-mile narrow gauge railroad, connecting the Old Reliable mine with the mill, equipped with 18-ton Porter locomotive and 8 cars; a 31-mile telephone line connecting the mine with Mammoth, Winkelman and Hayden, and a store, used as a commissary and office building. Other improvements are assay office, ice-making plant and 25 buildings for employees. Additional equipment installed 1917, includes a 285 h. p. Diesel engine with direct-connected generator, a 5-drill air compressor, a 5x6′ Marcy ball-mill and Callow flotation cells.

Production: by former owners in 1914 was 8,400 tons of ore, making 758 tons of concentrates averaging 28.26% copper, or a total of 428,421 lb. copper. Production from Nov., 1916, to Jan. 1, 1918, was 746 tons of concentrates, averaging 24% copper, from ore extracted in development work. The total output has been 8,000 tons of 3% and 12,000 tons of 1.75 to 2.5% ore, yielding 650,000 lb. of copper, equal to 1.6% recovered. This product was hauled 31 miles by wagon, and then 400 miles by rail.

sedimentary series has been distorted, faulted and intruded by a series of quartz porphyry and rhyolite porphyry dikes. Ore is gold and copper bearing and occurs as flat lenses or beds, replacing limestone and shale mainly along a bedding plane, but also as veins along contacts of quartz porphyry dikes and in places along fissures in limestone near dikes. The usual ore is gold-bearing, next in importance being copper-lead-silver ore.

Development: by 12 tunnels, from 40 to 350′ long, and 6 shafts from 10 to 35′ deep, on the Apex claims. No. 3 is in 320′ and is said to have opened ore 250′ long and 60′ at the widest point. Forty samples averaged about 1 oz. gold, 2 to 10 oz. silver, and 7 to 35% lead. Above No. 3 tunnel is a 100′ raise and below it a 200′ winze. Ore reserves given as 500,000 tons. Shipments to El Paso said to yield about $50 per ton. Plan erection of second 50-ton unit to be added to the dry concentration mill.

Property seems to have merit and the promotion to be conservatively handled.

LONDON-ARIZONA CONSOLIDATED COPPER CO. ARIZONA

Option for control of company held by Copper Exploration Co., which see.

Office: 1005 Title Insurance Bldg., Los Angeles, Calif. **Mine office,** Chilito, Gila Co., Ariz.

Officers: Chas. E. Finney, pres.; F. B. Pugh, v. p.; Edw. W. Brooks, v. p.; Robert J. Simpson, sec.-treas., with B. P. Cheney, D. C. Kurtz and S. F. Parrish, directors. Edward W. Brooks, cons. engr. and geologist. Harry Scott, supt.

Inc. Sept. 18, 1913, in Maine, as a merger of the London Arizona Copper Co., London Range, London Shamrock and Ball Copper companies. **Cap.,** $12,000,000; $5 par; 920,500 shares outstanding. Bonds: $253,000 6% outstanding. Commercial Trust & Savings Bank, Los Angeles, trustee. U. S. Corporation Co., 65 Cedar St., N. Y., registrar. Annual meeting first Tuesday in October. Company says funds for necessary equipment and development work have been arranged for with Copper Exploration Co., a Cameron Michel & Co. organization.

Property: 132 claims, 2,100 acres, in the Banner mining district (Ray quadrangle), 5 miles N. of Hayden. Claims form a compact group covering an extensive, well-mineralized area.

Geology: the tract shows a series of 1,500′ of well-bedded limestone, quartzite and shales resting on a laccolithic mass of diabase; these rocks are broken, faulted and later intruded by dikes and sheets of diorite porphyry, presumably the offshoots of an underlying batholithic mass of granite material. The ore occurs in contact metamorphic deposits and replacements, especially in the limestone. Much of the ore consists of garnet (andradite, the lime and iron species) intergrown with specular hematite copper sulphides and a variety of iron-magnesian lime silicate minerals. The copper ore occurs largely in "blanket" deposits, but also in fissures and vertical contacts. The main ore outcrop is 10 to 30′ wide and about three-fourths of a mile long, lying between beds of limestone and quartzite.

Silver-lead ores do not occur in the contact deposits, but are found in limestone along the dike contacts where contact alteration is not noticeable.

Development: includes the 300′ Curtain and 182′ Arizona shafts developing the copper and the 90′ O'Carroll shaft developing the silver-lead deposits. Total development aggregates 11,000′. The O'Carroll ore bed has been opened by 60 shallow tunnels, covering a distance of 2,000′ along the outcrop, and management states ore has been extracted from practically all of them, sulphide ore having been encountered in four.

Production: to date from development, 15,443 tons copper ore, 1,016 tons lead ore, 51 tons zinc ore, 14,437 oz. silver.

The ores are shipped to the Hayden plant of the A. S. & R. Co.

LONDON-ARIZONA COPPER CO. ARIZONA

Office: 1005 Title Insurance Bldg., Los Angeles, Calif.

Officers: Chas. E. Finney, pres.; F. B. Pugh, v. p.; Robt. J. Simpson, sec.-treas., with Edward W. Brooks, D. C. Kurtz, S. F. Parrish, R. E. Sloan, B. P. Cheney directors.

Inc. 1907, in Arizona. **Cap.** $10,000,000; $10 par; 592,260 outstanding.

September, 1913, the company transferred title to its property to the London-Arizona Cons. Copper Co. for 753,045 shares of stock of the London-Arizona Cons. Copper Co., which it now holds in its treasury. For description of property see London-Arizona Cons. Copper Co., also Volume XI.

MAZATZAL MINING CO. **ARIZONA**

Office: Globe, Ariz.

Officers. W. C. Stanley, pres.; A. J. Crossley, sec.-treas., with G. B. Peart and W. Thomas, directors; R. H. Bradley, mgr.

Inc. Jan. 25, 1917, in Arizona. **Cap.,** $3,000,000; $1 par; 1,029,000 issued.

Property: 65 unpatented claims, 1,300 acres in Mazatzal district, Gila county, said to show gold-silver-copper deposits in granite, schist and porphyry. Veins dip 70° N. E., and pitch N. W. Ore is both oxide and sulphide.

Development: by 1,000′ tunnel, in which 3 fissure veins were cut varying from 1 to 3′ in width, and showing copper ore assaying from $4 to $125 per ton. Plan sinking 500′ shaft. Reserves reported to be fairly large.

McMILLEN-STONEWALL MINING CO. **ARIZONA**

Address: Globe, Gila county, Ariz. V. Y. Smith, pres.-gen. mgr.; C. N. Lightle, sec.-treas.

Inc. March 27, 1907, in Arizona. **Cap.,** $1,000,000; shares $1 par.

Property: 34 claims, in the Richmond basin, 16 miles N. E. of Globe, Gila county, carry 3 miles of the strike of the Stonewall Jackson vein, of 25 to 35′ average width.

Property: includes the Stonewall Jackson mine, worked 1876-83, with an estimated production of about $500,000 of silver ore, of high average grade.

Development: by the 300′ three-compartment McMillen shaft and the old 600′ Stonewall Jackson shaft, latter showing no stoping done below 230′. The mine is said to have considerable ore carrying 5 to 50 oz. silver per ton, with about 40,000 tons of discarded silver ore on the old dumps.

Equipment: includes an old stamp mill and a small cyanide plant. A full and favorable report on the property was made May, 1912, by R. B. Wagner.

In 1914, property was bonded to G. H. Hayes and explored by diamond-drilling, which proved unsatisfactory owing to the broken nature of the ground. No recent reports, mail unanswered. Probably idle.

MINE OPERATORS CO. OF AMERICA **ARIZONA**

Address: Wm. D. Steadman, Miami, Ariz.

Incorporators: W. D. Steadman, W. J. Scott, of Miami, Ed. Arhelger, J. Cubitto, J. H. Mayer, F. W. Rolando of Globe, Ariz.

Inc. 1918 in Arizona. **Cap.,** $3,750,000; $5 par.

Property: low-grade copper-manganese mine near the Independence, Bellevue.

A prospect. Company regarded with disfavor.

MOUNTAIN CONSOLIDATED MINING & MILLING CO. **ARIZ.**

Letters returned unclaimed, 1919, addressed to Box 1899, Globe, Ariz., and G. B. Reed, Payson, Ariz.

Officers: G. B. Reed, pres.; J. W. Reed, v. p.; W. B. Haynie, sec.; A. T. Hammons, treas., with W. H. Shenk, A. C. McKillop and J. Nugent, directors.

Inc. March 22, 1917, in Arizona. **Cap.,** $3,000,000; $1 par; 1,285,000 issued.

Property: 66 claims, 1,260 acres, in Payson and Brown's districts, Gila county, said to show gold-silver-copper-lead-vanadium quartz veins in schist, slate and diorite. Ore occurs as veinlets. Copper minerals are sulphides.

Development: by 214′ shaft and 270′ tunnel. Estimated reserves are 36,200 tons, but as only 98 feet of lateral work had been done to June, 1917, this amount must include probable ore based largely on outcrops. The Black Rattler claims in the Brown district are reported to have a silver-copper vein 10,500′ long and from 40 to 100′ wide, in a slate-schist contact, which outcrops from 50 to 75′ above the surrounding country. Presumably idle.

OVERLAND MINING CO. **ARIZONA**

Mine near Winkelman, Ariz., adjoins the London Range mine of the London Arizona Copper Co. and "79" mine on the south and west. Claims said to carry an extension of the main dike system of the London range, showing metamorphic contact orebodies. Hayden Junction is the nearest railway point. Mine reported under lease to M. H. Murphy and W. E. Dunlap, of Kingman, in 1915.

No recent returns.

POWERS GULCH DEVELOPMENT CO. **ARIZONA**

Idle. John Matson, supt., at last accounts.

Property: 23 claims in Powers gulch near Globe, Gila county, is said to show a vein carrying bornite and chalcopyrite ore associated with pyrite. Mine idle for a long time, was reopened in 1915 and a strike of tungsten ore reported in April, 1916.

Development: by 2 shallow shafts and 2 short tunnels.

RAY CENTRAL COPPER CO. **ARIZONA**

Formerly the Finney Copper Co.

Address: Box 488, Phoenix, Ariz.

Officers: E. O. Petro, pres.; A. G. Dulmage, v. p.; H. T. Weldon, sec.-treas.-mgr., with W. O. Temple, directors.

Inc. May 20, 1916. **Cap.,** $150,000; 10c par; 700,000 outstanding. Annual meeting first Tuesday in May.

Property: 13 claims, 260 acres in Banner mining district, Gila county, said to show gold-silver-copper ore in a contact deposit in diabase and lime.

Development: by 165′ shaft; and drift on the lowest, or 165′ level. A prospect. Probably idle.

SILVER BUTTES MINING CO. **ARIZONA**

Address: C. P. Crawford, 121 South Central Ave., Phoenix, Ariz.

Inc. in Arizona. **Cap.,** $1,200,000; shares $1 par; 503,839 issued.

Property. 12 claims in Mazatzal mountains, Gila county. Geological conditions are said to be similar to those of Jerome. According to a report by A. F. Muter, there are two vein systems in diorite, really fault fissures containing ore, especially at junctions of the two. All ore near the surface shows intense leaching. An incline shaft was recommended on the N.-S. vein, which can be traced on surface for 3,000′. The Butte vein, 2 to 7′ wide, is said to contain from 25 to 300 oz. silver per ton, $2 to $15 gold, and 2 to 12% copper. Some rich ore has been shipped.

In Sept., 1917, work was reported resumed. No recent report, presumably idle.

SOMBRERO DEVELOPMENT CO. **ARIZONA**

Office: Houghton National Bank Bldg., Houghton, Mich. **Mine office:** Globe, Gila Co., Ariz. Dr. Lucius L. Hubbard, gen. mgr. Company is a syndicate, not incorporated.

Property: on Cherry creek, west of Sombrero Butte, and about 50 miles north of Globe, is slightly prospected by adits. The mine has a small water-driven plant. Inactive.

SOUTHWESTERN LEASING & DEVELOPMENT CO. **ARIZONA**

Care of Henry Snell, Globe, Ariz. Company inactive.

WARRIOR COPPER CO. **ARIZONA**

Office: Brown Bldg., Philadelphia, Pa. **Mine office:** Black Warrior, Gila Co., Ariz.

Officers: Spencer D. Wright, pres.; Philip Godley, v. p.; Geo. H. Buchanan, treas.; D. H. Paris, sec., with Ernest L. Tushin, H. B. Hopper, J. K. Kane, W. W. Doughten, T. A. Blythe, C. Gallagher, G. B. Walker and Thos. D. Martindale, directors.

Inc. March 10, 1905, in Delaware, as successor of Black Warrior Copper Co., Amalgamated, which came to grief. **Cap.,** $1,600,000; shares $10 par; in $750,000 cumulative 7% preferred stock and $850,000 common stock.

Property: 50 claims, 46 patented, about 800 acres, including the Black Warrior group and the Lost Gulch group, near the Inspiration mine. The

principal property is the Black Warrior mine, a producer since 1904, located about 7 miles N. W. of Globe.

Geology: the Black Warrior property shows slightly altered schist, dacite tuff, diabase, and conglomerate, the greater part of the area being covered by schist, which is the oldest formation. The diabase occurs as intrusive dikes, and the dacite is a surface flow over both schist and diabase. The Black Warrior vein is a fault zone 30 to 60′ wide, filled with crushed mineralized dacite for about 300′, with a breccia of schist and some diabase below. The vein has a generally E.-W. trend, and W. pitch. The ore averages about 50 to 60′ in width, though a width of 100′ is known at a number of points. This property includes the Montgomery group, with the Montgomery and Dadeville claims, developed by tunnels of about 1,000′ and 1,200′ length, developing extensive bodies of copper silicates and hydrated copper oxides of excellent average value.

The Lost Gulch claims show a highly altered monzonite-porphyry covering the larger part of the area, with extensive outcrops of dacite and limestone and smaller ones of diabase, general geological conditions being much the same as at the Black Warrior.

Development: the Black Warrior mine is developed by the Winnie shaft, 500′ from the western boundary, and tunnels of about 1,000′ and 1,200′ length, opening the mine to a depth of 300′, with 5 levels spaced at 50′ intervals. The mine has yielded a large tonnage of high-grade ore, giving assays of 6 to 25% copper, between the 200′ and 300′ levels. Considerable churn drilling was done, 1910-11, 1 hole in the vicinity of the Winnie shaft being sunk 506′ in schist, showing mineralization, and a 580′ drill hole proved the existence of chalcopyrite, disseminated in schist, though not of commercial value. The western portion of the property was tested without favorable results by churn drill, May, 1911.

Equipment: includes a steam plant, burning petroleum. Buildings include an assay office, engineering office, smithy, carpenter shop, several dwellings, and a 300-ton shipping bin. No further disclosures are available.

MIAMI-GLOBE DISTRICT, GILA COUNTY

ARIZONA BONANZA MINING & MILLING CO. **ARIZONA**

Mail returned unclaimed, March, 1919, from former address: Miami, Ariz.

Property: 10 claims, 5 miles N. E. of the Inspiration Consolidated, only slightly developed and said to carry ore assaying from 5-30% copper and $6 gold per ton. Company sold stock at 25c. per share to provide development funds in 1917.

ARIZONA-BUTTE CORPORATION. **ARIZONA**

Address: Columbia National Bank Bldg., Pittsburgh, Pa.

Officers: Wm. Schafer, pres.; E. R. Schafer, v. p.; Wm. Perry, sec.-treas., with C. S. Jamison, Jas M. Rae, A. C. Held, Jr., and J. H. Faught, directors.

Inc. April, 1917. **Cap.,** $1,000,000; $1 par. National Security Co., New York, transfer office.

Property: 15 claims, 300 acres, 8 miles west of Miami and 4 miles from the R. R., said to show numerous veins in granite, with pyrite, chalcopyrite, and bornite. Veins said to average about 5′ in width.

Development: one vein has a 600′ tunnel with a 240′ winze—here the vein is said to be 23′ wide and 700′ lower is a tunnel 1,700′ long which was expected to cut the vein within the next 100′.

Equipment: includes a 100-ton concentrator, which will need remodeling before being able to treat the several thousand tons of medium grade ore that the management claims is opened up.

ARIZONA COMMERCIAL MINING CO. **ARIZONA**

Offices: 50 Congress St., Boston, Mass., and 188 Middle St., Portland, Me. Mine at Globe, Gila Co., Ariz.

Officers: Chas. S. Smith, pres.; Harry M. Stonemetz, v. p.; C. H. Altmiller, treas., with E. S. Goulston, G. T. Rice, Chas. Sumner Cook, clerk, and Wm. E. Chandler, directors; Robert R. Boyd, supt.

Inc. April 4, 1912, in Maine. **Cap.**, $1,500,000; $5 par; 265,000 issued. Listed on Boston Stock Exchange. Annual meeting second Wednesday in April. Company is successor of the Arizona Commercial C. Co., bondholders of the old company receiving 70 shares of new stock for each $500 bond held and the stockholders being privileged to subscribe, share for share, for fully-paid stock in the new company upon payment of $3 per share.

Accounts for year ending Dec. 31, 1917, showed cash and loans on hand, $398,051; supplies, $42,450; accounts receivable, $135,154; and accounts payable, $79,722. Net earnings were $464,750 in 1917. Balance surplus, Dec., 1917, $2,713,563. In 1918, the revenue was $862,307; operating expenses, $560,784; dividends of $530,000, and depreciation and depletion, $188,277. Current assets were $785,796, and liabilities, $577,971.

PROPERTIES AT GLOBE, ARIZONA

Dividends: initial of 50c per share was paid Oct. 31, 1916; similar payments were made each quarter from April, 1917, to Oct., 1918, both inclusive; none since. A special Red Cross dividend of 10c. a share, was paid July, 1917. Total disbursements to Jan. 1, 1919 were $4.10 per share, equal to $1,096,500.

Property: 11 claims, 3 fractional, in 2 groups, known as the Black Hawk and Copper Hill groups, separated by the Iron Cap mine of the Iron Cap Copper Co. Lands are at Copper Hill, 3 to 4 miles N. E. of Globe, lying just north of

the Old Dominion, and adjoining the United Globe and Superior & Boston mines in Gila county. The Copper Hill group, 56 acres, carries the Old Dominion and Copper Hill veins for about 1,500′.

Ore: is a mixture of pyrite and chalcopyrite, contains 5% copper, 20% sulphur, 30% iron. All ore is shipped to the Old Dominion.

Development: in 1917 was confined to the Copper Hill mine, with 2,659′ of level work and 565′ of raises from the 8th to the 15th levels. In 1918, there was 6,729′ of work done in this mine.

The working shaft at the Copper Hill mine, 1,600′ deep, has extensive workings on the 10th, 12th, and 14th levels, along the Old Dominion vein, and ore has been extracted eastward until cut off by the Budget fault, ore being exposed along the bottom of the 14th level for 400′. The most important recent development includes the opening up of the orebody for 400′ horizontally and 75′ vertically on the 8th level, east of the fault where it is from 5′ to 40′ wide, averaging 5% copper; indications point to its extension downward to the 16th. Above the 13th level, a new vein of high-grade ore was opened in the hanging wall; it does not show on the 13th and continues some distance above the 12th level. In Sept., 1919, the new shaft was down to No. 5 level, with 2 shifts at work.

Future ore extraction will come from east of the fault, in the drifts driven on the 15th and 16th levels.

In Feb., 1919, company began two suits in Massachusetts against the Iron Cap Copper Co: (1) for $500,000 for ore alleged to have been illegally removed; and (2) for $150,000 for share of pumping expense. In Sept., the Supreme Court of Massachusetts sustained the pleas of the Iron Cap that suit must be brought in Arizona Courts. Immediately after this decision, Arizona Commercial brought the same suits under Massachusetts laws to be tried by a court and jury. In October, this company asked for an injunction in the Maine courts restraining Iron Cap from disposing of any of its assets until the suit was settled.

Arizona Commercial continued in 1919 to produce rock ore from its lower levels; the 15′ level showing ore that averaged 12% copper for a distance of 30′. In November, 10′ of 5% ore was cut on the 16th level.

The Black Hawk group, 97 acres, which carries the Black Hawk and Old Dominion veins for about 3,000′, has a surface capping of low-grade iron ore, above a 25 to 50′ vein, leached to considerable depth, followed by silicious ore, estimated to average about 4% copper, with excess of iron. There also is a hematite vein of 3 to 4′ width giving assays of 4.5% copper, with small silver values.

Equipment: at Copper Hill shaft includes a 72′ steel headgear, hoist, good for 1,500′ driven by 175 h. p. motor; 500-gal. electric pump; 20,000 cu. ft. Sturtevant fan; and 300-ton ore bins.

The power smelter plant was remodeled in 1916; new equipment includes two 600 k. w. turbo-generators. All power used is generated at this plant, which is connected with the Copper Hill mine by a 6″ pipe line for compressed air and an electric transmission line. On the 14th level two 500-gal. p. m. pumps, electrically driven, were installed, pumping all water from the Copper Hill mine to surface.

Production: in 1916 was 48,889 tons of ore, containing 4,178,474 lb. copper, 21,163 oz. silver and 302 oz. gold; and in 1917, 39,702 tons of ore, containing 3,860,949 lb. copper, 5,208 oz. silver and 374 oz. gold; and in 1918, 62,797 tons of ore, containing 6,076,303 lb. of copper, 15,981 oz. silver and 831 oz. gold. In 1919 the total yield was 7,500,000 lb. at cost of about 14 cents.

Opinion: "in proportion to its output this company has one of the largest showings of ore of any of the vein mines. The shaft is down to the 1,600′ level and, indeed, in Dec., 1919, the crosscut on this level has encountered the orebody finding it well up to the average grade.

The "Budget" fault throws the ore up several hundred feet, so that east of this fault the ground is almost virgin. At present the company is mining about 6,000 tons per month. It is, however, sinking a new shaft, which will

have a capacity of 400 tons in six hours. With this the company should have no difficulty in mining easily 10,000 tons per month.

It is estimated that there is in sight about 750,000 tons of ore, so that even on this larger rate of production there is some six years' supply of ore in sight. At this rate of mining it should not be difficult to produce 12,000,000 pounds of copper per year, as against a rate hitherto attained of around 8,500,000.

The relation between cost and price of copper production have been so upset of recent years that it is difficult to take any definite basis for estimating earnings. The ore, however, running 5½ to 6% is decidedly above the average of vein mines and should make for a cost somewhat lower than the average. With a normal spread between cost and price on a full production, it would not seem unreasonable to figure on a profit of $2.50 to $3 per share."

ARIZONA-GLOBE COPPER CO. **ARIZONA**

Office: 110 North First Ave., Phoenix, Ariz.

Officers and directors: P. J. Hickey, pres.; Harry Kay, v. p., with Geo. M. Mickie of Phoenix; J. T. Brown, Globe; and J. P. Hickey, Jr., mine supt. Cap., $2,000,000; $1 par.

Property: the Cole & Goodwin mine located on N. fork of Mineral Creek, 10 miles S. E. of Globe, held under lease and bond from P. J. Cole of Globe (Cole Dev. Co. q. v.). Mine has a 470′ shaft and about 600′ of drifting. Company reports 50,000 tons of ore in sight, averaging 4% to 19% copper with some gold and silver values.

In October, 1919, company was offering stock to the public at 50c. per share, to procure funds for a mill.

Stock handled by Arizona Development Co., brokers, Mesa, Ariz.

Fully described in Vol. XIII of this book, p. 439.

ARIZONA NATIONAL COPPER CO. **ARIZONA**

Idle. **Address:** 327 Pine St., Williamsport, Pa.

Officers: Thos. M. B. Hicks, pres.-treas.; C. S. Messerly, sec.; LeRoy Scholl, gen. supt.

Inc. Feb. 1, 1906, in Arizona. **Cap.,** $3,000,000; $10 par. Bonds $300,000 at 5%.

Property: 14 claims, also a 15-acre mill site and 100 acres timber lands, formerly known as the McNelly-Crowley property, on Pinto creek, west of Miami, carrying contact veins between schist and granite, said to average 14′ in width and traced 785′, showing considerable high-grade oxidized ores, including chrysocolla and native copper, with some chalcopyrite and occasional bornite. The 80′ ledge of decomposed schist is lightly impregnated with copper sulphides.

Development: by shafts and tunnels, with a total of 2,000′ of workings. Has steam power. No recent returns secured.

BARNEY COPPER CO. **ARIZONA**

Absorbed with the Porphyry Copper Co. by Porphyry Consolidated Copper Co., which see.

COLE DEVELOPMENT CO. **ARIZONA**

Office and mine. Globe, Gila county, Ariz. P. J. Cole, pres.; M. L. Cole, Jr., sec.-treas.

Inc. Sept., 1909, in Arizona. **Cap.,** $300,000; $1 par;151,000 issued. Company holdings reported under bond and lease to Arizona-Globe Copper Co., Nov., 1919.

Property: 17 claims, known as the Cole & Goodwin groups, 4 claims wide and 4 claims long, extending along Mineral creek, 3 miles south of the Gibson mine and about 10 miles S. W. of Miami, the nearest available rail point, and 10 miles N. E. of Ray, but is separated from Ray by some extremely rugged country.

Geology: country rock is Pinal schist with diabase intrusions, carrying the Cole and Goodwin fault, traceable about 2 miles, that cuts the scist diagonally. This property carries fissure veins in schist, and also disseminated ores in schist.

Development: by the 450′ Cole incline shaft, with 5 drifts, cutting several bodies of low-grade disseminated ore, and some high-grade from which

regular shipments of 6% to 17% copper and $2 to $4 gold and silver were reported in 1917. There also are several short tunnels, there being a 135′ crosscut tunnel about one-half mile from the shaft, and a 480′ crosscut tunnel, 1,700′ west of the shaft, with portal 500′ vertically below the collar of the shaft.

Equipment: includes a 22 h. p. gasoline hoist. Examined by G. M. Butler in 1919.

COPPER & SILVER ZONE MINES **ARIZONA**

Claims sold to Globe Dominion Copper Co., which see.

COPPER SPRINGS MINING CO. **ARIZONA**

Office: Globe, Ariz.

Officers: Capt. E. Storer Tice, pres.; R. L. Springer, v. p.; E. F. Hiatt, sec.-treas., with Dr. W. H. Meler, B. G. Stewart and W. H. Hiatt, directors.

Inc. in Aug., 1916, in Arizona. Shares $1 par; 696,230 issued. Listed on Boston Curb. Exchange Trust Co., Boston, transfer agents. Fidelity Trust Co., Boston, registrar.

Property: 25 unpatented claims, about 500 acres on Mt. Madera, in the Schultz ranch section of the Pinal mountains, about 6½ miles from Miami, in a rough section of the country. Property is reached by wagon road.

Development: by 8 tunnels, aggregating about 1,400′. Work reported to show considerable leaching and some silicates of copper in the upper tunels. Nos. 5 and 6 tunnels are reported to have cut carbonates and sulphides of copper running from 1½% to 4%. A new tunnel is being driven to obtain a depth of 400′ with the expectation of getting sulphide ore.

Copper values are reported in nearly all of the tunnels but not in a very appreciable amount.

Property is a prospect promoted by Temple H. Fay & Co., of Boston.

CORDOVA COPPER CO. **ARIZONA**

Property taken by creditors who organized new company called Lecora Copper Co., which see.

DUQUESNE MINING CO. **ARIZONA**

Address: care of T. A. Luckhart, sec., DuBois, Pa. Mine near Globe Gila Co., Ariz. Geo. M. Luckhart, pres and mgr.

Inc. 1909 in Arizona. **Cap.,** $1,000,000; shares $1 par.

Property: 10 claims, in Gold gulch, about 3 miles south of the Arizona National and 15 miles west of Globe, in the Pinal mountains. Mine has a 10′ vein, carrying mainly silver-lead ore with copper expected at depth. Opened by 3 tunnels, 2 of 200′ and 300′, showing ore assaying well in gold. A 50′ shaft on the East End claim shows ore giving assays of 5% copper, 3 oz. silver and $4 gold per ton.

Equipment: includes a 25 h. p. gasoline hoist, and an oil engine. Only assessment work done in 1914-15.

Probably closed down since 1917.

GERMAN COPPER CO. **ARIZONA**

Idle. **Office:** Chas. H. Trotter, sec., 10 No. New Jersey St., Indianapolis, Ind. Mine at Globe, Ariz.

Officers: John H. Murdoch, pres.; Chas. H. Zollner, v. p.; John A. Hook, treas., with Wm. Elwarner, Jos. Lauler, Wm. Burnett, John I. Carson and J. B. McMurray, directors; P. H. Pernot, cons. engr.

Inc. March 25, 1911, in Arizona. **Cap.,** $3,000,000; $5 par; 142,373 issued; outstanding debt, $95,000. Annual meeting, second Tuesday in October. Company is successor, 1911, of the Arizona-Colorado Belt & Gold Mining & Milling Co.

Property: 14 claims, 270 acres, held by location in the Globe district of Arizona. Ore occurs in a large fissure vein cutting through diabase, quartzite, and limestone, and as contact ores between diabase and sedimentary rocks. Vein strikes N. E.-S. W., dips 55°, is reported as 9′ wide, proven to depth of 900′, and said to carry 2% copper, 2 oz. silver and slight gold values per ton, principally as chalcopyrite, on 800′ and 900′ levels. Ore developed above 800′ estimated at $125,000.

Development: by 863′ shaft, and a total of 3,000′ of underground work.

The 800′ level is said to block out 2,000 tons of ore with 18,000 tons of 2½% ore reasonably certain.

Equipment: includes 100 h. p. steam hoist, pump and 7-drill air compressor. Arizona-Eastern railroad is 1 mile from property, which is well located and has merit. Assessment work only being done at last accounts.

GIBSON CONSOLIDATED COPPER CO. **ARIZONA**

Main office: 505, 5th Ave., New York City. **Mine office:** Bellevue, Ariz.

Officers: Gen. Amasa P. Peake, v. p.; H. F. Bierce, managing director; P. P. Greer, treas., with F. F. Towle and E. J. Kaltenbach, directors.

Inc. May, 1917, in Delaware. **Cap.,** $1,000.000; $1 par; 820.000 issued. Columbia Trust Co., New York, registrar. Empire Trust Co., New York, transfer agents.

Property: 16 claims, 8 patented, 300 acres, about 8 miles W. of Globe, Gila county, with a good wagon-road connection, includes the Gibson mine which was opened by Messrs. Gibson and Henderson with capitalization of $90 cash and a team of horses and not only paid its way but earned good profits.

Worked in a very small way, by different owners, 1900 to 1906, when taken over by the Gibson Copper Co., and thereafter worked continuously until June, 1910. Mine was under lease and option to the Summit Copper Co., for 17 months, at $442,375, but reverted to owners, Jan., 1912, and was again operated under lease by Sultan & Wayne until August, 1913.

Geology: country rock is Pinal schist and granite carrying 3 approximately parallel fissure veins, having a N. E. strike. The Summit and Pasquale are the principal veins, the former vein, of 4 to 7′ width, traceable for the entire length of the property, a distance of 1¼ miles. The Summit and Pasquale veins are about 250′ apart, the Intermediate vein about 75′ E. of the Pasquale. Ore occurs in the Summit and Pasquale veins in well-defined shoots, pitching 50 to 65° S. the lenticular form of these shoots being in some cases due to strike faulting and movements. Ore is mainly massive chalcopyrite, with a little bornite. Gangue is quartz with some calcite and small quantities of specular hematite and gypsum. Two veins show high-grade ore and some low-grade ore has been developed in 5 veins. The McKinley vein, undeveloped, shows a strong outcrop.

Development: to 500′ depth by shafts and tunnels with 26,000′ of work The Pasquale tunnel, driven on the Pasquale vein, is about 200′ below the collar of the incline shaft. The Reynolds tunnel is to intersect the vertical shaft at 1,800′ from the portal, at depth of 500′; the Toombs tunnel, 100′ vertically above and the Upper Toombs tunnel, 210′ above the Reynolds, are drifts on the Summit vein. Working shaft is an incline, 600′ deep, sunk on the Summit vein with 6 levels which show that the Summit vein runs N. 21° E., dips 56° N. W., and carries a seam of high-grade ore, the main pay streak carrying 8 to 15″ of chalcopyrite ore assaying 20 to 30% copper, throughout the various levels. The shaft has 5,915′ of workings on the Summit vein, besides drifts on the Pasquale and Intermediate vein, reached by crosscuts on the 3rd and 4th levels.

Development by the Summit Copper Co. was by a vertical 3-compartment shaft, sunk to a depth of 244′ by the Gibson Copper Co., and deepened by this company to 573′, this depth corresponding with the 7th level of the old incline shaft. About 4,000′ of new drifting and crosscutting, costing nearly $142,000, was done. The vertical shaft cuts the Pasquale vein at 165′, the Intermediate vein at 300′ and the Summit vein at 500′ depth.

The Pasquale vein differs from the Summit in that it cuts across the bedding of the schist, instead of following the bedding planes as does the Summit, having a strike of N. 20° E., with dip of 35 to 50°. Apparently the Pasquale vein is better defined, more continuous and stronger than the Summit, the fissure being of 5 to 10′ width, carrying a pay-streak, from a few inches to 3′ in width, of ore assaying up to 33% copper. Ore occurs in the Pasquale vein in shoots pitching to the south, similar to the ore occurrence of the Summit.

The Intermediate vein, with drifts of 225′ length on the 3rd and 4th levels, has a strike of 12° E., with dip of 5.° N. W., and is only about 8″ wide, with

firm walls and, as developed, is not of great importance, but has possibilities. The ground is heavy and treacherous, requiring timbering for practically every foot of drifting and concrete posts were used.

Ore reserves: estimated by new owners in 1918 at 469,000 tons of ore, containing 2.64% copper. This figure is in our opinion much too high as Messrs. Pritchett & Hamilton estimated the developed ore reserves, at the end of 1910, excluding all high-grade ore, and omitting probable ore between the 3rd and 4th levels on the Pasquale vein, as 33,011 tons of ore, averaging 4.36% copper, on the Summit vein; 17,062 tons of 3% copper ore in the Summit filling; 39,860 tons of 2% ore on the Summit dump and 8,578 tons of 6.51% copper ore developed in the Pasquale vein. The development by the Summit Copper Co. proved disappointing; irregular occurrence and insufficient tonnage failing to offset the high-grade ore extracted.

Equipment: at the incline shaft includes two 250 h. p. boilers, a 14x16" hoist and a 6-drill air compressor. The plant at the vertical shaft includes two 200 h. p. water-tube boilers, a 16x20" double-drum hoist, good for 1,000' depth and a 10-drill cross-compound air compressor, with a 132' smokestack of 42" diameter. The vertical shaft has pumps with a capacity of 192,000 gal. daily. A 200-ton mill started work in Aug., 1919.

Production: the gross value of ore produced by the Gibson Copper Co., 1906-09, has been estimated at $1,250,000. It was shipped to the Old Dominion smelter, a distance of about 18 miles, by 10-horse teams, and required careful selection, owing to the extremely high cost of transportation, returning better than 20% copper. 1917, produced 1,262,275 lb. copper, and 1918, 662,033 lb. Costs were high, as only 25% of the copper actually mined was sold. The low-grade ore will be treated when mill is operating, thus materially reducing costs.

GIBSON COPPER CO. **ARIZONA**

Fully described in Vol. XII of this book. Property sold May, 1917, to Gibson Cons. C. Co., which see.

GILA MONSTER MINING CO. **ARIZONA**

Address: W. H. Seamon, mgr., P. O. Box 561, Globe, Ariz.

Officers: W. E. Clark, pres.; Dr. J. L. Adams, v. p. Dr. J. Q. Grave, sec.-treas., with O. O. Clark, directors. Transfer office, Monroe, La.

Inc. 1917 in Arizona. **Cap.,** $1,000,000; $10 par; 40,000 outstanding.

Property: 16 claims, 300 acres, in Richmond Basin, 9 miles from Globe. Said to show a NE-SW contact vein between diorite and diabase, the ore running 40 oz. silver and 1% copper.

Development: by shaft and tunnel to a depth of 800' and 3,000' of workings.

Equipment: 40 ton cyanide plant. No production reported and believed to be idle.

GLOBE BULLION MINING CO. **ARIZONA**

Address: Globe, Ariz.

Inc. by P. J. Minck of New York, W. Buckland and G. B. Pert of Globe. H. Heidemann, supt.

Property: south of Miami, shows gold-bearing ore. Press reports stated that the company's slogan was, "Pick your own samples and the company will pay for the assay." Caveat emptor. Mail returned unclaimed. Presumably idle.

GLOBE DOMINION COPPER CO. **ARIZONA**

Office. P. O. Box 432, Globe, Ariz.

Officers: H. W. Clark, pres.; M. S. Clarke, v. p.; T. A. Pascoe, treas.

Inc. in Arizona. **Cap.,** $1,500,000; $1 par; 1,213,108 outstanding.

Property: 25 claims, about 425 acres, in diabase area, 1 miles east of Globe, adjoining the Old Dominion on east and south, was originally worked for silver, lead and copper, found near the surface. Development has proven the existence of copper at depth and owners expect to encounter the extension of the Gladiator vein of the Old Dominion mine. Property was formerly known as the Copper and Silver Zone Mines, owned by W. R. Martin, El Paso, Texas.

Development: by the 103′ Clark and 108′ Faugh shafts on the Old Ironsides claim, from which ore shipped has returned 1.25 to 3.5% copper, $19 to $236 silver, or an average of $21.60 per ton. Shipments from development work near surface said to have been worth $16,000. Present company has sunk the shaft to 800 level. Crosscuts to north and south have cut 7 veins, not explored on account of lack of funds. Property was reported on by Sydney H. Ball for Luke, Banks & Weeks, of 14 Wall St., who are reported to be financing it.

Reported idle March, 1919.

GLOBE & LOST GULCH SILVER-COPPER MINES CO. ARIZONA

Office: 1549 Logan St., Denver, Colo. Mine in Lost Gulch, Gila county, Ariz. Mary E. Brooke, pres. and gen. mgr.; H. A. Wimbush, sec.

Inc. April 1, 1907, in Arizona. **Cap.,** $1,000,000; $1 par.

Property: 10 claims, patented, 180 acres, and other locations; also a mill site at the head of Lost Gulch, 1½ miles N. of Inspiration and Miami, Ariz., showing quartzite, granite and limestone, cut by porphyritic dikes.

Development: shows silver-lead ore in diabase, with indications that copper ore will come in at depth; also shows silver-chloride ore in granite and limestone, and copper carbonate ore in dacite. Presumably idle, mail returned unclaimed, March, 1918.

GLOBE-MIAMI COPPER CO. ARIZONA

Address: D. F. Beggs, pres., 286 Fifth Ave., New York.

Officers: Victor Gilsey, sec.-treas., with F. W. Geiler, J. F. Daley, E. R. Terry, directors.

Inc. 1917 in Delaware. **Cap.,** 200,000 shares; $1 par.

Property: 21 claims near Inspiration and Black Warrior ground in Globe-Miami district, Ariz., upon which $200,000 is said to have been spent in development and purchase. Some gold ore has been extracted.

All the literature available on the property is from a brokerage house in New York. It is so profuse and tells so much about other properties and so few facts about this, that it is suspicious. The property may have a future, but it must be heavily burdened with too many metals, since the literature states there are copper, gold, silver, lead, tungsten, and molybdenum deposits on the claims.

GLOBE MINING CO. ARIZONA

Globe, Gila Co., Ariz. Now the Moline & Arizona Copper Co., which see.

INSPIRATION CONSOLIDATED COPPER CO. ARIZONA

Office: 42 Broadway, New York. Mine at Miami, Ariz.

Officers: C. R. Kelley, pres.; W. D. Thornton and L. D. Ricketts, v. p.'s; Joseph W. Allen, sec.-treas.; Evan J. Dudley, asst. sec.; W. S. Harper, asst. treas.; T. H. Donahue, gen. mgr.; Wm. B. Thompson, Wm. D. Thornton, Jos. W. Allen, Edmund C. Converse, William E. Corey, Charles A. Corliss, L. D. Ricketts, William G. Rockefeller, John D. Ryan, Charles H. Sabin, C. R. Kelley, Wm. R. Wraith, B. B. Thayer and Albert H. Wiggin, directors. D. A. Welch, purch. agt. Guaranty Trust Co., New York, and Old Colony Trust Co., Boston, transfer agents; Bankers' Trust Co., New York, and National Shawmut Bank, Boston, registrars.

Inc. Dec. 18, 1911, in Maine. **Cap.,** $30,000,000; $20 par; issued and outstanding Dec. 31, 1918, 1,181,967 shares. All bonds have been retired. Annual meeting fourth Monday in April. Listed on New York and Boston Exchanges.

Comparative General Balance Sheet, years ending Dec. 31:

Assets—

	Prop. & Equip.	Supplies	Cop. on hand	Oth. Current	Total
1918.....	$26,355,613	$2,180,333	$2,978,099	$14,214,507	$45,728,556
1917.....	25,465,242	1,932,383	.....	17,229,047	44,626,672
1916.....	24,858,094	1,133,633	.....	15,792,586	41,784,314
1915.....	25,293,529	622,276	1,115,960	411,281	27,443,046
1914.....	22,166,764	439,880	.....	2,641,219	25,247,863

Liabilities—

	Capital Stock	Bonds	Current	Surplus	Reserves	Total
1918..	$23,639,340	.....	$5,489,095	$12,784,433	$3,815,689	$45,728,556
1917..	23,639,340	.....	4,678,484	14,011,005	2,297,843	44,626,672
1916..	23,639,340	.....*	4,182,003	12,681,501	1,281,469	41,784,314
1915..	18,419,500	6,544,500	1,878,983	600,062	.....	27,443,046
1914..	14,459,160	10,500,000	288,703	.....	.....	25,247,863

*All retired, 1917.

Comparative Income Account, years ending Dec. 31:

	1918	1917	1916
Copper sales	$17,516,323	$21,242,217	$33,496,343
Other income	290,063	177,144	.....
Receipts	$17,806,386	$21,419,361	$33,496,343
Expenses—Mining	$3,743,032	$2,933,877	$3,335,889
Reduction and Trans. Ore	4,673,143	3,702,224	4,590,398
Refng., Sellg. & Trans. Metal	2,323,404	1,716,352	2,459,345
Adm. and Fed. Taxes	1,065,743	1,236,176	(a)629,823
Depreciation	750,000	750,000	750,000
Copper on hand—beginning	.....	.....	1,101,399
Total	$12,555,322	$10,338,629	$12,866,854
Profit:	$5,251,064	$11,080,732	$20,629,489
Coper on hand—December 31	2,978,099	.....	.....
Total income	8,229,163	11,080,732	20,629,489
Dividends	9,455,736	9,751,227	8,548,051
Surplus	(b)1,226,573	1,329,505	12,081,438
Previous surplus	14,011,005	12,681,500	600,062
Profit and loss surplus	$12,784,432	$14,011,005	$12,681,500

(a) Includes $151,034 interest paid, (b) deficit.

Dividends: $5.25 in 1916; $8.25 in 1917; $8 in 1918; $6.50 in 1919; and $1.50 in 1920, payable January 20.

Net earning per share: $0.65 in 1915; $17.45 in 1916; $9.37 in 1917; $6.96 in 1918.

Company took over properties owned by the Inspiration Copper Co. and the Live Oak Development Co., paying for same in stock. In May, 1912, the mill and camp site of the Black Warrior copper mine was purchased from the Warrior Copper Co. for $175,000. Early in 1914 the property of the New Keystone Copper Co., lying between the Inspiration and Live Oak groups, 219 acres, was purchased for $795,940, payable in 39,797 shares of stock at $20 per share, 9 shares of New Keystone for 1 share Inspiration.

Property: the holdings of the company are as follows: mining lands, 1,870 acres; mill-site, tailing disposal, water supply, etc., total 4,216 acres, 8 to 10 miles W. of Globe, Ariz.

To provide a supply of oil, purchased jointly with the Anaconda Copper Company in 1918, 160 acres of oil land in Bakersfield district, California, organizing the Arizona Oil Company. **Cap.,** $2,500,000; shares, $100 par; issued 16,320 shares. Inspiration owns 50% of the stock issued at a cost of $794,668.

Geology: property carries about 1½ miles of the strike of a mineralized belt of Pinal schist, much crushed, altered and silicified by contact action, due to the intrusion of the great mass of granite forming the hills to the S. W., the shattering having allowed the free circulation of secondarily

enriching solutions. The oxidized zone shows carbonates, occasionally of commercial tenor, as in the Clipper tunnel, but ore occurs mainly in secondary form as disseminated chalcocite, forming an enriched zone of commercial ore of 50 to 575′ in thickness, estimated by the management to average 180′, with an average of 90 to 100′ of overburden, underlaid by a primary zone of cupriferous pyrite below commercial tenor. About 40% of the values occur in small fissures and veinlets and along the jointing planes and planes of schistosity, copper being mainly in the form of flakes and grains of chalcocite, the balance of about 60% of ore values being disseminated through the gangue of friable Pinal schist, with some quartz. The mineralization also extends into the granite-porphyry contact, about 10 to 15% of the ore developed in the Colorado orebody being in granite. The cupriferous schist is faulted, just east of the Woodson orebody, by the Bulldog fault zone, of about 300′ width.

The Live Oak group of 14 claims, 200 acres, is about 1½ miles W. of Miami, at the western end of the Maimi ore belt and separated from the Inspiration group by the New Keystone group. The geological conditions are similar to those of the Maimi belt generally, save that much of the surface is covered by leached white granite, showing brilliant, green-stained outcrops of far more attractive appearance than any other part of the belt. This granite is underlain by schists carrying the ore, but part of the orebody is in granite.

The mine was originally opened on a flat dipping vein, 5 to 12′ thick, carrying high-grade chrysocolla ore, from which shipments running 17 and 18% were made for several years. Much of this material was quartzose and valuable as a gemstone. The vein ended at water level in a mass of low-grade chalcocite ore similar to that of the Miami mine. Orebody was developed by tunnel work and drilling by the Live Oak Development Co. by over 50 drill-holes with 20,000′ of drilling and 5,000′ of underground work. This work blocked out a body of disseminated ore 1,400′ long, 75 to 200′ deep beneath a capping of oxidized material averaging 435′ thick. The orebody as developed averaged 114′ thick and contained 15,000,000 tons of 2.11% copper ore.

The New Keystone Group has about 60 acres underlain by Pinal schist, covered in part by a sheet of granite porphyry, 25′ to 200′ thick. A strong fisure vein crossing the property was mined by the old Keystone Copper Co., the vein being 12′ thick with a paystreak averaging 15″, from which shipments of 19 to 22% copper and 2 to 5 oz. silver per ton were made for some years. Mine yielded, according to report, about $1,000,000. The New Keystone Copper Co. explored and opened up a deposit of disseminated glance ore similar to that of the Miami mine.

Development: by the new company consisted in blocking out this orebody by underground workings and churn drilling. The Keystone shaft is 330′ deep and at the time the company was absorbed by the Inspiration Cons. Copper Co., had a total of 14,886′ of workings. Churn drilling along 200′ squares was discontinued June, 1912, after company had put down a number of holes with an aggregate of 21,947′ of work. Development blocked out 2,516,000 tons of ore, which sampling showed to have an average of 2.25% copper.

Development under the present company has been of a dual nature, including both extensive underground openings, and churn-drill borings along the same general system as followed in the development of the Ray and Chino mines. Underground work in 1918 amounted to 14.88 miles; total workings to Dec. 31, totaled 127.85 miles, in addition to 29⅓ miles churn drilling. Stoping operations have destroyed 63.9 miles of workings to the end of 1918, so the present openings are 63.95 miles.

The Inspiration orebody is being worked by 2 main tramming levels at 326′ and 450′ in depth respectively. The Live Oak orebody is accessible through the Live Oak shafts, but all ore is hauled through the main

haulage-tunnel, 6,600′ long, connecting with the bottom level of the Inspiration shafts.

Ore is mined by the so-called Ohio system, locally termed the "Finger Raise" system, undercutting and caving in blocks of about 70′ vertical dimension; the broken and caved ore is drawn off through a system of inclined raises delivering to the haulage-ways below; these raises have a sufficient number of branches immediately below the caved area to reduce the interval between the heads of the raises that tap the caved ore to a minimum of about 8′. The ore is carried in trains of 5-ton cars by air locomotives to the working shafts, where it is delivered to one set of double concrete bins underground holding 3,700 tons and hoisted to surface through 2 shafts, delivering to a bin of 2,000 tons capacity located between the shafts. Skip loading and hoisting is automatically controlled. Ore extraction is entirely confined to these 2 cement and steel-lined shafts, 585′ deep and 107′ apart, in Webster gulch, on the north side of the mountain, while men and supplies are lowered and water pumped at the Incline, or Supply shaft on the opposite, or Miami side of the mountain. The 2 shafts are operated from the same hoist house, but have entirely independent units, capable of handling 1,000 tons per hour. The total lift is 630′. The ore is hoisted in skips, passed through crushers and put in 25,000-ton storage bins. From these bins it is carried over the company's 1.6-mile railroad, with 3% grade, to the mill at the old Black Warrior townsite.

Ore extraction: 1916 was a complete operating year, mining confined almost entirely to the Inspiration ground. The output was 5,353,880 tons, averaging 1.548% copper. The greatest day's output was 21,289 tons. The average output of ore per shifts work was 17.46 tons. The area undercut was 18.4 acres. The cost of mining was 60.7c per ton.

From the time the ore is dumped from the chutes into the mine cars no manual labor is required, all operations being entirely mechanical.

The company owns its own railroad of 4½ miles standard-gauge track, connecting the mine with the mill and the mill with the smelter of the International Smelting Co.'s Miami plant, where concentrates are smelted.

The mine and mill are connected with both the U. S. Reclamation hydro-electric plant at Roosevelt and with the company's own steam plant, consisting of three 6,000 k. w. turbo-generator units.

Ore reserves:

	Jan. 1, 1916	Mined in 1916	Mined in 1917	Mined in 1918	Jan. 1, 1919
Tons.....	97,143,000	5,353,880	3,914,742	5,139,132	82,725,246
Copper.....	1.63%				

No attempt was made during 1918 to develop additional ore. There are about 20,000 tons of oxide ore, upon which experiments are being made by leaching, with encouraging results.

Equipment: the surface and underground plant is capable of handling 20,000 tons of ore daily. A feature at the main shafts is the electric automatic hoists; coarse-crushing station, ore bins, and tramway to mill. The treatment plant, designed by H. K. Burch, consists of 20 sections, each one with rated capacity of 900 tons per day, making a total of 18,000 tons per day.

The scheme of treatment, stated in general terms, is as follows: at the mine—crushing ore to 4″, maximum size in gyratory crushers, crushing this ore to 1½″ maximum size by Symons disc-crushers. At the mill—crushing product from the Symons disc-crushers in Marcy ball-mills to pass 48-mesh screen, treatment of this product in flotation machines with separation of flotation tailing into sand and slime. Sand is treated on concentration tables and the slime retreated in flotation machines. Concentrates are dewatered in the filter plant.

While plans were for a 7,500-ton mill to cover 8 acres, adoption of the flotation process has permitted doubling originally planned capacity within space of 3 acres. As a result of this compactness, elimination of elaborate classification and some crushing, the costs of the combined oil flotation and water concentration in 1916 were 50.385c per ton. Mill is equipped with Minerals Separation and Callow flotation machines, also one designed by Rudolf Gahl, formerly metallurgist. Coal tar is the chief component in the frothing mixture. The first unit of the mill went into operation June 29, 1915, the 18th in Feb., 1916, and the 20th a year later. The first ore was caved underground and actual mining started July 25, 1915.

By Aug., 1919, a 35-ton leaching plant had been erected to try this method of treatment on the carbonate and silicate ores.

Production.

	1918	1917	1916
Ore treated, tons	5,110,101	3,891,075	5,316,350
Average per day, tons	14,172	12,884.4	14,850
Mill feed, per cent copper	1.361	1.388	1.548
Tailings, per cent copper	0.380	0.355	0.397
Extraction, per cent	72.99	75.34	74.860
Concentrates, per cent copper	30.398	29.27	30.688
Water per ton ore, gallons	310	348	1,108
Steel balls, used per ton ore, lb.	1.82	1.82	1.760
Flotation oil, used per ton ore, lb. (coal tar 1.2 lb.)	1.35	1.32	1.287
Cost per ton milling, cents	.....	.....	50.385
Refined copper for years, lb.	98,540,041	80,566,982	120,772,637
Cost per lb. of copper, cents	11.259	10.439	8.673
Cost per ton of ore	.....	.....	$1.948

In 1917, production was decreased by the I. W. W. strike which caused a shut down of the property early in July. Work was resumed in the mill Sept. 1, but production was slow in returning to normal. For 12 months of 1919 the output was 77,500,000 lbs., about 60% of capacity.

A profit of $20,629,489 for the first complete year's work gives a good idea of future possibilities, although sales of copper realized over 25c per lb., against an average of about 15c over a period of normal years. Even at the latter figure, and costs at 11¼c per lb., profits should be made on the normal output, which is at the rate of 10,000,000 lb. monthly. The cost of copper for 1918 increased only 0.82c over the 1917 cost, while operating costs of most mining companies almost doubled. The company has not added to its ore reserves for two years, but they are sufficient to maintain normal operations for 17 years.

Opinion: Company is exceptionally well managed and shares are an excellent investment at current 1919 prices.

INSPIRATION EXTENSION COPPER CO. **ARIZONA**

Address: F. O. Augustin, 433 Broome St., New York City. Wm. H. Correa, pres.; A. L. Rosengarten, v. p.

Inc. Feb. 11, 1913, in Delaware. **Cap.,** $1,000,000, increased to $1,500,000 in 1915; $5 par; all issued. Annual meeting February 11th. Company's holdings are under bond and lease to the Castle Dome Development Co., 100 Broadway, New York, which owns 97% of this company's stock, 1919.

Property: 95 acres, patented, in the Miami district, partially surrounded by claims of the Inspiration Cons. Copper Co., underlain by schist, locally altered, said to show a deposit of low-grade copper ore. Also 29 claims, unpatented, about 500 acres, on Porphyry Mountain, about 5 miles W. of the first group and adjoining the Continental mine of the Old Dominion Copper Co. This group shows disseminated ore in granite, said to be enriched near an intrusion of diabase. Development to date consists principally of tunnels, all above water level.

Development: of the Miami tract includes a 500′ shaft disclosing primary sulphides.

Equipment: includes a 35 h. p. gasoline hoist good for 500′, with various buildings. Extensive drilling of ground planned for 1919.

INSPIRATION-MIAMI COPPER CO. **ARIZONA**

Addresses: care Mr. Birger Lie, 141 Broadway, New York City, or 611 Delta Bldg., Los Angeles, Calif. Mine address: Geo. W. Danehy, mgr., P. O. Box 759, Miami, Ariz.

Property: several detached groups of claims, mostly 4 miles north of Miami, includes (1) Pat Sullivan group comprising the Lookout claims No. 1 to 15; (2) McGinnis group, 16 claims, and 2 Sullivan claims; (3) Sutton group of 4 claims; (4) seven fractional claims lying immediately north of the main shaft of the Inspiration Copper Co. and the Warrior shaft. Also (5) 2 groups of claims near the Louis d'Or Mining Company's drill holes.

Claims said to cover an area of monzonite porphyry, 2,000′ to 4,000′ wide, lying between schist to the southeast and diabase on the N. W.

A shaft 140′ deep is said to be in mineralized granite averaging 1.25% copper.

Examined by S. T. Godbe, E. M. of Los Angeles.

INSPIRATION MIAMI EXTENSION COPPER CO. **ARIZONA**

Address: Birger Lie, 141 Broadway, New York City and 611 Delta Bldg., Los Angeles, Calif.

Property: 5 patented claims 4 miles north of Miami said to show bornite ore, in 65′ shaft. The tract covers part of a monzonite zone 2,000′ to 4,000′ wide, with diabase on one side and schist on the other.

INSPIRATION NEEDLES COPPER CO. **ARIZONA**

Office: P. O. Box 1056, Miami, Ariz.

Officers: D. R. Williamson, pres.; Wm. Phillips, v. p.; F. W. Hamm, sec.; A. D. Williamson, treas., with Geo. J. Stoneman, directors.

Inc. Jan. 4, 1912, in Ariz. **Cap.,** $2,000,000; $1 par; issued 1,465,213. Security Transfer & Registrar Co., New York, transfer agent and registrar. Listed on Boston and New York Curbs. Annual meeting first Monday in February.

Property: 42 claims, 740 acres, 3 miles from Miami, Ariz., adjoins Southwestern Miami on the W., lies 1 mile S. W. of Inspiration Cons. property. Surface shows Gila conglomerate, Pinal schist and Schultze granite formation.

Development: the result of assessment work, consists of a number of shafts, none over 100′ in depth, and tunnels, none over 200′ in length.

August, 1916, two churn-drills operating at holes No. 1, 1,000′ deep, and No. 2, 551′ deep. Both holes were in Pinal schist, the last 100′ of No. 1 was in leached schist, showing small amounts of native copper.

Examined by J. H. Dockweiler (Crocker Bldg., San Francisco, Calif.) in June, 1916.

Hoping to resume drilling, stopped Feb., 1917, on account of fuel shortage.

IRON CAP COPPER CO. **ARIZONA**

Office: 50 Congress St., Boston, Mass. Mine at Copper Hill, Gila county, Ariz.

Officers: Frank P. Knight, pres.; J. Judson Dean, v. p.; R. H. Knight, sec.-treas.; F. A. Woodward, supt.; with Alvin T. Baldwin, directors; David Cole, cons. erect. engr.

Inc. Feb. 7, 1911, in Maine. **Cap.,** $2,000,000; $10 par; 50,000 preferred and 150,000 common. 146,079 outstanding. Stock listed on Boston Curb. Annual meeting, third Tuesday in March.

Bonds: $500,000, 8%, 20-year, dated Oct. 1, 1918. State Street Trust Co., trustee and transfer agent. Federal Trust Co., registrar.

Dividends: 25c monthly during 1918, with 50c extra June 29; total to Feb. 15, 1920, $6.45 per share on common: $1.22½ on preferred.

While plans were for a 7,500-ton mill to cover 8 acres, adoption of the flotation process has permitted doubling originally planned capacity within space of 3 acres. As a result of this compactness, elimination of elaborate classification and some crushing, the costs of the combined oil flotation and water concentration in 1916 were 50.385c per ton. Mill is equipped with Minerals Separation and Callow flotation machines, also one designed by Rudolf Gahl, formerly metallurgist. Coal tar is the chief component in the frothing mixture. The first unit of the mill went into operation June 29, 1915, the 18th in Feb., 1916, and the 20th a year later. The first ore was caved underground and actual mining started July 25, 1915.

By Aug., 1919, a 35-ton leaching plant had been erected to try this method of treatment on the carbonate and silicate ores.

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Cost per ton of ore	.....	.....	$1.948

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Equipment: includes a 35 h. p. gasoline hoist good for 500′, with various buildings. Extensive drilling of ground planned for 1919.

INSPIRATION-MIAMI COPPER CO. **ARIZONA**

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A shaft 140′ deep is said to be in mineralized granite averaging 1.25% copper.

Examined by S. T. Godbe, E. M. of Los Angeles.

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Examined by J. H. Dockweiler (Crocker Bldg., San Francisco, Calif.) in June, 1916.

Hoping to resume drilling, stopped Feb., 1917, on account of fuel shortage.

IRON CAP COPPER CO. **ARIZONA**

Office: 50 Congress St., Boston, Mass. Mine at Copper Hill, Gila county, Ariz.

Officers: Frank P. Knight, pres.; J. Judson Dean, v. p.; R. H. Knight, sec.-treas.; F. A. Woodward, supt.; with Alvin T. Baldwin, directors; David Cole, cons. erect. engr.

Inc. Feb. 7, 1911, in Maine. **Cap.**, $2,000,000; $10 par; 50,000 preferred and 150,000 common. 146,079 outstanding. Stock listed on Boston Curb. Annual meeting, third Tuesday in March.

Bonds: $500,000, 8%, 20-year, dated Oct. 1, 1918. State Street Trust Co., trustee and transfer agent. Federal Trust Co., registrar.

Dividends: 25c monthly during 1918, with 50c extra June 29; total to Feb. 15, 1920, $6.45 per share on common: $1.22½ on preferred.

Company reports for year ended Dec. 31, 1918. surplus, $334,170; cash accounts receivable stocks and bonds total $835,404. No debts save outstanding bonds.

Property: the Iron Cap and Bird groups at Globe, 20 patented claims, dividing two Arizona Commercial groups and adjoining the Old Dominion property. Also 7 claims in Lone Star district, Arizona.

Geology: claims show shale and quartzite cut by diorite at depth, traversed by a fissure vein running N. E. and S. W., and dipping at 70°.

Development: by 1,181′ Williams shaft, with levels at 660′, 765′, 868′, 968′ and 1,068′. Vein is opened for about 1,000′ in length. The Iron Cap shaft is 1,126′ deep, with levels at 800′, 920′, 1,020′ and 1,120′. Vein is opened for about 1,400′ from that shaft. Reserves include over 300,000 tons of 4½% milling ore.

Litigation: in Feb., 1919, the Arizona Commercial Mining Co. brought 2 two suits against the Iron Cap (1) alleging wrongful extraction of ore, and (2) for a share of pumping expense. This was brought in the State of Massachusetts, but in September, the Supreme Court of that State refused to hear the charges, on the plea of Iron Cap, and directed that they be heard by a court in Arizona. Arizona Commercial immediately brought suit again under Massachusetts laws to be tried by court and jury, and also brought suit in the courts of Maine asking an injunction against Iron Cap from disposing of any of its assets until a settlement was made.

Equipment: 2 double-drum hoists, 2,200 cu. ft. and 3,600 cu. ft. air-compressors, and and 750 h. p. boiler plant, power-line to the Inspiration Cons. plant, 600-ton concentrator being built, crushing plant, etc.

Production: during 1918, shipped 57,291 tons of smelting ore to custom smelters, 27,399 tons concentrating ore to Old Dominion mill. Production was 9,441,000 lb. copper, and 153,585 oz. silver. In Aug., 1919, the output was 83 cars of ore, returning $65,479, of which $26,479 was profit. In September, ore was started to the Inspiration mill at the rate of 200 tons daily. In October, mine produced 660,600 lb. copper and 10,300 oz. silver, with a net profit of $55,631.

Smelting ore contains from 1 to 6 oz. silver, 4 to 11% copper. Concentrating ore runs from 0.5 to 0.7 oz. silver, with about 3% copper.

The future of this property appears to be good.

LECORA COPPER CO. **ARIZONA**

Idle. **Office:** 500 Lonsdale Bldg., Duluth, Minn. **Mine office:** Globe, Gila county, Ariz. David Fairchild, treas. The Cordova Copper Co., the old company, was taken over by its creditors and renamed.

Property: 21 claims, aggregating 270 acres, north of the Old Dominion mine and west of the Arizona Commercial.

Development: by the 1,225′ three-compartment Gem shaft with extensive crosscuts on the 1,100′ and 1,200′ levels, cutting the Gem and Future veins, which have shown a little ore occasionally, but nothing of commercial size.

Shipments made from a vein 5 to 8′ wide on the 1,200′ level, averaged 3.35% copper, 33% iron, 35% sulphur, with $1.30 in gold and silver.

Equipment: includes hoist and 12-drill air compressor. Management has struggled faithfully to make a mine, both east and west of Globe. No. recent information received.

LOUIS d'OR GOLD MINING CO. **ARIZONA**

Reorganized 1916 as Louis d'Or Mng. & Mlg. Co., which see.

LOUIS d'OR MINING & MILLING CO. **ARIZONA**

Is a reorganization of the Louis d'Or Gold Mining Co., which company was practically a reconstruction of the Lost Gulch United Mines Co. Controlled by Baldwin Syndicate.

Address: P. O. Box 995, Miami, Ariz. **Office:** 732 Monadnock Block, Chicago, Ill.

Officers. L. W. Whitmer, pres.; G. M. Eggleston, v. p.; G. O. Swarts, sec.; G. P. Baldwin, treas.; with Theo. A. Steller, Chas. E. Hart (supt.), O. M. Gale and J. W. Bennett, directors.

Inc. Nov. 29, 1916, in Ariz. **Cap.**, $3,000,000; $1 par; 1,168,195 issued. Assets, May, 1917, $35,000. Annual meeting 2nd Monday in December.

Property: 17 claims, partly fractional, 292 acres, in 2 contiguous groups, about 2 miles north of the mouth of Lost Gulch, and 3 miles from a railway. Claims show monzonite-porphyry, diorite and granite, carrying 4 fissure veins, of which 3, of 4′ estimated average width, are more or less developed, the mines as a whole having about 8,500′ of workings, mostly on the Badger and Bonanza claims.

The **Badger** mine has a vein of 3 to 6′ width, developed by a 145′ shaft, somewhat wet, carrying ore said to average about $7 per ton in values, with occasional shoots of $17 to $30 per ton, and a 400′ tunnel showing a vein of 3 to 6′ width, averaging about $7 per ton. Equipment includes a 15 h. p. gasoline hoist, good for 400′ depth.

The **Bonanza** mine has a 1,050′ tunnel. The **Cedar Tree** mine carries mainly argentiferous and auriferous galena, with a little copper and zinc. The Tiger or main vein is entirely auriferous, is developed by a 350′ tunnel to 110′, and is said to carry values of from $3 to $90 per ton. All ores are sulphide.

Shipments: of surface ore averaged 6 oz. silver and 1 oz. gold, with lead and silver. Development by winze sunk from the tunnel on the vein.

Equipment: the mill, of wood, completed Feb., 1910, has 10 stamps, a 6x10″ Gates crusher, 2 Wilfley tables, 2 Frue vanners and a Pierce amalgamator; power equipment includes two 80 h. p. water-tube boilers and a 150 h. p. Corliss engine, 40 h. p. steam plant and compressor, installed 1915.

Company is churn drilling 300 acres of adjoining ground 1½ miles north of the Inspiration Consolidated at Miami, and has contracted to settle for each 20 acres as they are drilled and according to conditions underground; monthly payments, however, being made on property.

Examination of the Louis d'Or in 1916 by Chas. E. Hart, led to above purchase, his report stating that the west side of the property was in "copper porphyry" with good surface indications of copper sulphides occurring at 500′ to 600′ in depth.

Churn and diamond-drilling has been under way for two years, putting down three holes, 660, 1,177, and 885′ deep, respectively. These are at the southwest, the northeast, and northwest ends of the property. A fourth hole was being drilled July, 1919, in the center of the northeastern section. On June 29, it was down 170′, showing a commercial ore from a depth of 35 feet.

The property has been a failure as a gold mine, but possibly has a chance of making good as a "porphyry copper."

MIAMI CONSOLIDATED MINES CO. **ARIZONA**

Mail returned unclaimed, June, 1919, from Miami and Globe, Ariz.

Office: 110 Nassau St., New York, and 1050 Old South Bldg., Boston, Mass.

Officers: J. S. Cook, pres.; J. A. Pinyan, J. H. Thomson, Theo. Phillips, G. J. Davis, Irva Linley, J. B. Kendall, A. E. Gilmore and E. G. Schulze, directors; J. H. Dockweiler, cons. engr.

Inc. 1916 in Arizona. **Cap.**, $2,500,000; shares $1 par; 1,336,000 issued. Security Transfer & Registrar Co., New York, registrar.

Property: about 1,200 acres S. of and adjoining Inspiration Consolidated, Southwestern Miami, and Inspiration Needles properties at Miami, Ariz. Originally held by 19 different owners. In 1915, prospectors shipped 272 tons of 2.6 to 5% copper ore, in 1916, 100 tons of rich ore, and previously 500 tons of 3 to 6% ore, all coming from two well-defined areas; north-central and southern. Prospectus was modest enough to inspire confidence.

Development: churn-drilling under way in 1918. No. 1 hole in May, 1917, was down about 1,000′ and is said to have passed through sulphide ore at 420′; No. 2 found sulphides at 585′, this ore understood to be an extension of the Live Oak orebody of the Inspiration Co. No. 3 hole reported to have struck chalcocite ore.

Property warrants further drilling to determine extent of orebody.

MIAMI COPPER CO. **ARIZONA**

Office: 61 Broadway, New York. **Mine office:** Miami, Gila county, Ariz.

Officers: Adolph Lewisohn, pres.; J. Parke Channing, v. p.; Sam A. Lewisohn, treas.; with J. H. Susmann, Wm. H. Nichols, Walter T. Rosen, S. S. Rosenstamm, E. H. Westlake, F. W. Estabrook, B. Hochschild and Theo. L. Herrmann, directors; Herman Cook, sec.; F. W. Maclennan, mgr.; F. W. Solomon, mill supt.; R. B. Yerxa, asst mill supt.; W. F. Williams, chief clerk; Arthur Stonham, auditor.

Inc. Nov. 30, 1907, in Delaware. **Cap.**, $3,000,000; shares $5 par; increased Nov., 1909, to $3,500,000, and again increased Aug., 1910, to $4,000,000; issued, $3,735,570. Of this last increase in capitalization, 60,000 shares were offered to stockholders at $18 per share. Of the issued stock, 300,000 shares were given, Nov., 1907, in payment for lands; 200,000 shares were issued April, 1908, at $5 per share; 100,000 shares were issued Aug., 1908, at $10 per share; 60,000 shares were issued Aug., 1910, at $18 per share, and of the balance, 88,236 shares were set aside for conversion of bonds, and 52,886 shares remain unissued. Debentures, $1,500,000 first-mortgage 10-year 6% gold bonds have been retired.

The company is controlled, through stock ownership, by the General Development Co. Mechanics & Metals National Bank, New York, and Old Colony Trust Co., Boston, registrars; Bankers Trust Co., New York, and American Trust Co., Boston, transfer agts. Shares are listed on the New York and Boston Stock Exchanges. Annual meeting, third Wednesday in April.

Comparative General Balance Sheet:

Assets:

	Property & Equip.	Devel.	Metal on Hand	Other Current	Stock Invest.	Total
1918....	$25,207,559	$825,688	$2,897,773	$1,624,294	$5,103,920	$35,659,234
1917....	25,279,255	946,418	1,721,784	2,589,688	1,929,354	32,466,499
1916....	4,582,483	1,207,071	5,419,056	1,893,412	100,000	13,202,022
1915....	4,593,765	1,416,994	3,017,566	299,163	100,000	9,427,488
1914....	4,465,743	1,535,208	966,489	471,712	100,000	7,539,152

Liabilities:

	Capital Stock	Res. for Mine Depl.	Capital Surplus(a)	Acc'ts. Pay	P. & L. Acct.	Total
1918....	$3,735,570	$6,433,002	$18,672,204	$2,478,894	$4,338,564	$35,659,234
1917....	3,735,570	4,160,165	18,672,204	1,187,565	4,710,995	32,466,499
1916....	3,735,570	423,588	1,995,412	831,816	6,215,636	13,202,022
1915....	3,735,570	.....	1,995,412	521,161	3,175,345	9,427,488

(a) Premium on shares, less expense of issue.

Dividends: started in 1912, were paid regularly until Oct., 1914; resumed in May, 1915, at rate of 50c, and increased 25c each quarter since: $1.50 per share in 1912; $2.00 in 1913; $1.50 in 1914; $2.25 in 1915; $5.75 in 1916; $8.50 in 1917; $4.50 in 1918; $2.50 in 1919. Shareholders have received over $16,000,000 in the last 4 years. On February 16, 1920, 50c is payable.

Property: 222 acres, mining claims, patented, 555 acres held for the mill and power plant and 345 acres for water rights, in the Miami district, 6 miles west of Globe.

Geology: claims show an area of silicified schist at and near a contact with a great intrusive body of granite, known as Schultze granite. The altered schist belt averages about 1,200′ in width and has a generally E.-W. direction. The granite merges into granite porphyry at its borders, and this and offshoots, or dikes of the granite in the schist, are mineralized along the ore belt. This is seen in a dike with E.-W. strike, of 40 to 60′ width, mineralized in the same manner as the schist.

The schistose area is netted with contraction fractures and later fissureing due to metasomatic changes of volume, accompanying mineralization and alteration. The ore belt is marked by silicification and intense alteration of the schist, a change that fades out into natural gray schist a few hundred yards north of the Miami and Inspiration mines. The ore zone is oxidized and leached to an average depth of 210′, this part containing small seams and veinlets of oxidized ore. Below this leached belt a few feet of mixed ore is succeeded by the zone of disseminated glance, a rather soft, much altered rock, specked with tiny glance grains and films.

Mining methods: the mine contains two separate orebodies known as the Main and Captain. In the former, topslicing produces 3,000 tons per day; in the latter, which consists of lower-grade ore, a system of shrinkage stoping with undercutting and caving of the pillars is used. The production by this method is also approximately 3,000 tons per day.

In the topslicing methods, haulage levels are laid out 150′ apart vertically, with drifts spaced 50′ apart horizontally, and along these drifts, raises to the slicing levels are spaced 50′ apart. One sub-level 50′ above the haulage level is installed for the purpose of distributing air from the fans through the raises to the various slices. The slices are mined in blocks 250′ square and 10′ high. Each block is a unit in itself, being served by its own supply raise and manway. The extreme horizontal dimensions of this orebody are 1,000′x750′.

The Captain orebody is about 350′ thick with extreme horizontal dimensions of approximately 500′ square. This is developed by a haulage level below the orebody, and hand tramming levels at suitable vertical intervals above the haulage level in the orebody. The hand tramming level consists of drifts 25′ apart, with drawing off chutes spaced along them at intervals of 6¼′ apart on the alternate sides of the drifts, thus tapping the orebody at intervals of 12½′ apart in all directions. The ore is soft, and caving is induced by putting up narrow shrinkage stopes at right angles to the drawing off drifts, and subsequently caving the pillars between them by undercutting. The ore is drawn off from the chutes uniformly and trammed in 20 cu. ft. cars and dumped through raises to the haulage level, where it is transported to the shaft in trains made up of 30 cars of 3.3 tons capacity, by 6-ton electric trolley locomotives.

Development: by extensive underground operations, supplemented by churn drilling. Up to the end of 1918 drill holes of 640′ average depth had been drilled to the number of 117. Drill-holes were put down at the corners of 200′ squares. Drill borings in the vicinity of the mine have shown commercial ore to at least 115′ additional depth below the 720′ level of the mine.

The mine is operated through a 4-compartment shaft, with a main hoist capable of hauling 10,000 tons of ore per day, and an auxiliary hoist for hauling timber and supplies. These hoists are operated from their own boiler plant using oil as fuel. California crude oil is used for fuel for which storage capacity for 1,000,000 gals. is provided.

A new shaft, No. 5, similar in size to No. 4, the present main working shaft, has recently been sunk to a depth of 930′ so as to safeguard the continuous operation of the mine and to facilitate the segregation of the ore into two classes; it will also provide a haulage level and ore pocket for the deepest ore at present known to exist on the property. This shaft has been concreted.

Development: work in 1918 amounted to 14,872′, as compared with 25,476′ in 1917, and 42,118′ in 1916. Total amount of underground workings at close of 1916 amounted to 290,678′.

Ore reserves: Jan. 1, 1919, figured at 12,570,000 tons of 2.38% sulphide ore and 36,000,000 tons of 1.06% sulphide ore. In addition there are 6,000,000 tons partly developed mixed sulphide and oxide ore of an approximate grade of 2% copper. These figures are reliable, because of the unusually thorough manner in which the ore has been developed and blocked

out and the well-known conservatism of the management. A very large part of this ore is actually blocked out underground, and the estimated average percentage is based upon thousands of careful assays, made of samples taken at 5′ intervals, throughout the workings. It is probable that further development of the mine will develop more or less additional ore, possibly above what is considered the present payable limits.

Ore situation: at the beginning of 1916, the manager reported 18,140,000 tons of 2.4% ore. During the last three years there has been mined 5.616,000 tons of ore assaying slightly over 2% in copper. In 1918, the tonnage amounted to 2,134,520; at the 1918 rate of output there is a 6 years supply of ore, exclusive of the low grade sulphide, and the mixed sulphide and oxide ore, which is not much of an asset unless the company can make a high recovery, and at a smaller cost per ton, than now prevail. Granted an 80% recovery on the 1% ore, or, 16 lb. copper and 20c would give a gross value of $3.20 per ton, but in 1918 the cost of copper in concentrate on board cars at Miami was $2.417 per ton of ore. However, the company's technical staff may work out a method to treat this ore at a profit.

Power generation: the power house contains four 600 h. p. water tube boilers, one 530 h. p. water tube boiler, and two additional boilers, each of 610 h. p. capacity. The power house also contains two 4,000 cu. ft. steam-driven air compressors and three 1,000 k. w 4-cylinder triple expansion steam driven electric generators, and two independent steam driven condensers. The installation of two 4,000 k. w. steam turbo-generators, each with its individual condenser, has just been completed, so that the capacity of the power plant is 6,000 k. w. with one turbine and one reserve reciprocating engine.

The main shaft has 2 Nordberg hoists, the larger for raising ore havin 2 drums of 10′ diameter with 55″ face, capable of handling 1,000′ of 1⅜″ rope. An auxiliary hoist has 16x16″ cylinders with a drum of 8′ diameter and 6′ face for hoisting the man cage. The ore hoist raises two 7½-ton skips which are dumped directly into the pockets of the crusher building.

The crusher building, at No. 4 shaft, of 6.000 tons daily capacity, has Chalmers-Williams crushers, breaking ore to 1¼″ size, the product being fed through two 4x10′ trommels to four 62x18″ rolls that crush oversize to half-inch cubes. Ore then goes by belt conveyor, Miami type, heavy duty Traylor, to the mill bins.

In 1919, a new shaft-house, head frame, and 250 h. p. motor geared hoist was installed at No. 5 shaft.

The concentrator, originally designed by H. Kenyon Burch, with initial capacity of 2,000 tons daily, since increased by remodeling to 6,000 tons daily is on a hillside south of the ore deposit, permitting gravity handling, and with a large acreage nearby, available for tailings. The mill building is of steel and stands on concrete foundations and in interior construction steel and concrete are used almost exclusively.

Ore treatment: in the crusher building ore is reduced by gyratory crushers and rolls to pass a ¾″ hole, and is then delivered by belt conveyors, equipped with automatic weighing device, to bins behind the mill, with a total capacity of about 10,000 tons.

The mill proper is divided into six sections described as follows: from the bins, ore is carried by belt conveyor to an 8′x36″ Hardinge mill loaded with 4″ balls. The product of this mill passes to a Dorr classifier, where the finished product made up to this point is separated. The oversize from this classifier is divided between two 8′x30″ Hardinge mills loaded with 2″ balls, each operating in closed circuit with a Dorr classifier, and in these, the reduction of the entire feed to finished size (minus 48-mesh) is completed. The ore-pulp is then subjected to treatment by flotation in pneumatic flotation cells, which are a modification of the original Callow design. These cells are fitted with air bottoms covered with a porous

medium through which is admitted air for aeration of the pulp. The total area of air bottoms in one section is 539 sq. ft. Air is supplied by a Root's blower with a capacity of 5,000 cu. ft. of air per minute at 6-lb. pressure, driven by a 150 h. p. motor. After flotation, the sand contained in the flotation tailing is subjected to treatment on Deister sand and slime tables. Concentrates pass through tunnels to the concentrate handling plant. The original plant consisted of round tanks with filter bottoms subjected to vacuum, but this is no longer used, and concentrates are now prepared for shipment by filtering. This plant consists of four Dorr thickeners 60′ diam. by 12′ depth, from which the thickened product passes to three 12′ Oliver filters. From these the concentrates are delivered by belt conveyor direct to railroad cars.

The above description represents the latest flow-sheet adopted for the plant. Concentrates produced in the mill assay about 42% copper, and are being shipped to the International smelter at Miami.

Experiments on the treatment of the oxidized ore are being carried out a 100-ton test plant: results have been encouraging, though not definite.

Water supply for the mill comes from the Old Dominion mine at Globe, and from two 16″ wells equipped with centrifugal pumps, at the lower end of the Miami wash. Here is the main pumping plant, equipped with two Nordberg pumps of a capacity of 1,250 gal. per minute each. Water is delivered to the mill through a 14″ pipe to two steel storage tanks with a capacity of 500,000 gal. each.

Buildings include machine shop, warehouses, steel change house, store, boarding house, bunkhouse and upwards of 150 frame dwellings for employes, all lighted by electricity. There is a substantial office building, erected at a cost of $15,000, a club house and recreation hall, and a hospital owned jointly with the Inspiration Consolidated Copper Co.

Early in 1917 a Y. M. C. A. building was erected in the town of Miami at a cost of $85,000. This is operated by the Industrial Branch of the Y. M. C. A., and membership is open to all residents of the district.

Mine is served by an extension of the Arizona Eastern railroad from Globe to Miami.

Production: begun March, 1911—

	Tons	Oper. Cost p. Ton			%	%	% Cu. in	Lb. Cu. Rec. per	Net Prod.	Cost Cents	Selling Price
	Treated	Mine	Mill	Total	Cu.	Rec.	Cncts.	T. Ore	Lbs. Cu.(a)	per Lb.	Cents
1918....	2,132,941	$1.360	$0.722	$2.417	2.026	71.15	40.147	28.82	58,407,563	14.833	25.195
1917....	1,640,206	1.268	.691	2.284	2.032	69.25	43.040	28.15	43,863,699	12.51	29.150
1916....	1,842,017	1.119	.589	1,937	2.07	73.88	42.492	30.58	53,518,331	9.523	24.465
1915....	1,348,122	1,016	.579	1.878	2.17	75.17	41.91	32.66	41,832,059	8.765	17.331
1914....	1,096,633	1,188	.499	1.959	2.28	69.93	39.31	31.96	33,296,010	9.204	13.349
1913....	1,058,784	1.603	.572	2.465	2.30	71.06	38.09	32.68	32,867,666	10.609	15.240
1912....	1,040,744	1.203	.659	2.042	2.39	69.39	37.02	33.21	32,832,609	9.588	16.582
1911	445,036	1.213	.627	2.011	2.48	73.37	40.36	36.39	15,385,783	9.103	13.03

(a) Smelter returns.

The 1919 total was about 52,000,000 lb.

Production was lessened by the 1917 strike which started July 2; the property was closed down for seven weeks and after resuming work normal production was not reached until the end of the year. I. W. W. and Union recognition were the basic troubles.

In 1914 the Minerals Separation Co. brought suit against the company for infringement of patent, and in the final decision given in 1917 by the U. S. Circuit Court on appeal, Miami was declared to have infringed the M. S. patents. An accounting was in progress in 1919. It is said that the process now used is entirely different from that employed when the suit was started, yet in November, Minerals Separation had started further suit for alleged continued infringement.

The Miami is a property of demonstrated worth and the management is thoroughly experienced and capable. Company is particularly free in giving information concerning all operations.

MIAMI DEVELOPMENT CO. **ARIZONA**

Office: Miami, Ariz.

Incorporators: R. H. Granville, P. Kimburg, G. T. Coleman, C. P. Kelly.

Inc. May, 1918. **Cap.,** $1,000,000, 50c par.

Holdings unknown, and letters returned unclaimed, 1919.

MIAMI MERGER CO. **ARIZONA**

R. C. Ellwood, pres., Miami, Ariz.

Inc. 1916, in Arizona. **Cap.,** $2,500,000; $1 par.

Property: 1,350 acres of land "controlled" by the company. So far as we know, no work of any consequence was ever done on this property, promoters efforts being confined to selling worthless stock at high prices to the innocent speculator or investor. The market was created through the manipulations of Harry Lefkovitz, who also handled Miami Cons. Mines Co. and Inspiration Needles. Mr. Lefkovitz who has changed his name to Lefko, was arrested in Los Angeles, Dec., 1918, by the Federal authorities, put on trial, in New York and convicted Dec., 1919.

This company has been a rank fraud from start to finish.

MIAMI MINING & MILLING CO. **ARIZONA**

Address: Box 764, Globe, Ariz.

Officers: P. R. McDowell, pres.-treas.; N. W. Tanner, sec.-mgr.

Inc. in Ariz. **Cap.,** $1,000,000; $1 par.

Property: 50 acres in the Globe district, Pinal Mountains, is said to show 8 veins, containing gold, silver and lead.

Development: by crosscut tunnel.

Equipment: 50 h. p. air-compressor installed in 1918. The 250-ton mill of the Arizona Butte was purchased from W. J. Porter, of Globe, July, 1919.

A prospect, conservatively worked.

MIAMI MOTHER LODE MINING CO. **ARIZONA**

Address: Miami, Ariz.

Officers: W. Schafer, pres.; F. W. Solomon, v. p.; G. D. Barclay, sec.-treas., with A. Reid, E. Schafer, H. W. Faust and H. E. Gragge, directors.

Inc. in Arizona. **Cap.,** $5,000,000; shares 50c par.

Property: consolidated claims of Manitou and other companies, totaling 1,100 acres, in Miami district, Ariz.

Development: by 325′ shaft said to have cut 18″ vein on the 200′ level and disclosed several lenses of ore in other workings.

No recent returns, presumably idle.

MIAMI NEEDLES COPPER CO. **ARIZONA**

Idle and probably dead. **Last address:** Globe, Ariz.

Officers. D. R. Williamson, pres.; F. Beston, v. p.; F. W. Ham, sec.-treas., with Geo. J. Stoneman, directors.

Inc. 1912. **Cap.,** $500,000; $5 par.

Property: 11 claims on Needle mountain, about 5 miles west of Miami, slightly developed.

Is apparently succeeded by Inspiration Needles Copper Co., which see.

MOLINE & ARIZONA COPPER CO. **ARIZONA**

Formerly the Globe Mining Co.

Office: Moline, Ill. **Mine office:** Globe, Ariz.

Officers: B. F. Baker, pres.; F. J. Harper, v.-p.; P. J. McHugh, sec.; R. C. Schallberg, treas., with J. F. Heckman, F. B. Walker, G. A. Schallberg, directors.

Inc. 1918 in Arizona. **Cap.,** $2,000,000; $1 par; 860,000 outstanding.

Property: 21 claims, patented, 335 acres, 2½ miles north of Globe, shows granite-porphyry, syenite, quartzite and diorite, carrying fissure veins in diorite of 2 to 100′ width, with gossans giving assays of 2 to 6% copper, 4 to 30 oz. silver and $2 to $28 gold per ton. The Mineral Farm

group includes the Vacey-Constance mine, worked 1886 for silver, and said to have produced upwards of $100,000 worth of ore under former ownership, this group having upwards of 20 old pits and shafts, of 10 to 165′ depth. The Mineral Farm group shows altered sedimentary and igneous rocks, with iron dikes and a complex fissure system. The Mineral Farm vein, of about 4′ width, gives assays of 4.8% copper and up to 132 oz. silver and $7.44 gold per ton, and the group also shows a 20′ vein, said to sample 22% copper, 9% zinc, 2 oz. silver and $4.96 gold per ton, which seems excessive. Developed by 400′ vertical shaft, short tunnels, etc. The Eagle Pass group has a 215′ two-compartment shaft, between 2 iron outcrops.

Equipment: includes a 60 h. p. boiler 10″x14″ hoist and air compressor. There are 6 mine buildings. Examined by F. Tovote, J. T. 'Bickel.

NEW DOMINION COPPER CO. **ARIZONA**

Office: 25 Broad St., New York City. **Mine office:** Globe, Ariz.

Officers: E. W. Mitchell, pres.; P. M. King, v. p.; A. G. Bisgood, sec.-treas., with R. E. Vandruff, directors.

Inc. in Arizona. **Cap.,** $2,000,000; $1 par; 1,110,000 outstanding.

Property: 21 patented claims and fractions about 1½ miles from the Arizona and Eastern Railroad terminal at Globe, adjoins the Old Dominion property on the north and the Iron Cap and Big Johnnie to the south and east.

Geology: similar to that of the Old Dominion ground, where the principal oxidized ore is cuprite. The ore occurs in lodes or veins, as masses in limestone, and as an irregular mineralization of shattered rocks. Some sulphide ore has been found along a fault-vein on the 450′ level. The limestone area, according to the geologic map of the U. S. G. S., is much greater than that of the Superior and Boston, but slightly less than that of the Old Dominion. There are 9 veins showing on the surface. Although there is ore in paying quantities in the workings, no large orebody has been blocked-out, though surface ores show high silver value and copper up to 21%. The engineers report that big orebodies may be expected at 1,300′ in depth. The former operator shipped several carloads in 1916, averaging 8.31% copper.

History: several shallow shafts were sunk and considerable silver ore shipped in the early seventies and eighties. In 1906, the property was developed to the 800′ level by the Globe Consolidated, which was forced to shut-down by the panic of 1907, when the property reverted to the original owners. The New Dominion then bought the ground and has done considerable development.

Development: by 825′ shaft, with various levels. This is to be deepened to 1,400′, and crosscuts driven to explore the veins at that depth. Several thousand tons of commercial ore were mined from the two veins, cut on the 800′ level, the product going to the Old Dominion smelter. Company has no pumping expense, as the Old Dominion mine is working on the 1,800′ level, and drains the ground.

Equipment: includes a modern machine-shop, 400 h. p. steam plant, compressor, and all necessary machinery to do development planned for 1920. There are also several large houses for quartering the men.

NEW DOMINION MINES CO. **ARIZONA**

Idle and no record of recent operations available. Described in Vol. XIII.

NORTH DOMINION C. MNG. & DEV. CO. **ARIZONA**

Office: Hamil Bldg., Globe, Ariz. Mine at Radium Station, 3½ miles from Globe, Gila county., Ariz.

Officers: L. L. Lichtfield, pres.-act. treas.; A. Billard, v. p.-act. sec.; with Wm. Richards, W. H. Mercer and C. S. James, directors.

Inc. July 31, 1916, in Arizona. **Cap.,** $5,000,000; 2,750,000 issued.

Property: 42 claims, about 800 acres, mostly on the east side of Pinal creek, 3 miles north of Globe. The area is outside of the Globe district proper and is several miles from the producing mines of the Globe and Miami districts. Company claimed that it had spent $20,000 on development to Dec., 1917.

Geology: claims said to show diabase and diorite cut by a mother-lode and offshoots from it. This lode is reported to be 20 to 80′ wide and to carry oxidized ores of copper with some vanadium as well as silver and gold values.

Development: consists of 12 prospect shafts from 20 to 115′ deep and 6 crosscut tunnels, the total results of 12 years' work, according to company's prospectus.

A report by J. E. Hurd, states "there is not in the whole district a property capable of producing a greater quantity of ore rich in the metals, as the N. D. C. M. & S. Corp., which with careful management can be made to furnish work for several thousand people and to pay yearly very large dividends for a great number of years on the large and rich bodies of ore known to exist."

Such statements are not only humorous, but in our opinion are gross exaggerations and not warranted by the limited development work done to date.

Two carloads of ore reported to have averaged 8½ % copper in 1917.

Mail returned from Globe in 1919. In Aug., 1919, 36 claims of property were advertised for Sheriff's sale to cover a judgment of $2,405 obtained against company.

NORTHWEST INSPIRATION COPPER CO. ARIZONA

Address: A. H. Hammond, mgr., Miami, Ariz.

Officers. L. J. Overlock, pres.; C. E. Lucas, v. p.; A. H. Hammond, sec.-treas., with J. P. Glass, J. D. Houston and A. C. McKillop, directors.

Inc. Jan. 31, 1916, in Arizona. **Cap.,** $1,500,000; shares $1 par; non-assessable; 750,000 in escrow until 300,000 are sold.

Property: 23 claims, 483 acres, at Miami, Ariz., adjoining Inspiration Consolidated Copper Co. for about 4,500′ on the north, and less than half a claim from the Black Warrior mine on the west. Examined by Carl Triechka and A. H. Hammond.

Claims reported to show a deposit of disseminated copper ore in schist. At last accounts a shaft was being sunk 500′, to cut the Black Warrior and Black Copper veins at depth. No recent information. Presumably idle.

OLD DOMINION CO. ARIZONA

Office: 50 Congress St., Boston. **Mine and works office:** Globe, Gila county, Ariz.

Officers: Chas. S. Smtih, pres.; Walter Douglas, v. p.; with Cleveland H. Dodge, A. C. James, E. H. Ferry, and J. Waldo Smith, directors. Wm. M. Bradley, clerk; Chas. H. Altmiller, asst. clerk-treas.; John McNair, comptroller; W. G. McBride, gen. mgr.; I. H. Barkdall, mine supt.; H. H. Colley, smelter supt.

Inc. Jan. 15, 1904, in Maine. **Cap.,** $8,750,000; $25 par; $7,426,775 issued and fully paid. Annual meeting last Wednesday in March. Stock listed on Boston and New York Stock Exchanges.

Assets: 31st Dec., 1918, $20,298,550, including mines $13,019,253; plant and equipment, $3,966,961; supplies and prepaid expenses, $521,225; metals on hand, $2,345,841; accounts receivable, $177,569; cash and securities, $262,702.

Liabilities: include capital stock $7,426,775; accounts payable and taxes, $2,677,768; reserves for depletion, $3,116,161; reserves for depreciation, $2,990,044; surplus account, $4,087,801.

Comparative operating report shows:

	1918	1917
Sales copper, gold, silver	$5,731,082	$8,595,443
Miscellaneous earnings	.....	39,728
Total earnings	5,731,082	8,635,171
Cost copper, gold, silver, sold	4,441,178	6,084,371
Gen'l and admn. expenses	142,825	174,290
Operating profit	1,147,079	2,376,509
Depreciation	325,042	319,875
Depletion	304,195	263,852
State and Federal taxes	216,080	571,517
Net profits	301,762	1,221,265

Dividends: 50c in 1905 and 1906; $1 in 1907; 50c in 1908; $1.50 in 1909; 1910 and 1911; $14 in 1912; $5 in 1913; $4 in 1914; $5 in 1915; $12 in 1916; $8 in 1917; $4 in 1918; a total of $14,405,260. Quarterly dividend due in March, 1919, was indefinitely postponed on account of metal market conditions.

The company is carrying 5 months production of copper. Stockholders have always shared in its profits, the company maintaining a surplus sufficient only to provide comfortably for current requirements, so that the passing of the dividend at a time when copper was selling close to 15c per pound was a business like procedure on the part of the management.

The company was formerly a securities-holding corporation only, organized to promote the operations of the Old Dominion Copper Mining & Smelting Co. and United Globe Mines, but early in 1917 it acquired all the assets of the Old Dominion Copper M. & S. Co. of New Jersey, subject to its liabilities, paying $10,000,000 in cash, and also acquired all of the assets of the United Globe Mines, except one claim valued at $5,000, subject to its liabilities, at a valuation of $4,995,000. This company previously held about 96% of the capital stock of the N. J. company, and all of the capital stock of the U. G. Mines. By this purchase the Old Dominion C. M. & S. Co. and the U. G. mines were eliminated as separate operating organizations and the charter of the Old Dominion C. M. & S. Co. was surrendered. This merger eliminated duplication of office work and also double taxation on the same income.

Property: formerly owned by O. D. C. M. & S. Co., 38 mining claims and fractions, 5 millsite claims, and 4 placer mining claims, all patented; included in these is the Old Dominion mine at Globe; the Old Dominion and Keystone claims, 3½ miles north of Globe and the Continental mine at the head of Webster gulch, about 18 miles west of Globe; also the Chicago & New York group of 60 acres and the Geneva mine. The property formerly owned by United Globe Mines, consisted of 60 claims and 4 mill sites, lying west of the Old Dominion group, including the Grey Buckeye and Buffalo claims.

Geology: at the Old Dominion mine, the principal ore zone occurs along a big fault vein having a N.-E. strike with sharp easterly dip. The hanging wall is limestone and quartzite, with footwall of diabase of more recent age, faulting evidently occurring both before and after the intrusion of the diabase. The ore favors the hanging wall, but also occurs in lenses along the bedding planes of the limestone and in shattered quartzite, the largest lens yet developed being 60x100x200′ in size. The oxidized ores are mainly cuprite, associated with a little malachite and chrysocolla, in a gangue of iron oxides and quartz.

Sulphide ores first appear at a depth of about 350′, as chalcocite, with gangue of pyrite and quartz, the lower workings also showing chalcopyrite. All ores are more or less argentiferous, and, as a rule, are highly silicious, requiring heavy lime and iron fluxes in smelting.

Development: in 1918 totaled 22,163′ compared with 24,321′ in 1917. "A" shaft was sunk but 5′, but will be sunk to the 20th level as rapidly as possible. By August, 1919, it had been enlarged to 5 compartments between No. 18 and 19 levels, and its depth was 70′ below No. 19. Little work of importance was done above the 14th level; on the 1½ level near B shaft some small bodies of smelting ore were opened up. On the lower levels the greater part of the work was confined to the 16th, 17th and 18th levels east and the 17th and 18th levels west; the winze on the west side was sunk from the 18th to 20th level and a little drifting and crosscutting done on the 19th and 20th levels. Considerable work was done on the 18th level west but what ore was discovered was very irregular and did not extend far above the 18th level. The developments on the east side of the mine particularly on the 17th and 18th levels may be considered highly satisfactory, a feature of this lower east side development is the maintenance of good copper content in the ore. The fact that Arizona Commercial a little farther east has developed rich ore on its lower levels promises well for further work on the O. D. east side. Development of the U. G. ground is mainly through the workings of the Old Dominion. The Kingdon and the Grey are the operating shafts. Production from this property is included in that of the Old Dominion Co.

The production of copper from direct smelting ores has decreased very seriously during the last two years, due to a large extent to the disappointing developments in the smelting ore zone between the 18th and 16th levels west. Not only has the tonnage of smelting ore developed in that period been small, but the copper content of the ore has been below the average of that mined on the west side of the mine during the past six years. Of this much reduced smelting ore production in 1918 the greater part came from the 15th, 16th and 18th levels west. A small amount of ore was mined on the 9th, 10th, 11th and 12th levels, a small tonnage came from the 14th level and practically nothing from the 14th level west. In August, 1919, a crosscut from the A shaft on No. 18 level had passed through 12′ of 5% ore; this is considered to be an important development.

The east side produced most of the concentrating ore for the year. Only a small amount of ore was produced above the 12th level. The 14th level produced 20,000 tons. The 15th level was a small producer. The 16th level gave the largest ore production from any one level. The 17th level east produced a satisfactory tonnage of ore, practically all of which was of smelting grade, the vein here is wide and fairly regular. This level is counted upon as an important future producer. On the 18th level work was mainly development; this produced considerable ore.

No important changes have been made in mining methods and the heavy wet ground on the west side is still worked by square sets and filling, while the more solid ground on the east side of the mine is stoped by cut and fill without timber.

The "A" shaft, or main working shaft, on the eastern side of Pinal creek, in the west section of the mine, is connected with the principal workings by underground trolley lines, including a line to handle the ore of the Gladiator mine, which has yielded a notable quantity of smelting ore, and large quantities of concentrating ore. "A" shaft has 5 compartments, 2 equipped for skip hoisting, 2 with cages for lowering men and supplies, and 1 for air and steamlines, water columns and electric cables. Ore and waste, hoisted to surface, is handled in skips.

Pump shaft was lined with concrete from 10th level to surface in 1916.

Equipment at "A" shaft includes a steel engine house, built 1910, having a 17″x31″x48″ Nordberg compound hoist, good for 2,000′ depth.

"B" shaft, on the eastern side of Pinal creek, bottomed on the 14th level, has 4 compartments. "C" shaft has a 100,000 cu. ft. fan for ventilation, and is bottomed on the 14th level. "D" shaft, 300′ deep, is located on the western side of Pinal creek, about 2,000′ west of the most westerly pre-

vious workings. The "K" shaft, 1,400′ deep, also has a ventilating fan. The Transit shaft is about ⅛ mile east of "A." The Kingdon (1,200′) and Grey shafts, main working shafts of the United Globe Company, are connected with the 1,200′ level of the O. D. mine. The Grey shaft has a 75 h. p. electric hoist. Property has a number of smaller shafts and several tunnels, not in present use.

Pumping: the mine is very wet, the daily average amount of water pumped being 3,730,000 gal. in 1918. The company sells part of the water pumped to the Miami C. Co., but receipts from this source reimburse it only to a slight extent for the pumping expense.

The mine is equipped with pumps of about 20,000,000 gals. capacity daily, these including a 1,500-gal. pump on the 10th level, having a 12″ water column, discharging 30′ above the collar of the shaft into a launder on a trestle leading to a storage tank, whence water is drawn for use of the mill and smelter. There are 4 Nordberg steam pumps on the 12th level, having a rated capacity of 8,000,000 gals. per day, with 4 Gould electric pumps, 2 on the 10th and 2 on the 14th levels. On the 18th level there are two 1,200 gals. per minute quintuplex electric pumps. New centrifugal pumps were added, 1916, driven by power generated by a Diesel engine. An electrical centrifugal pump was added in 1918.

Early in 1916 drilling in Pinal creek proved the existence of a badly broken and porous area under the creek near the mine workings. Management has been grouting this ground with slime from the mill, thus reducing flood-water entering the mine from this point. Up to 1918 a total of 2,015′ of holes was drilled in the creek bed, and 23,000 tons of slimes run into this area through the holes.

Mill and smelter: the mine, mill and smelter are connected by a private railway, equipped with a locomotive and 50-ton ore cars.

A new crusher plant and sampling mill were erected in 1913. Capacity is 150 tons per hour. In 1914 a 600-ton concentrator, using a 300-ton flotation plant to extract copper from the slime, was completed. The old 300-ton concentration mill, erected 1909, will be maintained as a reserve for test purposes.

The smelter does custom work, and was formerly an extensive purchaser of sulphide ores for fluxing the oxidized ores of the Old Dominion and United Globe mines, but these mines developed large quantities of sulphides in the lower workings. In June, 1919, custom ore being smelted was from the Arizona Commercial.

The smelter has 8 double storage bins, holding 1,000 tons of coke, limestone and ore. Mixing, weighing and charging are done automatically, requiring a force of only 4 men. There are 5 blast-furnaces, 3 being 44″x198″ at the tuyeres, and the other 2 being 44″x231″, set tandem, with settlers between, charged automatically from side-dumping cars. The furnaces have a nominal capacity of about 2,400 tons daily, but on furnace is held on reserve. Fuel is New Mexico coke. The smelter is served by an electric locomotive and three 3,000-lb. tilting cars for charging, with a steam locomotive and dump-cars for slags.

In the converter department acid converting was abandoned in January, 1913, and one stand of the basic converter type has handled all of the production since that time. The basic converter has been particularly successful at the Old Dominion plant. A shell removed in 1915 from the stand had been there for 30 months without patching and had during that time produced over 70,000,000 lbs. of copper. Shells are handled by a 40-ton electric traveling crane. The converters take 50% matte, and turn out blister copper of 99.5% copper with small silver values.

The power plant at the smelter includes a 2,300 k. w. generator and two 750 k. w. generators, direct-connected to horizontal low-pressure steam turbines, utilizing exhaust steam. All machinery, except hoists and compressors, is actuated electrically. There is a 30-drill compound air com-

pressor, with intercooler and water-jacketed air cylinders, and a complete electric light plant; a 5,000 cu. ft. air compressor has also been installed. Furnace blast is supplied by Connersville blowers of 45,000 cu. ft. per minute aggregate capacity and an 18,000 cu. ft. air compressor furnishes converter blast. Fuel oil is used for the boilers.

Production: smelter production is larger than mine production because the smelter treats a considerable amount of custom ore.

	Tons Extr.	% Cu.	Tons Conc.	% Cu.	Tons Charge Smelt.	Costs per Ton Mng.	Conc.	Sm.	Lb. Fine Cu. Prod.	Cost p. Lb. Cts.	Rec'd p. Lb. Cts.
1919.....	267,450	....	.....	....	366,450	....	.....	.....	28,500,000	.....	.....
1918.....	230,451	4.52	226,998	3.90	165,028	*	.....	.....	33,378,158	*	25.01
1917.....	199,888	4.97	199,575	3.78	198,548	$8.08	$1.254	$3.134	32,365,795	.....	25.91
1916.....	152,059	5.88	254,213	3.89	271,367	6.48	1.14	2.79	40,776,611	11.69	26.81
1915.....	115,459	6.56	173,046	4.34	106,549	5.51	1.21	2.75	27,736,148	8.90	18.61
1914.....	129,813	7.44	151,893	4.67	207,595	5.20	0.93	2.67	30,210,361	8.22	13.71
1913.....	169,961	5.88	150,203	3.70	300,926	4.78	0.88	2.63	30,572,863	9.70	15.21
1912.....	201,181	4.67	166,870	3.77	306,086	4.55	0.75	2.36	27,353,243	10.34	16.42
1911.....	174,246	5.84	140,230	3.99	231,603	4.18	1.01	2.57	26,482,019	9.15	12.39

* Costs not published.

Production in 1918 included 5,071 oz. gold and 184,981 oz. silver, and 5,000 oz. and 127,000 oz., respectively, in 1919.

Monthly production compares as follows (in lbs.).

	1919	1918	1917	1916	1915
January	2,812,000	3,400,000	3,000,000	3,121,000	1,745,000
February	2,360,000	2,841,000	2,695,000	2,823,000	2,074,000
March	2,574,000	2,872,000	3,335,000	3,277,000	603,000
April	2,389,000	2,814,000	3,516,000	3,290,000	1,338,000
May	2,564,000	3,239,000	4,430,000	3,405,000	2,868,000
June	2,015,500	3,368,000	3,965,000	3,843,000	2,744,000
July	1,629,000	2,533,000	.....	3,852,000	3,199,000
August	1,937,000	2,064,500	888,000	3,600,000	2,843,000
September	2,460,000	2,292,000	2,270,000	3,011,000	2,538,000
October	2,365,000	2,373,000	1,623,000	3,200,000	2,970,000
November	2,261,400	2,101,000	2,844,000	3,650,000	2,443,000
December	2,534,000	2,686,000	3,368,000	3,270,000	2,495,000

Mine was closed down from July to September, 1917, owing to labor strikes.

Ore reserves in the Old Dominion property are usually sufficient for at least 2 years' production at the normal rate. It is not advisable to have reserves for a longer period than this as it is too expensive to keep the ground open. Ore has been found continuously and consecutively on all levels down to the 18th, 1,400′ level, and company has found no difficulty in opening ore as required. Indications are that production will increase in the future rather than decrease. Management is exceptionally capable and efficient.

OLD DOMINION EXTENSION COPPER CO. ARIZONA

Office: Globe, Ariz. Walter Harris, Maud Meeth, and E. S. Davis, incorporators.

Inc. April, 1917, in Arizona. **Cap.,** $1,000,000; $5 par. Company formed to acquire mines, ore, and do a general mining business. No recent information on hand.

OLD DOMINION EXTENSION MNG. DEV. CO. ARIZONA

Mail returned from former office, at Globe, and also from Miami, Ariz.

Officers: J. F. Chisholm, pres.; R. G. Thomas, v. p.; L. M. Greenstein, sec.-treas.; all of Miami, Ariz., with W. P. Geary, F. Gill and A. R. Malone, directors.

Inc. 1916 in Ariz. **Cap.,** $5,000,000; shares $5 par; 474,000 in treasury. 226,000 shares given for property were reported in escrow for an unstated length of time.

Property: 600 acres, adjoining and dovetailed into Old Dominion C. Co. ground, at Globe, Gila county. Diamond drilling was started, July, 1917, to cut the Sea-Bird vein at about 800′ in depth.

Development: by tunnels and several shafts, one 125′ deep, sunk in quartzite and entering limestone. A 200′ drift along the quartzite limestone displacement was reported to show several pockets of ore and an average sample of the black oxide of manganese found showed 13 oz. silver.

Is a prospect. Presumably idle.

OLD DOMINION COPPER & SMELTING CO. **ARIZONA**

Fully described in Vol. XIII. See Old Dominion Co.

PORPHYRY CONSOLIDATED COPPER CO. **ARIZONA**

Formerly Barney Copper Co. **Address:** Box 1419, Globe, Ariz.

Officers: J. D. Coplen, pres.; J. B. Coplen v. p.-gen. mgr.; K. W. Holbert sec.-asst. treas.; E. T. Wilder treas.-asst. sec., with Thomas Wight, directors.

Inc. 1919 in Arizona. **Cap.**, $5,000,000; $1 par; offered at 40c per share, October, 1919. On June 2, 1919, Barney shareholders decided to re-organize under the new name. Each share issued by the Barney was exchanged for 3½ shares in the Porphyry Consolidated, and each share of Porphyry Copper was exchanged for 1⅝ shares of Porphyry Consolidated.

Property: 35 claims, 454 acres in the Barney and 113 acres in the Porphyry, 3½ miles N. W. of Miami, Gila county, main shaft being 400′ from Inspiration Consolidated ground.

Development: Barney in Jan., 1912, an option on property was given to the General Development Co. for $600,000. This company put down 2 holes, one at the bottom of the 400′ shaft passed out of schist and into dacite and at 1,030′ into granite porphyry. This drill-hole encountered an artesian flow at 960′, which is a valuable asset of the company. The General Dev. Co. soon after relinquished its option. Drill-hole No. 2 was discontinued at 600′ without disclosing ore. The Barney Co. claims to have put down two holes, one of which passed through 20′ of ore, about 1.2% copper, before being lost. Second hole was also lost at depth of 640′ before striking ore.

Prophyry—a 775′ shaft is said to have passed through 60′ of carbonate and 85′ of chalcocite. Workings total 2,000′. A winze sunk 225′ below the 650′ level by Sept., 1919, said to have been in ore all the way. The Van Dyke shaft was then 300′ deep.

Equipment: pipe-line, telephone-line, and dwellings; 50 h. p. engine, hoist and compressor, etc.

Disseminated ore has been found, but its extent and average value is still to be determined. Is a promising, though embryonic "porphyry" copper.

PORPHYRY COPPER CO. **ARIZONA**

Absorbed by Porphyry Consolidated Copper Co., which see.

RADIUM MINES CO. **ARIZONA**

Address: W. H. Mercer, mgr., Globe, Ariz.

Property: 60 claims, 4 miles north of the Old Dominion mine, Globe, said to show vanadium ore in a vein or mineralized fault zone in diabase. The ore shows galena associated with iron oxide and manganese; vanadanite occurs as crystalline incrustations around other minerals, but has not yet been found in commercial quantities.

No recent information.

SOUTHWESTERN MIAMI DEVELOPMENT CO. **ARIZONA**

Office: 85 Devonshire St., Boston, Mass **Mine office:** Globe, Ariz.

Officers: Geo. F. Ruez, pres.; L. A. Thulin, sec.; W. S. Rooney, treas., with R. H. Gross, T. S. Dee, D. T. Kennedy, J. H. Blodgett and A. H. Moir, directors; F. W. Hoar, gen. mgr.

Inc. June 24, 1911, in Arizona. **Cap.**, $500,000, increased Feb., 1912, from $250,000; $5 par; issued 15,000 fully paid shares and 85,000 assessable shares;

$3.25 paid in. Assessment of $1 was called, payable July 9, 1919; previous assessment was 25c, payable Jan. 12, 1914. The first annual report, dated Dec. 31, 1912, gave receipts since organization as $276,084 and disbursements as $197,162 of which $65,944 was payments on options, leaving a balance of $78,922. Shares are listed on the Boston Curb. Boston Safe Deposit & Trust Co., registrar.

Property: 17 claims, 4 patented, adjoining the Inspiration Consolidated holdings, in the Miami district, 8 miles west of Globe, shows silicified schist, mineralized at and near the contact with granite-porphyry, the orebody being an extension of the porphyry deposit opened in the Inspiration and Miami properties. Ore occurs as chalcocite disseminated in schist.

Development: by churn drilling, along the same lines followed by its big neighbors, Miami and Inspiration. Eighteen holes have been drilled, averaging about 1,200′ deep and the total footage amounting to about 20,000. Ore developed is estimated at 3,000,000 tons of 1.25% copper. The company has been inactive for two years, being tied up in litigation to oust trespassers. In April, 1919, the company was given authority by the court to clear its property of all trespassers.

In addition to its mining property it acquired leases in 1919 on 800 acres oil lands in Northern Texas. It was to drill this land that the assessment was called; this will furnish $92,000; in addition there is $30,000 in the treasury. By October, drilling was soon to be started.

SUPERIOR & BOSTON COPPER CO. ARIZONA

Offices. 50 Congress St., Boston, Mass.; and Globe, Gila county, Ariz.

Officers: T. R. Drummond, pres.; John F. Barry, sec.-treas.; with J. B. Hardon, W. F. Fitzgerald and Garret Mott, directors. E. G. Deane, mgr.; C. W. Botsford, geologist.

Inc. Nov. 23, 1906, in Arizona. **Cap.,** $6,500,000; was originally $1,500,000, increased Sept. 5, 1908, to $2,000,000; April 22, 1909, to $2,500,000; July 25, 1911, to $3,000,000; Sept. 30, 1911, to present amount; shares $10 par; $3.50 paid in; issued 297,827. Company has levied 9 assessments, last one of $1 Aug., 1919. Listed on Boston Stock Exchange. State Street Trust Co., Boston, registrar; Boston Safe Deposit & Trust Co., transfer agent. Annual meeting first Monday in December.

Comparative Financial Statement: fiscal year ending Sept. 30—

	Ore Sales	Calls & Sundries	Balance Oct. 1 Prev.	Total	Total Expend.	Balance Oct. 1
1918.....	$246,158	$106,332	$141,577	$494,078	364,703	$129,374
1917.....	340,198	42,344	176,107	559,649	418,071	141,577
1916.....	40,501(a)	243,030	29,529	313,060	136,953	176,107
1915.....	54,530(b)	19,108	59,285	132,923	103,394	29,527
1914.....	291,515	1,720	75,268	368,503	309,218	59,285
1913.....	153,436	268,503	81,382	503,321	428,052	75,269

(a) Lessees produced $167,212 additional. (b) Lessees produced $42,164 additional.

Property: 51 claims, 785 acres, 28 claims, 388 acres, patented. The Globe & Arizona tract of 22 claims was bought for $320,000, an adjoining group of 21 claims was bought for $46,000, and the Collins-Doyle group of 5 claims was bought for $150,416.35, giving a total cost of $516,416.35 for lands. The Collins-Doyle group, added, 1909, adjoins the former holdings on the north, carrying the extension of the Old Dominion fault, and being well located with respect to the Great Eastern vein. The property is a compact tract next east of the Arizona Commercial, and east of the Old Dominion. Lands are about 4,200′ above sea level, and about 800′ above Pinal creek, at Globe. The property carries both limestone and iron ore for fluxes. It is reached by the Arizona Commercial and Arizona Eastern railways, both connecting with the main line at Globe.

In 1917 the Telfair group of 12 claims, 200 acres, adjoining the Superior & Boston, was acquired for $7,000 cash and 14,000 shares. The ground is valuable, as it is considered to have the extension of the Old Dominion vein.

Geology: the property shows diabase cutting through about 600′ of quartzite with interbedded shale and Globe limestone. Copper ore occurs in veins filling fault fissures. There are 2 dominant fault-belts, one series including from north to south, the Old Dominion, Great Eastern or Black Hawk, Limestone, Quo Vadis, Black Oxide and Iron King fault veins, intersected at nearly right angles, by other faults of later age, apparently but slightly mineralized. Three of the veins—Great Eastern, Limestone and Black Oxide have all produced considerable ore in the past. The upper portion of the Old Dominion vein has been faulted 200′ to 700′ to the N. and wherever opened, is barren of copper. The supposition is it has never been mineralized. Later development may show the Quo Vadis to be the faulted continuation of the Great Eastern; there is a possibility that both are merely the eastern extension of the Old Dominion vein. The average strike of the faults is N. 70° E., with average dip of 60° N.

Development: by 4 shafts, the McGaw, Great Eastern, Limestone and Gardner, and 1 tunnel. Underground workings total about 35,000′. New work during year ending Sept. 30, 1918, amounted to 1,904′. The Great Eastern 444′ vertical shaft being poorly located, was replaced by the McGaw shaft, to the north.

The McGaw shaft is 1,400′ deep, with 3 compartments. The 10th level opened at 970′ corresponds with the 10th level of the Arizona Commercial mine, next west. This shaft lies 900′ north of the old shaft and is sunk between the Old Dominion fault on the north and the Great Eastern vein on the south, and is planned to intersect the Great Eastern vein at depth. This is the main working shaft of the mine and does the ore hoisting for the entire property.

One of the main hindrances to mining in the past has been water, also the largest item of expense.

The Great Eastern vein on the 6th level in the McGaw shaft, showed an ore shoot 25′ to 30′ wide, proven for a distance of over 800′. The 8th level exposed this vein for over 400′ and also showed the zone of oxidation to continue to this depth. The 10th level discloses the first sulphide ore encountered in the McGaw workings of the mine, but the 12th level shows little or no copper in this vein, as far as developed. The vein matter is heavily stained with iron, highly silicious and, when commercial, carries about 7% copper.

The Old Dominion vein is tapped by crosscuts from the McGaw shaft, on the 4th, 6th and 10th levels, where it shows only oxidized material, quite thoroughly leached, carrying slight silver values, but with promise of copper ore at greater depth.

The 318′ Limestone shaft showed a 4′ footwall paystreak of commercial ore on the 300′ level; has not been operated for several years.

The Gardner 3-compartment vertical shaft at the southern end of the property, on the Black Oxide vein, is 435′ deep; mine is now idle. The Black Oxide vein apparently is a continuation of the Buckeye fault, on which the Old Dominion has opened mines on the Buckeye, Carrie and True Blue claims.

The 1,054′ Black Oxide tunnel has its portal about 1,000′ S. W. of the Limestone shaft, and cut the Black Oxide vein at 670′, giving a 400′ back drifts on this level showing a vein carrying micaceous hematite, with small quantities of copper, and a little shoot of smelting ore. Indications are favorable to the existence of good bodies of high-grade sulphide ore at greater depth. The Black Oxide is 280′ east of the True Blue mine of the Old Dominion, from which lessees shipped small quantities of high-grade ore for several years.

The Iron King vein, parallel with the other 4 faults of the property, shows a good gossan, and has an old 70′ shaft, in leached vein material similar to that in the other faults, at similar depth.

In 1918, exploration work was mainly in eastern part of mine on the 800′ and 1,000′ levels. Above the 800′ level a body of oxide ore was found, in places 20′ wide and assaying about 6% copper.

Equipment: includes hoists at each shaft, aggregating 1.260-h. p. The main plant, at the McGaw shaft, has four 250 h. p. water tube boilers, a 5-ton

hoist good for 1,600′, and a 1,200 cu. ft. cross-compound air compressor, with an auxiliary compressor at another shaft. The mine has three 1,000-gal. pumps.

The company owns numerous buildings, including well-equipped machine shop, smithy, carpenter shop, office, change house, and warehouse, with a number of dwellings for employees. Buildings are lighted by electricity. Fuel is mainly petroleum, with 5,000-gal. and 12,000-gal. storage tanks.

Production: was begun Feb., 1908, and to end of 1910 amounted to 27,126 tons ore, yielding 3,846,402 lb. copper and 94,698 oz. silver, all from the Great Eastern vein above the 6th level with the exception of about 681 tons extracted by lessees from the Black Oxide workings. Known ore reserves being exhausted, production was suspended Aug., 1910, to March, 1913, when shipments were again resumed, curtailed in 1914 and resumed March 15, 1915.

Output in the year ended Sept. 30, 1918, was 22,751 tons of ore assaying 3.88% copper and 4 oz. silver per ton, compared with 17,146 tons (assay not given) the previous year. Copper production totalled 1,676,446 lb. Cost of copper sold and delivered was 22.81c per lb., with average price received of 22.42c.

As a result of recent geologic examination by C. W. Botsford it appears that no effort had, up to 1919, been made to find the Old Dominion vein, the chief producer of the district, so it has been determined to locate the extension of the lower part of this vein, which lies somewhere under the Great Eastern vein, upon which all previous work had been done. This exploratory work will be done by diamond drilling from the 12th level. On the 8th level a crosscut is being driven south to cut the various veins and the 10th and 12th levels will be continued eastward. Good ore was opened in the 400′ footwall vein in Oct., 1919.

The company has made courageous efforts to make a mine and it is hoped that the new development work undertaken will open up the reserves of sulphide ore which have been sought for so long, for it is upon finding these that final success depends. Extensive development was very encouraging and continues throughout 1919. Costs have been lowered, and collection of long overdue assessments has helped out company's finances.

SUPERIOR & GLOBE COPPER CO. ARIZONA

Idle for several years. **Office:** 3 Calumet State Bank, Calumet, Mich.

Officers: John Daniell, pres.; Fred Smith, v.-p.; Chas. Chynoweth, sec.; Joseph W. Selden, treas., and Hon. Norman W. Haire, directors.

Inc. Dec., 1908, in Arizona. **Cap.**, $3,000,000; shares $10 par; issued $2,450,000, in 15,000 shares of full paid stock and 230,000 shares of stock $1 paid. Property is fully paid for; lands were bought for $75,000 cash and 15,000 shares of full paid stock. Listed on Boston Curb. First National Bank, Calumet, registrar. Annual meeting, third Monday in November.

Property: 13 claims, 250 acres, include the Magnet group of 12 claims, adjoining the Mineral Farm group of the Globe Mining Co., and 1 fractional claim, of several acres. The property, 2 miles N. E. of Globe, is in the eastern portion of the Globe district, lying N. of the Arizona & Michigan and N. E. of and adjoining the Globe Mining Co. and the Yuma mine of the Old Dominion, latter carrying the Yuma-Big Johnnie-O'Dougherty fault. The outcrop of the Yuma fault, on the Superior & Globe lands, shows an iron gossan carrying copper stains for about 3,000′.

Development: by several old shafts of 50 to 60′ depth, said to have been sunk for gold ore. Present owner has sunk 680′ vertical shaft in the hanging of the Yuma fault, on Copper Trust No. 2 claim, about ¾ mile from the Superior and Boston mine. The shaft cuts a 5′ vein carrying iron with copper stains and has about 1,100′ of workings on the 650′ level, the N. crosscut 522′ long showing 2 veins. The Yuma vein, cut at 235′ from the shaft, has 320′ of drifting, with an 85′ winze and a 17′ crosscut to the vein from the bottom of the winze. The vein shows merely iron and manganese, with copper stains and small silver contents. In the N. crosscut, 487′ from the shaft, a second vein was cut showing a width of 20′ and a 38′ drift thereon showed material similar to that in the other vein, neither carrying commercial values. The S. crosscut on the 650′ level was driven 233′ in hard diabase, developing nothing of value.

Diamond drilling was begun in June, 1910, a 350′ horizontal and a 957′ vertical hole being bored from the bottom of the shaft. This work was continued until early 1912, but developed nothing of importance.

Equipment: includes a 100 h. p. gasoline plant having a 60 h. p. hoist good for 1,000′ and a 3-drill gasoline air compressor. There are 5 buildings, including carpenter shop, engine house, office and dwelling.

UNITED GLOBE MINES **ARIZONA**

See Old Dominion Co.

VAN DYKE COPPER CO. **ARIZONA**

Address: E. R. Rice, mgr., Miami, Ariz.

Officers: C. W. Van Dyke, pres.; with H. A. Smith, mgr.; W. E. Loomis, Wm. E. Brooks, L. D. Van Dyke and C. B. Loomis, all of Miami, directors.

Inc. Aug., 1916, in Arizona. **Cap.,** $5,000,000; 50c. par.

Property: 1687 acres, 417 patented, adjoins Miami and Inspiration on S. E.

Development: drilling was started in fall of 1916 and owing to war conditions, was discontinued early in 1918. 2,500′ of drilling said to have disclosed 40′ of ore averaging 7% copper. In May, 1919, a 2-compartment shaft was started to develop this ore. On Sept. 1, shaft was down 310′. It will be sunk to 1,300′ before lateral work is started.

Equipment: includes 3-churn-drilling outfits, 25 h. p. hoist, and 10 by 10 air-compressor.

GRAHAM COUNTY.

ARIZONA SYNDICATE MINING & DEVELOPMENT CO. **ARIZONA**

Address: T. D. Derry, sec., Ray, Ariz.

Officers: E. Hunt, pres.; Ernest van de Vord, v. p.; L. E. Troxel, treas.; Thos. D. Derry, sec.

Inc. Jan., 1918, in Arizona. **Cap.,** $500,000; $1 par.

Reported to have a silver property near Geronimo, Graham county, and a manganese property in Coconino county, both being only prospects.

ATLAS COPPER CO. **ARIZONA**

Address: Safford, Graham county, Ariz.

Inc. 1917 in Arizona. **Cap.,** $1,000,000; $1 par. Is a reorganization of the San Juan Copper Co.

Property: the San Juan mines, 13 claims, 260 acres, in the Lone Star district, Graham county, 8 miles N. of Safford. Ore occurs in granitic porphyry traversing diorite and is said to average 3.6% copper, with gold and silver values. Developed by 330′ main shaft, 750′ of drifting, and 2,500′ of diamond drilling, and equipped with hoist, compressor, churn-drills, and pump.

Shipments in 1916 to Douglas and El Paso smelters said to have netted the company $50,000. No output during 1917 and 1918.

Property closed mid-1919, and company in bankruptcy.

COPPER REEF CONSOLIDATED MINES **ARIZONA**

Office: Wm. A. Griffith, sec., 1409 Park Bldg., Pittsburgh, Pa.

Inc. Feb. 19, 1910, in Arizona. **Cap.,** $5,000,000; $5 par; issued 632,000 shares. Union Trust Co., Pittsburgh, transfer agent. Annual meeting, first Monday in February.

Property: 125 claims, 2,800 acres, including 600-acre mill site, in the Stanley Butte district, Graham county, 12 miles S. W. of San Carlos, on the Arizona & Eastern Railroad from Bowie to Miami.

Claims are on the western slope of a high mountain ridge whose eastern face shows granite overlaid by 600′ of quartzite by limestone, while the western slope is plated with massively bedded gray limestone. On the claims the carboniferous rocks are cut by numerous fractures carrying small replacement bodies of silicious copper ore. The rocks dip down the slope at 35°, and most of the orebodies are either in gash veins or occur along fractures, conformable to the bedding. In the many older pits and shallow shafts, the narrow gash veins were not over 2′ wide and the ore pinched out at 20 to 30′ in depth.

Development: said to aggregate 1 mile, is mainly by main 1,600′ tunnel, but includes the 800′ North Star and 125′ Jessie shafts. The manager estimated in 1914, 80,000 tons developed by 3,600′ of work, which is a liberal estimate. Ores average about 5.4% copper and 68% silica, the copper being partly in the form of chalcopyrite and bornite, mixed with chrysocolla, malachite and azurite, etc. Management claimed average value of 8.65% copper with varying gold and silver up to $12 per ton.

Equipment: includes two 40 h. p. gasoline hoists, 4-drill air compressor and all necessary mine buildings.

Production: early in 1919, one shipment of 17 tons netted $1,050, and another of 30 tons netted $1,575. Ore awaiting shipment was valued at over $4,000.

Operations suspended end of 1915. Secretary wrote, March, 1916, that company is quite satisfied with its property and the existing conditions, and requested no publicity in the Handbook. Investors take notice.

Early in 1919, Kirby Thomas examined the property, reporting that the company had entered an orebody which will yield more than enough net cash to return every dollar of the $300,000 already invested by the company. There are also three other orebodies close by of the same general character and extent. In July, 1919, it was proposed to raise $30,000 for additional development, and bring mine to the producing stage.

GERONIMO MINING CO. ARIZONA

Address: Miami, Ariz.

Inc. in Arizona, 1916. **Cap.**, $3,000,000; $1 par.

Incorporators: N. C. Bandy, D. J. Shea and A. M. Cobb, of Miami. J. W. Sterling, cons. engr.; R. F. Fitzgerrells, gen. mgr.

Property: at Geronimo, Graham county. Churn-drilling for copper ore was started in 1916, one hole cutting 4½% ore at 85′.

This is one of the many companies launched during the boom in 1916.

Presumably idle.

GOLD BUTTES MINING & MILLING CO. ARIZONA

Jos. and Daniel Fraser, incorporators, Duncan, Ariz.

Inc. Dec., 1915, in Arizona, to operate the New Strike gold property, near Twin Peaks. Ore contains gold and is developed for 800′.

Believed to be idle.

GRAND REEF MINE ARIZONA

Address: R. V. Dey, owner, 28 W. 88th St., New York.

Property: 14 claims patented, in the Aravaipa district, Graham county.

Ore occurs in fissure veins between granite and porphyry, said to average 3½% copper, 24% lead, 12 oz. silver and $2.30 gold per ton. Developed by 7,500′ of workings in which superintendent estimates 175,000 tons of ore blocked out.

Equipment: includes steam hoist and 7-drill air compressor.

Property worked under lease by Laurel Canyon Mng. Co. in 1915-16 and shipped 1 to 2 cars of concentrates per week to El Paso smelter.

No recent returns.

HOME COPPER CO. ARIZONA

Address: Morenci, Graham county, Ariz.

Officers: H. J. Degener, pres.; W. A. Leonard, v. p.; W. P. Gee, sec.-treas.

Inc. April, 1901.

Property: 35 claims, 700 acres, in 2 groups, also a mill-site on Eagle river. Promoters were unable to inspire confidence and could not raise enough money to prospect the property sufficiently to prove if it has merit. Not a "wild cat," but a mistake. See Vol. XI, Copper Handbook.

INSPIRATION CENTRAL MINING CO. ARIZONA

Address: J. A. Karlson, Safford, Ariz.; and R. H. Dymond, Geronimo, Arizona.

Officers and directors: W. E. Tester, pres.; J. A. Karlson, v. p.; C. B. Yett, sec.-treas.

Inc. Sept. 28, 1916, in Arizona. **Cap.**, $1,000,000; 50c par; 800,000 issued. Annual meeting second Monday in February.

Property: 43 unpatented claims about 14 miles west of Geronimo, in the Turnbull and Santa Terressa Mountains, Black Rock district, Graham county.

Geology: vein occurs at contact of schist, porphyry, and limestone, dipping 85° S. Ore in streaks, is from 2 to 10′ wide, and contains copper carbonates and sulphides. Average assay is 10% copper, with silver and gold.

Development: by 250′ and 150′ tunnels. Workings total 500′ to depth of 400′. On Turnbull property a 20″ vein of high-grade copper-silver ore was reported in 1919. Reserves recently estimated as 7,000 tons, are now given as 100,000 tons, in a body blocked out by 500′ of workings. In June, 1919, of 2 lots of ore sent to smelter, one assayed 27% copper and 17 oz. silver, the other 7% copper and 4.3 oz. silver.

Expenses in 1916 amounted to $10,000 and $15,000 in 1918. Ore is hauled to Geronimo on the Arizona Eastern line, thence to smelters at Globe or Miami.

A prospect whose possibilities are being exaggerated.

LONE STAR CONSOLIDATED COPPER CO. ARIZONA

Officers: Hon. Wm. H. Powers, pres., 209 Washington St., Boston, Mass.; Henry H. Folsom, sec.; A. G. Smith, treas. Chas. B. Spaulding, supt., at last accounts.

Inc. Aug. 6, 1906, in Maine. **Cap.**, $5,000,000; shares $10 par, practically as successor of Maravilla Copper Co.

Company controls the Mineral Mountain Copper Co., through ownership of a two-thirds share interest, and controls, through majority stock ownership, the Chase Creek Copper Co.

Property: 32 claims, includes the Little Clara mine, developed by tunnel and shaft, and the Lone Star mine, in the Gila Mountains, 10 miles N. of Solomonville, having a 900′ shaft, said to show a 5′ vein of sulphide ore carrying 8 to 10% copper, with fair silver values and a little gold. The shaft also shows stringers of ore giving assays of 5 to 20% copper. Equipped with compressor and drills. Idle several years.

NEW YORK-ARIZONA GOLD & COPPER CO. ARIZONA

Address: Morenci, Graham Co., Ariz.

Officers: A. L. York, pres.; J. F. Cleaveland, v. p.; C. E. Tyler, sec.-treas.; John C. Molder, gen. mgr.; J. R. Wester, supt., at last accounts.

Inc. April 15, 1907, in Arizona. **Cap.**, $900,000; shares $1 par.

Property: 30 claims, unpatented, 600 acres, and a 150-acre mill site, 4 miles west of Morenci, in the Copper Mountain district. Includes the Buzzard Shadow and adjacent groups. Claims show quartzite, shale and limestone cut by porphyry, with contact deposits, having orebodies, more or less developed, said to range from 10″ to 4′ in width.

Development: by tunnels, 100′, 450′ and 600′ long and the Lillian tunnel, 1,800′, claimed to show a vein carrying several ore shoots. There are 5 shafts, including the 260′ Argentine shaft, said to show copper sulphides; the 80′ Louise shaft, reported to cut an 8″ vein showing ore assaying up to 15% copper, 180 oz. silver and $20 gold per ton, and the 72′ Jensen shaft near the Louise. The Buzzard Shadow group, at the eastern end of the property, shows a 2 to 4′ vein carrying auriferous and argentiferous copper ore.

Equipment: includes a 15 h. p. gasoline hoist, 4 Nissen stamps and a tube-mill.

Idle since 1917.

ARIZONA-CELTIC COPPER CO. ARIZONA

Out of business. Property formerly owned by the Arizona Morenci Copper Co. See Vol. XIII.

ARIZONA CONSOLIDATED COPPER MINES, LTD. ARIZONA

Office: H. S. Blake, sec., Throgmorton House, Copthall Ave., London, E. C. 2, Eng. **Mine office:** Clifton, Ariz. Hon. H. A. Stanhope and W. M. Steward, directors.

Inc. June 17, 1899, in Great Britain. **Cap.**, £150,000 £1 par; issued £135,007, which was paid to the Continental Finance Syndicate, Ltd., 1909, for

property, and £10,000 cash working capital. Balance sheet, Nov., 1918, showed cash, £520; loans at call, £732; expenditures, £9,818; liabilities, £1,063.

Property: 120 acres, known as the Scioto, Lowland and Chillicothe mines, in the Copper Mountain district, Clifton, Greenlee county, adjacent to the Arizona Copper Co. and the Detroit Copper Co. Location includes a mill-site on the San Francisco river. The claims are said to show a vein 2½′ to 8′ and in places 30′ wide, proven for 3,500′. Company also owns 8 claims at Armstead, Mont., showing copper.

Development: at the Clifton properties by 3 adits; No. 1 in ore for 55′; No. 2, 110′; No. 3, 100′. Operations reported resumed April, 1917.

ARIZONA-MAYFLOWER COPPER CO. **ARIZONA**

Office: Duncan, Ariz.

Property sold May, 1917, at Sheriff's sale to Krakauer, Zork & Moye, El Paso, Texas. Operated under agreement with owners by S. D. Conley, Duncan, Arizona.

Inc. 1916, in Mass. **Cap.,** $1,000,000; $1 par.

Property: 40 claims, in the Mayflower district, Greenlee county, Arizona and Steeple Rock district, Grant county, New Mexico. Ore occurs as sulphides and oxides in fissure veins, 7′ to 10′ wide, dip 55° S. W., course S. E.-N. W., with dacite foot and limestone hanging wall; reported to average 5 oz. silver, 2.5% copper and 9 oz. silver, 7% copper, with $2.50 gold per ton. Developed to a depth of 100′ by 3 shafts and equipped with compressor, drills, gasoline engine and hoist.

ASH PEAK EXTENSION MINING CO. **ARIZONA**

Address: J. Horgan, Duncan, Ariz.

Inc. 1917, in Arizona.

Property: 14 claims, unpatented, in the Clifton district, said to show good gold-silver values at surface. Presumably idle.

ASH PEAK MINES CO. **ARIZONA**

Address: Charles Starr, mgr., Duncan, Ariz.

Property: claims in the Duncan section below Clifton, said to show good gold and silver. Shipments were made in 1918.

Under lease and option 1916-17 to the International Mines Development Co., but option was relinquished. Under bond to the Goldfield Consolidated, 1918-1919, and about 50 men employed vigorously prospecting and developing the mine. Ore contains gold, silver and lead. Main shaft 800′ deep. The 100-ton cyanide mill will be moved from the Aurora Cons. property, Aurora, Nev., to the mine.

CHASE CREEK COPPER CO. **ARIZONA**

No recent returns secured.

Mine office: Clifton, Greenlee Co., Ariz.

Officers: Clarence K. McCornick, pres.; H. G. Smith, treas.; S. S. Campbell, mgr.; Isaac N. Stevens, supt.

Cap., $5,000,000.

Property: 52 claims, 1,040 acres, 8 miles west of Clifton, having a 2,300′ tunnel, 6x8′, on lands adjoining the Longfellow mine, cutting the Longfellow orebody, of concentrating grade, at a distance of 493′, having a back of about 900′, showing low-grade sulphide copper ore. Tunnel practically reaches the Coronado Railroad, permitting advantageous shipments.

CUPRITE COPPER CO. **ARIZONA**

Mine near Clifton, Greenlee county, Ariz.

Officers: N. W. Lord, pres.; Isaac N. Stevens, v. p.-mgr.; L. B. Kauffman, sec.; Geo. B. Kauffman, treas.; Frank A. Ray, engr., with Frank B. Laine, directors.

Inc. March, 1904, in Arizona. **Cap.,** $1,000,000; $1 par.

Property: 26 claims, 490 acres, in the Copper Mountain district, opened by shafts of 30′ and 320′ and tunnels of 150′ and 260′. The leached zone carries isolated pockets of rich ore. Company also owns about 2,000 linear feet of strong hematitic outcrops, ranging 5 to 100′ in width. Property considered promising, but company inactive since 1916; awaiting developments on adjacent properties.

EAGLE GOLD & COPPER MINING CO. **ARIZONA**

Address: care W. J. Riley, First National Bank, Clifton, Ariz. Mine

near Morenci, Greenlee county, Ariz.

Officers: Wm. M. McCoy, pres.-mgr.; E. C. Bunker, v. p.; E. V. Horton, sec.; W. J. Riley, treas.; H. A. Collins, gen. mgr.

Inc. in Arizona. **Cap.,** $1,000,000; $1 par.

Dividend of 2½c per share reported paid during 1917.

Property: formerly known as the Gold Belt 30 claims, 4 miles N. W. of Morenci, carries veins with copper, lead and gold ores, developed by a 40′ shaft on 1½′ vein of rich silver lead ore.

Equipment: includes 5-stamp gold mill.

After 5 years of idleness, property was reported active, June, 1917, and to have shipped 300 tons of ore monthly to the Clifton and Douglas smelters. Ore said to contain 17% copper and 8% manganese per ton.

STARGO SILVER BELT MNG. CO. **ARIZONA**

Company owned by the old Stargo silver mine, near Morenci. Reported in 1919 that mining property had been sold to M. J. Harmon and associates, who plan building a cyanide plant.

CLIFTON-MORENCI DISTRICT, GREENLEE COUNTY

AMERICAN CELTIC COPPER CO. **ARIZONA**

Out of business. See Vol. XIII for description.

ARIZONA COPPER CO., LTD. (THE) **ARIZONA**

Head office: 44 Charlotte Sq., Edinburgh, Scotland. **Mine and works office:** Clifton, Greenlee, Ariz.

Board of directors: G. Readman, chairman; W. A. Carter, Young J. Pentland, Alex. McNab, F. L. MacLeod, H. A. Rose, T. E. Salveson, and Sir David Paulin; William Exley Miller, sec.; Norman Carmichael, gen. mgr.; R. W. MacFarlane, act. supt.; P. B. Scotland, supt. of mines; Arthur Crowfoot, supt. of mill; J. G. Cooper, cashier and purch. agent.

Inc. August 5, 1884, in Great Britain. (For early financial details see Copper Handbook, Vol. XI, 1914, p. 72.)

Cap., authorized, £755,000; issued £703,984 10s as follows: 160,000 "A" preference shares of 5s each, all uncalled but £7,480 10s paid in advance of calls; £316,530 preference stock; £379,974 ordinary shares (1,519,896 shares of 5s each fully paid). Profits are divided thus: 10% cumulative dividends on "A" preference less 5% interest on amount uncalled and unpaid; 7% cumulative dividends on preference stock; balance to ordinary shares.

Funded Debt: 5% terminable debentures, reported to have been redeemed Dec., 1918. Fiscal year ends on September 30.

Dividends: on ordinary shares for recent years have been as follows: 3s 6d in 1913; 2s 9d in 1914; 1s 9d in 1915; 4s in 1916; 4s 9d in 1917, and 3s in 1918.

Balance sheet for 1916-17 showed a profit of £317,717, after setting aside £137,805 for redemption of debentures, paying preferred dividends, transferring £50,000 to reserve (now £678,731), and £255,000 to reserve (now £613,563) for contingent liabilities. Ordinary shares received a total of £303,979. There was £13,737 carried forward.

For half year ended Mar. 31, 1918, after allowing for the above items, profit was £130,836. Ordinary shares received £113,992. Balance forward was £30,581.

Property: about 4,000 acres in the mineral belt of Clifton-Morenci district. Principal producing mines: Humboldt, Clay, Longfellow, Coronado, King, Metcalf and Boulder, others in reserve or process of development. Produces about 4,500 tons of concentrating ore and about 175 tons of direct smelting ore daily. Concentrating ore is chalcocite, disseminated in porphyry, carrying about 2.45% copper. Top-slicing is principal mining method used. Metcalf mining division supplies concentrator at Clifton. Morenci and Coronado divisions supply concentrator at Morenci. All mines connected by electric haulage to main hoisting shaft at concentrator, except Metcalf, which is connected by 36″ gauge steam road (Coronado R. R.) to Clifton.

In June, 1919, the Shannon Copper Co's property of 17 claims, mill and smelter were acquired. These are in the same district.

Electric haulage operated by 21 6-ton locomotives, used singly, and two-unit and three-unit. Coronado-Morenci ore tram consists of 36 10-ton cars hauled by three-unit locomotive over track of 20" gauge of 50 lb. rails.

Longfellow division: principal mines, Humboldt, Clay and Longfellow. Orebodies disseminated chalcocite in porphyry dikes and faulted or brecciated areas. Mining conducted principally through adits at present. There are 8 working levels and 2 shafts. Commercial ore proven to depth of 900' below surface. Concentrates transported by gravity incline 2,515' long to Coronado R. R., thence 6.1 miles to smelter, 2.2 miles below Clifton.

Metcalf division: principal mines, King and Metcalf. Other smaller producers. King mine produces disseminated chalcocite ore from faulted areas in porphyry and granite. Metcalf mine yields oxide ore from deposits in limestone and shale and small porphyry dikes. Ores transported by gravity inclines to bins on Coronado R. R. and treated at the Clifton concentrator. Outlying mines served by cable tramways. Ores mined by open-pit and shrinkage underground methods. Equipment for drilling 16 holes, from 1,000' to 1,500' deep, now on property.

Coronado division: principal mines, Coronado and Horseshoe. Pyramid mine in development stage. Orebodies disseminated chalcocite and surface oxide ore in porphyry dike filling fault fissure in granite. Developed by 5 shafts (deepest 1,100') and nine levels, adit level 9,400' long, 1,100' below surface, and is part of electric haulage system to concentrator at Morenci. The Coronado shaft was gutted by fire Aug., 1917, but has been re-timbered.

At the Clay mine further development work opened up a large but very low-grade orebody, not yet being mined. The Pyramid mine has 2,000' of work on the 6th level, and the 1,100' or Coronado adit level. In the Coronado vein, the oreshoot is bottomed between the 7th and 11th levels, but ore reserves have been maintained by additional ore developed east of the Matilda shaft.

The Horseshoe orebody is now an important producer, connected with the main haulage, or 1,100' level. In the King mine, a shoot of 8-10% ore, 10' thick and 200' long, was found in the pyritic vein on the 3rd level.

The incline top-slicing method of mining at the Coronado was described by W. G. Scott in a paper for the A. I. M. E., February, 1918.

Prospecting with churn-drills was started in 1918 to determine character of ground east of the Coronado adit, 6,000' being drilled.

The reduction works consist of two concentrating plants, No. 4 mill at Clifton with 500 tons daily capacity; and No. 6 mill at Morenci, with 4,000 tons daily capacity. A 100-ton experimental mill for the treatment of low-grade ores was erected at Morenci. Both concentrating plants have been equipped with the Callow system of pneumatic flotation, with the necessary thickener and filter equipment for handling the flotation concentrate. An addition of 8 Dorr pulp thickeners has been made to the water reclaiming equipment; tables have replaced jigs, and a dust-catching system has been installed in crushing department at No. 6 plant.

Recent improvements include 12 Allen cones for de-watering and re-grinding mill feed; 12 Dorr classifiers, Dorr thickeners, and 8 Callow cells.

The new smelting plant, started early in 1914, is situated 2 miles below Clifton, on the east bank of the San Francisco river. This plant is entirely of steel, brick and concrete, and consists of a receiving bin system with a capacity of 1,000 tons of ore and 1,500 tons of concentrates, a crushing, grinding and sampling plant, and a bedding plant with a storage capacity of 20,000 tons for mixing and storing the ores and concentrates, supplementary bunker bins being provided for the fettling ores, converter ores and fluxes.

The mixed charge is fed to the roasting plant, consisting of eight 7-hearth Herreshoff air-coled roasters, equipped for firing with coal if needed. The roaster gases pass through a large dust chamber to a central stack, and the roaster charge and dust to the reverberatory plant, consisting of 3 oil-fired furnaces 22x100' (2 operating). The waste gases from this plant pass through a set of six 712 h. p. Stirling boilers, which, with 5 oil-fired boilers, supply

the steam necessary to operate the power plant. The matte is tapped into ladles handled by 40-ton cranes for treatment in the converter plant, which consists of 4 stands with 5 shells of the Great Falls type converter, 12′ in diameter. The bullion produced is cast in pigs for shipment on two straight-line casting machines. Both the reverberatories and the converters are provided with suitable dust chambers, the gases ultimately discharging into a common stack. The plant is served by both standard and narrow gauge railroad, in addition to electrified industrial tracks, and is equipped throughout with belt conveyors for the transportation of material.

The power plant is housed in a brick-steel concrete structure, and consists of 3 General Electric turbines of 2,000 k.w., three 10,000 cu. ft. Nordberg blowing engines for converter air, and a compressor for high-pressure air; the auxiliary pumps, motors, generators, transformers, condensers, cooling towers, spray ponds, etc., necessary for operations. The plant supplies all power needed at the smelter and also, through a 13,200-volt transmission line 10 miles long, the power needed for the town of Clifton, the concentrators and mines.

Well-equipped machine, blacksmith, boiler, tin, carpenter and electrical shops are maintained, as well as a large warehouse and brick shed.

Miscellaneous enterprises operated by the company include foundry, machine shop, saw-mill, a 30-ton ice plant and town lighting plant. The company also has general merchandise stores at Clifton, Morenci, and Metcalf.

Production: for fiscal years ending September 30: 1907, 27,404,349 lb.; 1908, 33,980,291 lb.; 1909, 32,017,487 lb.; 1910, 32,161,205 lb.; 1911, 34,569,019 lb.; 1912, 38,150,000 lb.; 1913, 34,230,000 lb.; 1914, 38,942,455 lb.; 1915, 37,416,010 lb.; 1916, 34,100,000 lb. (operations suspended by strike five months) 1917, 42,480,000 lb.; 1918, 40,468,000 lb. In 1919, due to general curtailment, the output was 32,900,000 lb.

CORONADO MINING CO. **ARIZONA**

Clifton, Greenlee county, Ariz.

Inc. July 12, 1902, in Maine. **Cap.**, $1,000,000; shares $1 par. Is controlled through ownership of a stock interest of about 53%, by the Shannon Copper Co., the remainder of the stock is held principally by Phelps Dodge Corp. Officers and management are the same as those of the Shannon Copper Co.

Property: 30 claims, 400 acres, patented, near Metcalf, adjoins the mines of the Detroit Copper Mining Co. and the Coronado mine of the Arizona Copper Co., Ltd. Mine has a 2-compartment shaft, on the Garnet claim, showing some ore on the 200′ level; also several shallow shafts and short tunnels.

Idle since 1916.

DETROIT COPPER MINING CO. OF ARIZONA **ARIZONA**

Fully described under title of Phelps Dodge Corporation.

LESZYNSKY COPPER MINE **ARIZONA**

Address: J. Leszynsky, owner, 32 Broadway, New York City. Mine address: Clifton, Ariz. John Christy, lessee.

Property: 38 claims, 24 patented, in Morenci-Metcalf district, Greenlee county, showing a deposit of low-grade disseminated copper ore, said to average 2½%, with between 2 and 3 million tons developed by shafts and mine workings. Plan erecting 250-ton concentrator.

LONGFELLOW EXTENSION COPPER MINING CO. **ARIZONA**

Address: Clifton, Arizona.

Officers: C. H. Thompson, pres.; W. J. Riley, v. p.; I. N. Thompson, sec.

Property: 38 claims on Chase creek, near Clifton, developed by 400′ tunnel with still some distance to go, to be under the mineralized copper ledge showing at surface.

NEW ENGLAND & CLIFTON COPPER CO. **ARIZONA**

Sold to Phelps Dodge interests. Described in Copper Handbook, Vol. XI.

P. D. EXTENSION COPPER CO. **ARIZONA**

Mail returned from Morenci, Ariz., marked "out of business." Described in Vol. XIII.

SHANNON COPPER CO. **ARIZONA**

Office: 67 Milk St., Boston, Mass.

Officers: Nathan L. Amster, pres.; H. N. Stonemetz, v. p.; Chas. R. Jeffers, sec.-treas., with Kenneth McNeil, Wm. A. Paine, M. W. Cole, C. J. McGilravy, J. B. Beaty and David A. Ellis, directors. J. W. Bennie, gen. mgr.

Inc. Nov. 13, 1899, in Delaware. **Cap.**, $3,000,000; shares $10 par, increased July, 1909, to $3,300,000; issued, $3,000,000, with $300,000 held in the treasury. **Bonds:** $600,000 at 7% were retired 1911; the company guaranteed an issue of $600,000 of 6% bonds, authorized May, 1909, by the Shannon-Arizona Railway Co., reduced to about $87,000 at time Metcalf properties were sold to Arizona Copper Co. Shares are listed on the Boston Stock Exchange. National Shawmut Bank, Boston, registrar; Boston Safe Deposit & Trust Co., transfer agent. Annual meeting, third Wednesday in March.

In 1918 receipts from sales of copper, gold and silver amounted to $2,254,774; expenses totaled $2,532,357, leaving a deficit for the year of $277,583.

On February 28, 1919, current assets amounted to $422,231, of which $8,930 was cash and $296,718 unsold copper carried at 15c per lb. Current liabilities totaled $447,370, leaving $25,139, an excess of liabilities.

The Arizona Copper Co., May 14, 1919, took over the Clifton-Metcalf properties of the Shannon, including mines, reduction works, railroads and other property. Sale ratified by shareholders, Oct., 1919. Price said to be $600,000. With this money company will pay off outstanding bonds of Shannon Ariz. Ry. Co., will clean up its floating debt and have remaining $400,000 and no debts. The Metcalf mines had been idle for some time, the ore having declined in grade until it could not be profitably treated.

The company retains its other property, the Copper Belle mine at Gleeson, Ariz., and the Yaeger Canyon properties, 8 miles S. W. of Jerome. The Yaeger mine was closed down in March, 1919, to wait for a better demand for copper; the mine is opened to the 1300′ level and is said to have cost $75,000; an additional $125,000 was spent on development. It is doubted whether this sum can be recovered from the ore developed. The Copper Belle mine is described under Leonard Copper Co., which is the subsidiary company holding title to the mine.

Production: in 1918 amounted to 9,627,987 lb. copper, 2,466 oz. gold and 77,314 oz. silver. Of the copper production, 7,164,918 lbs. were sold at 22.10c per lb.

STEVENS COPPER MINING CO. **ARIZONA**

Office: No. 1 Broadway, New York. **Mine office.** Clifton, Greenlee county, Ariz.

Officers: Fred Enos, pres.; W. Rowland Cox, v. p.; Geo. H. Kent, sec.-treas.; Robt. McCart, Jr., resident mgr.

Property: 39 claims, patented, 780 acres, about 2 miles from Metcalf, Ariz., shows granite overlaid by Cambrian quartzite and Silurian limestone, with much faulting and intrusive porphyritic dikes, with orebodies near the fault lines. Some of the claims have produced copper ore, which was shipped to the Shannon smelter. Property being worked by lessees.

MARICOPA COUNTY

ABE LINCOLN MINING CO. **ARIZONA**

Address: E. W. Getter, Los Angeles, Calif.

Officers: G. W. Platner, pres.; V. P. Unitt, v. p.; W. H. Dudley, v. p.; E. W. Getter, sec.-treas., with W. H. Wood, A. E. Mack, J. H. Bulla, W. F. Denny and R. McPhail, directors. C. E. Nathorst, mgr.

Property: in Hassayampa district, Wickenburg, Maricopa county, near the Monte Cristo, Silver Bar and Eagle mines.

Development: by shaft recently completed to the 700′ level, where the vein is reported to be 27′ wide. Assays gave 12% copper, 12 oz. silver, $5 gold per ton. In the tunnel being driven to connect with shaft the vein is stated to be 10′ wide with high copper content, 12 oz. silver and $10 gold per ton. Other lower-grade veins exist.

Equipment: includes 50 h. p. hoist, 5-drill compressor.

Reported in January, 1919, shipping high-grade chalcopyrite ore from tunnel. Reserves claimed to be sufficient for 200 tons daily output for some time.

APACHE CHIEF MINING CO. **ARIZONA**

The secretary, W. G. Lentz, 218 National Bank of Arizona Bldg., Phoenix, Ariz., reported in Oct., 1919, that company had not kept up its corporation tax and was probably dead. See Vol. XIII.

ARIZONA CACTILONE COPPER CO. **ARIZONA**

Mail returned unclaimed 1919, from former address.

Officers: J. G. Hardin, pres.; S. C. Kingsbury, v. p.-gen. mgr.; I. J. Lipson, 2nd v. p.; C. D. Montgomery, sec.-treas.

Inc. Feb. 8, 1917, in Arizona. **Cap.** $3,000,000; $1 par; 400,000 sold at 25c each.

Property. 21 claims of the Slocum Copper Co., in Maricopa county, 22 miles N. of Phoenix. Ground was examined by C. H. James in May, 1917, who recommended expenditure of $30,000 to $50,000 in exploration.

Geology: main formations exposed are a more or less schistose pre-Cambrian granite and an altered diabase, the latter intruded by 2 prominent iron-stained quartz dikes showing a little copper carbonate and pyrite. Ore consists of copper and iron minerals in a diabase porphyry.

Development: by shafts 106′ and 200′ deep, midway between the quartz dikes. No important zone of secondary enrichment is expected.

ARIZONA DIXIE COPPER CO. **ARIZONA**

Officrs: R. J. Schultz, pres.; J. W. Ambrose, v. p.; F. H. Larson, sec.-treas., all of Phoenix, Ariz.

Inc. 1917 in Ariz. **Cap.,** $1,500,000; 25c par.

Property: 13 claims, 25 miles S. W. of Hassayampa, developed by 80′ shaft and 40′ drift, said to show a 5′ vein carrying ore that assays 4% copper, with gold and silver values. Plan to pump out water from shaft and sink.

ARIZONA LEAD & COPPER CO. **ARIZONA**

Mail returned unclaimed, March, 1919, from Wickenburg, Ariz., and from Edw. E. Northrup, pres. and mgr., El Paso, Texas.

ARIZONA SAMPLING & REDUCTION CO. **ARIZONA**

Geo. M. White, mgr.; L. N. Butler, sec.-treas. Operates a reduction plant at Wickenburg, handling mainly custom ores, also developing the Copper Hill mine in Copper Basin (which see) and the James Jackson mine near Kingman.

BALLARD GROUP **ARIZONA**

Address: F. C. Bolen, 312 E. Van Buren St., Phoenix, Ariz.

Property: 7 miles south of Palo Verde station, on the Arizona Eastern line, Maricopa county, a few miles north of Rawley mine.

Examined by D. C. Nicholson in June, 1919, who says that the formation consists of altered schist, of ancient origin and much decomposed. Three immense "bars" of red oxidized silicious porphyry which run through the ground from north to south, seem to be favorable for prospecting. Secondary enrichment is expected at depth, as the rock at surface has been leached. Drilling is suggested.

Development: by open-cuts and two 30′ shafts. In most of the trenches the ore exposed is said to carry from 3.8 to 31.35% copper.

BLACK ROCK (LTD) MINING & MILLING CO. **ARIZONA**

Mail returned unclaimed, March, 1919, from former address: Constellation, Ariz. **Inc.** in 1910 in Arizona.

Property: 3 patented claims, about 12 miles east of Wickenburg. Developed by 360′ shaft, drifts and crosscuts, on a vein from which some ore is reported to have been extracted.

Equipment: includes hoist and 2 Huntington mills.

BUCKHORN & BOULDER MINING CO. **ARIZONA**

Officers: H. L. Chandler, pres.; P. E. Fuller, v. p.; R. F. Palmer, sec.-treas. A. J. Peters, John Cummard, W. L. Sirrine, B. B. Moeur, directors.

Inc. 1917, in Arizona. **Cap.,** $1,000,000; $1 par; 550,000 issued.

Property: located on the west end of Superstition mountain, 20 miles northeast of Mesa, Maricopa county; idle for about 20 years; was unwatered and examined during 1917. Reported to be a porphyry ledge, 18′ wide on the 80′ level, assaying 9.9% copper, $4.50 gold per ton. Footwall is granite. A parallel porphyry ledge is 200′ to the east. Shaft is 180′ deep with 200′ of drifts and crosscuts. The ore is carbonate, changing to sulphides on the 180′ level.

CALUMET & CORNELIA DEVELOPMENT CO. **ARIZONA**

Mail returned unclaimed, March, 1919, from former office National Bank of Arizona Bldg., Phoeniz, Ariz.

Cap., $1,000,000; $1 par; in treasury, 740,000 shares.

Property: 370 acres, 25 miles from Phoenix. Shaft 50′ deep said to show carbonate and oxide ores averaging 6.7% along a contact vein in schistose rocks cut by intrusive dykes. Reported on by R. W. Hollis.

Unfavorably regarded; presumably idle.

CARMELITA MINING & MILLING CO. **ARIZONA**

Office: 142 W. Washington St., Phoenix, Ariz.

Officers: P. P. Parker, pres.; M. S. Weyant, v. p.; J. A. Marr, sec.-treas., with H. J. McCoy and J. H. Williams, directors. Geo. Waymire, superintendent.

Inc. in Arizona. **Cap.,** $350,000; $1 par; 30,782 outstanding.

Property: 17 claims, 340 acres, in the Harqua Hala mountains, Maricopa county, 14 miles from Wenden, said to carry a body of free milling ore, from 2 to 8′ wide and assaying $17 per ton. Shaft 200′ deep with 100′ crosscut to vein. Claimed 3,000 tons of $15 milling ore on the dump. During 1918, built small mill, using tables and flotation process, and installed compressor, air drills and gasoline hoist.

CARNEY MINING CO. **ARIZONA**

Mail returned unclaimed, Sept., 1918.

P. G. Carney, pres. and business mgr., Mesa, Maricopa county, Ariz. Homer Davidson, supt.

Property: the Royal Gorge mine, shows a veins with gold-copper ore.

Development: by 800′ tunnel and 100′ shaft.

Equipment: includes gasoline engine and air compressor. Planned to erect cyanide mill in 1917.

Presumably idle.

DRAGON MINING & DEVELOPMENT CO. **ARIZONA**

Address: Wickenburg, Ariz.

Officers: J. G. Scarborough, pres.; F. L. LaForce, v. p.; E. P. Truitt, sec.; H. Hertz, treas.

Property: 248 acres in Wickenburg district, Ariz. In May, 1918, shaft was 250′ deep with 1,000′ of workings. The ore is said to contain gold, silver, and vanadium.

Equipment. includes 25 h. p. gas engine and hoist, compressor, 60 h. p. Commercial gas engine. No. 2 Cameron pump, and a 50-ton mill being erected in 1919.

EMPRESS COPPER MINING CO. **ARIZONA**

Mail addressed to C. K. Hartley, supt., Wickenburg, Ariz., returned unclaimed. J. P. Hutchinson, pres., Phoenix, Ariz.

Company formed, 1917, to reopen and work the old Swallow mine, 12 miles east of Wickenburg, in the Castle Creek district. Developed by 400′ shaft. Vein said to be 6′ wide, assaying $15 gold and 13% copper. Equipped with 25 h. p. hoist, 70 h. p. engine and electric pump. Shipment of 42 tons of copper-gold ore made in April, 1917. Presumably idle.

GILA COUNTY CINNABAR MINING CO. **ARIZONA**

Mail returned unclaimed from Phoenix, Ariz. Owns quicksilver claims in the Sunflower mining district, Mazatzal mountains, Maricopa county, 30 miles from Phoenix. Ores occur in ancient schists, and consist of cinnabar and an opaline silica.

Erected a 30-ton furnace for recovery of metal. Geology described by Ransome, U. S. Geological Survey, Bull. No. 620, pp. 111-128, 1915.

GOLD BAR MINES CO. **ARIZONA**

Address: F. A. Muller, pres., Wickenburg, Ariz.

Property: 34 claims of the Interior Mining & Trust Co., 15 miles N. E. of Wickenburg. Developed by 750′ shaft. At 300′ ore is gold-copper, at 500′ copper sulphides beginning to appear.

Equipment: includes 12 Nissen stamps of 100-ton daily capacity.

GOLDEN REEF MINES CO. **ARIZONA**

Address: Col. J. N. Seger, pres., Phoenix, Ariz.

Property: the "Boyer" gold claims, 35 miles north of Phoenix. Slightly developed claims, said to have 4 quartz veins, 4′ wide. Assays reported up to $200 free milling gold per ton, average about $10.

GRAND TRAVERSE & ARIZONA MINING CO. **ARIZONA**

Idle since 1910.

Office: Manistee, Mich. Mine near Cave Creek, Maricopa Co., Ariz. Owns 3 patented claims. Fully described Vol. X, Copper Handbook.

HARRIS COPPER CO. **ARIZONA**

Offices: Findlay, Ohio, and 319 Van Nuys Bldg., Los Angeles, Cal.

Officers: C. C. Harris, of Findlay, Ohio, pres., treas., gen. mgr. and purch. agt.; W. J. Martin, v. p.-mine supt.; Harry W. Moore, sec.; preceding officers, W. J. Sease, Los Angeles, and Fred F. Harris, San Jose, directors.

Inc. July 10, 1910, in Arizona. **Cap.**, $1,000,000; shares $1 par; non-assessable; issued, $710,001. Annual meeting, second Tuesday in January.

Property: 34 claims, 550 acres, in the Tip Top district, about 50 miles north of Phoenix and 30 miles east of Wickenburg, on the Agua Fria river, at the mouth of Black Canyon creek. Claims, partly purchased with stock and partly located by the company, show schists cut by diabase intrusions. The company's map shows 2 groups of claims, the Cascadilla, or western, being in part 3,000′ wide and 1,200′ long; the group covers 3 veins running north and south. Development is meagre; one shaft in diabase and 2 tunnels with an aggregate of 800′ of work, costing $9,000.

The Copper Reef, or east group, covers 2 veins, 1 alongside the Agua Fria river claimed to be an extension of the vein mined by the Kay Copper Co. Company claims 1,000 tons of $15 ore blocked out, which is reasonable. One vein said to be 500′ wide and another 90′ in width, the observers evidently considering altered schist to be vein matter.

The president of the company writes the editor as follows: "We insist that the report speaks the truth quoted as we make the report to you, and if any establishment is placed on the wording of our report, it must conform in meaning to give the information that can be construed from the wording that we give."

The property may have a great outcrop and it may contain copper in commercial quantities, but we defy any mining engineer to find out what the company does have on its property, from the report issued by the management and reprinted as a gem of humor in the "Mining & Scientific Press," and in part reproduced herewith. "COPPER—A red, ductile, tenacious, malleable metal of great and varied use, originally called brass of cypress, copper sand, alacaunte, C group of minerals, mostly soft, included C. suprite, malaconite, malachite, cheesylite, chrycopyrite, olivnite, etc. Black C ore, malaconite, gray C ore, Chalcocite, C Purite, yellow C ore, variety Chalcopyrite, the common ore.

"The formation of the Harris Copper Co. have blended with the iron, lime and porphyry with quartz. Many of the above minerals, but more especially the commoner forms with oxides condensed formation on the top with the iron and lime, with a great amount of carbon and sulphur in the schist formation, with an amalgamated condition of the various mineralizations where gold and silver predominates. The schist in the lower rocks, I am led to believe from the geological lay of the uplift that is now held and owned by the Harris Copper Co., there is beneath the surface of this great iron-capped ledge a great body of copper ore." Enough said.

Despite the unfavorable impression created by the company's literature, it is understood that the property has genuine merit, has orebodies, and with cheaper transportation will make a good mine. Part of property reported leased to Wilson Foster of Los Angeles in 1914 for ten years; lessee is required to spend $20,000 and company to receive 15% of gross output.

Information circulars sent to company in 1919 were not returned, so probably little or nothing is being done.

HAUXHURST MINE **ARIZONA**

Jas. Hauxhurst, owner and mgr., at last accounts.

Property: 900 acres, in the Big Horn mountains; about 65 miles W. of Phoenix and 27 miles S. W. of Wickenburg. Mine formerly owned by the Hauxhurst Copper Co., was under bond for about 3 years to the United States Copper Mines, Inc., which forfeited same, 1909; leased to F. C. Alsdorf, 1913, but relinquished. See Vol. XI, Copper Handbook.

KAY COPPER CO. **ARIZONA**

Officers: Geo. W. Long, pres.-gen. mgr.; S. J. Tribolet, Phoenix., Ariz., v. p. Harry Kay, sec.; R. E. Moore, Valley Bank, Phoenix, treas, with Frank R. Ross, directors.

Cap., $2,000,000; $1 par; approximately 1,150,000 shares issued.

Property: 40 claims, with townsite of 600 acres, 1,300 acres in all, includes the Starkweather mine on the Agua Fria river, at the mouth of Black Canyon creek, 50 miles N. of Phoenix, and some 9 miles from Cave creek. For the past 8 years the property has been held by S. J. Tribolet, who spent about $70,000 in opening it to a depth of 350′. A strong copper vein in schist was followed down from the surface, and levels opened at 50′ intervals, ore being mined and shipped, reported to assay from 10 to 16% copper with some gold and silver. The ore is chalcopyrite. Recently Geo. W. Long and the Yawkey Estate of Detroit acquired control and continued development to the 600′ level. The main oreshoot is reported to be 5′ wide on the 200′ level, 18′ on the 350′, 30′ wide and 110′ long on the 500′ level, and 35′ wide on the 600′ level; and that 200′ of drifting has not reached the limit of the ore. Over 2,000′ N. of the main shaft, the main ore-bearing zone has been prospected further into the hanging wall by No. 3 shaft, 200′ deep, that is said to have opened another body of shipping ore, size not known at present, with reported assays as high as 22% copper and $3.50 in gold and silver. This shaft will be sunk to the 400′ level. Diamond drilling has been in progress for several weeks and is said to have shown other orebodies N. of the main shaft.

Present work has not disclosed the possibilities of the property. Tentative plans include an expenditure of $800,000 on a 1,000′ vertical shaft 600′ W. of present incline shaft, extensive development, and a 1,000-ton mill.

L. & N. GROUP **ARIZONA**

Owned by Christopher Martin, et al.

Property: 7 claims, about 7,500′ along the Gila county belt, in the Sunflower mining district, Maricopa Co., Ariz., shows stringers of quartz and cinnabar. Development work and prospecting was in progress in 1917. A furnace with 1 retort was built in 1914, and 2 flasks of quicksilver were shipped March, 1915. Geology fully described U. S. G. S. Bull. 620-F (1915). No recent reports, but believed to be idle in 1919.

MARICOPA MINES CO. **NEVADA-ARIZONA**

Office: B. of L. E. Bldg., Cleveland, Ohio. Earl G. Hill, agt., Austin,

Nev. Mine offices: Morristown, Maricopa Co., Ariz., and Austin, Lander county, Nev. In process of reorganization, March, 1916.

Property: 33 claims, 611 acres, along the north contact of the Austin mineral belt. Principal property, 17 claims, at Austin, Nevada, shows four fissure veins in quartzite, ranging from 3′ to 20′ in width, traceable 1,400′, and said to carry average values of about 4% copper, 50 oz. silver and $2.80 gold per ton.

Development: by 4 shafts, deepest 800′, and 5 tunnels, 2 longest being 2,000′ and 830′, with total underground openings of about 12,000′.

Equipment: includes 2 small steam hoists and an air compressor at the Arizona property and a 75 h. p. gasoline hoist, 2 air compressors, machine shop, and necessary mine buildings on the Nevada property.

The 100-ton concentrator, in New York canyon, near Austin, has a Blake crusher, 2 rolls, 9 Card tables, 6 slime tables and a small cyanide plant.

The Prosperity group, 16 claims, in the Wickenburg district, Arizona, shows granite and limestone, the ore occurring in fissure veins in porphyry. Six known veins of 8 to 30′ width, developed by about 1,800′ of workings. Ore is mainly chalcocite.

No recent information is at hand. Letters returned unclaimed, June, 1919.

MARS CONSOLIDATED CO. **ARIZONA**

Probably dead. **Address:** care F. J. Webber, Colorado Springs, Colo. Company is the successor of the Heckley Gold & Copper Mining Co.

Property: 13 claims, in 3 groups, on Copper Hill, in the Black Rock district, 6 miles N. E. of Wickenburg, Maricopa Co., Arizona, shows 3 veins of 6′, 10′ and 25′ claimed average width, developed by a 268′ tunnel, said to carry ore assaying up to 28% copper. Letters unanswered.

MENDOTA MINING CO. **ARIZONA**

Reported to have purchased the property of the Yorba Mining Co., in the Harqua Hala Mountains, Maricopa county.

MONARCH MINING & SMELTING CO. **ARIZONA**

Address. Wickenburg, Ariz.

Officers: W. O. Donovan, Vidalia, Ga., chairman; J. H. Mulholland, pres. and gen mgr.; Jas. R. Vaughan, v. p.; J. B. Everidge, v. p.; J. H. Mulkey, sec.-treas.; officers are directors. A. D. Akin, cons. engr.

Inc. Aug., 1904, in Ariz. **Cap.,** $1,000,000; increased to $1,500,000 in 1913 and to $3,000,000 in 1914.

Bonds: $100,000 1st mtge., issued 1913; $57,400 outstanding. Assets of company given as $62,523 over liabilities, Jan., 1915.

Property: 6 claims, patented, 100 acres, known as the Ryland or Three Black Buttes group, in the Black Rock or White Picacho district, 9 miles S. E. of Wickenburg, shows diorite and schist carrying oxidized ores changing at shallow depth to chalcopyrite and occasional bornite, said to assay 2 to 20% copper and estimated by management to average 1 to 3 oz. silver and $3 to $15 gold per ton.

Development: several shallow shafts and tunnels of 600 and 300′, with about 1,500′ of underground workings and several thousand feet of surface trenching.

Equipment: includes a 50 h. p. distillate engine, 5x8″ Rumsey triplex pump, and a 4-drill Sullivan compressor. There are about 26 buildings, all owned by the company. Water is taken from the Hassayampa river through 7 miles of 4″ pipe-line.

Development has proved surface ores to be badly broken, not continuous and occurring in pockets. Former management counted on raising funds for deep development by milling surface ores, but with wet concentration process used in 100-ton mill, major part of oxides and carbonates was lost in the tailing. Mill was therefore closed down after trial run.

Presumably idle.

ORO GRANDE MINES CO. **ARIZONA**

Office: Clinton, Ia. Mine near Wickenburg, Maricopa county, Arizona.

Officers: at last accounts, G. E. Lamb, pres. and treas.; Geo. B. Upton, v. p. and gen. mgr.; F. W. Ellis, sec., and T. G. Norris, directors.

Inc. 1901 in Arizona. **Cap.**, $3.000,000; shares $10 par; non-assessable; issued $2,500,000. Is a close corporation, controlled by 6 shareholders. Annual meeting, second Tuesday in January.

Property: 9 claims, patented, 161 acres, in the Black Rock district of Maricopa Co., shows contact deposits, between diorite and hornblende schist. The ore under development with strike of N. 27° E. and vertical dip, is estimated by management as 170′ wide, traceable 4,400′, and carries oxidized ores, bornite and chalcocite, with gold values.

Development: by shafts of 320′, 100′ and 100′, with about 8,000′ of workings, reported to have blocked out 980,000 tons of ore.

Equipment: includes a 55 h. p. gasoline plant at the mine, with a 15 h. p. hoist and 5-drill Sullivan air-compressor.

The 50-ton mill has ten 1,050-lb. stamps with a 40 h. p. gasoline engine; water is pumped, for milling, from Box canyon on the Hassayampa river.

The manager reports a saving by straight amalgamation of 99% of assay-value and having made 60-day mill-runs with a total cost of $1.87 per ton, for mining, milling, pumping, and all expenses, which is interesting, if true. Idle since 1907.

PARADISE GOLD MINING CO. **ARIZONA**

Address: Box 1095, Phoenix, Ariz. F. Obermuller, v. p.-mgr.; Jos. L. Obermuller, cons. engr.

Property: 6 mining claims and 3 mill; sites in Paradise Valley mining district, Maricopa county, 23 miles from Phoenix, said to have 2 parallel veins about 300′ apart, traceable at surface for 3,000′, 45′ wide at depth of 100′ and averaging about $5 in gold. Sinking shaft to 200′ level in 1917. Stock offered to the public at 25c., Feb., 1917. No later information, presumably idle.

RED MT. CONS. COPPER MINES CO., INC. **ARIZONA**

Address: Central Bldg., Phoenix, Ariz., and 99 Grand St., Brooklyn, New York.

Officers: C. E. Meyers, pres.-mgr.; Jas. H. Sullivan, v.-p.; C. W. Caulkins, sec., Brooklyn; F. Brose, treas., with E. J. Widness, J. S. Smith, W. A. Anderson, J. L. Anderson and G. M. Barklay, directors.

Inc. April, 1917, in Ariz. **Cap.**, $5,000,000; $1 par; issued 1,194.500 shares. Manager reports $25,000 spent in 1918 on development and machinery.

Property: 21 unpatented claims in Dixie district, about 35 miles N. W. of Phoenix, said to show gold, silver and copper ore. Development: shallow shaft, less than 100′, and 2 tunnels, total length about 400′.

Equipment: includes a 50 h. p. hoist, and a compressor.

New York Curb papers in Sept., 1918, and Feb., 1919, had write-ups on the stock-selling methods employed by a certain "wild-cat mining stock promotion house," claiming that this firm peddled out stock at 50c. a share until it found its rightful level at "nothing a share." The papers stated that none of the officers of the Red Mt. Cons. Copper Mines Co. had anything to do with the issuance of and sale of the company's stock by the promotion house.

RED ROVER COPPER CO. **ARIZONA**

Reorganized, 1917, as Red Rover Mining Co., which see.

RED ROVER MINING CO. **ARIZONA**

Address: care of B. A. Gillespie, mgr., Phoenix, Maricopa Co., Ariz. Is a reorganization of the Red Rover Copper Co.

Lands: 12 claims, known as the Red Rover Group, 12 miles north of Camp Creek and 50 miles N. E. of Phoenix, the nearest rail point.

Development: by 10.000′ of underground workings, including a 200′ tunnel and a 500′ incline shaft, showing a 10 to 16′ orebody between limestone and porphyry, carrying a 3′ paystreak estimated to average 10% copper, 6 to 60 oz. silver.

The Red Rover mine, discovered 1882, has shipped from shallow workings about $200,000 worth of high-grade ore, running about 15 to 25% copper, with value mainly in silver chloride, 1 carload of 20 tons netting $41,000, with no allowance made for copper content.

Production: for 1913-14 was 440 tons of ore. Has been steadily developing since 1918, with about 25 men employed. Is a meritorious development proposition.

ROOSEVELT LAKE COPPER CO. **ARIZONA**

Mail returned in 1919 from former address at 17 E. Adams Street, Phoenix, Arizona.

Officers: R. H. Williams, pres.; A. J. Matthews, v. p.; W. E. Laird, sec.; C. E. Ashley, treas., with C. H. Prather and J. R. Murdock, directors.

Inc. in Arizona. **Cap.**, $1,000,000; shares $1 par; 400,000 issued.

Property: the Humdinger and Orocobre claims in the Mazatzal mountains, 20 miles from the Roosevelt dam, and the Virginia claims, 9 miles from Phoenix, Ariz. One claim said to have ore worth $1,000,000 on hand.

Development: by tunnels; churn-drilling contemplated.

Extravagant statements have been published about this company's possibilities, a full-page advertisement including this gem: "In this vast treasure-house—in vaults of porphyry and quartz, with walls of adamant—what wealth awaits the drill and blast, only the most active imagination can conceive." At last report company had sold its Roosevelt Lake property and was to use the cash to develop the claims near Phoenix.

ROWLEY COPPER MINES CO **ARIZONA**

Office: Kansas City, Mo. **Mine office:** Gila Bend, Maricopa Co., Ariz.

Officers: E. D. Lysle, pres., Leavenworth, Kan.; C. D. French, v. p.-treas., Kansas City, Mo.; J. T. McRuer, sec., with Jas. O. Goodwin, and D. Rowley, directors.

Inc. June, 1909, in Arizona. Cap. $10,000,000; $1 par; fully paid and non-assessable.

Property: 6 claims, patents pending, 124 acres, about 28 miles N. W. of Gila Bend, and 65 miles S. W. of Phoenix, Ariz.

Development: by two incline shafts 200′ and 256′ deep, the latter 32′ below water-level, with about 700′ of crosscuts and drifts and a 234′ vertical shaft. Said to have exposed 3 strong veins of copper-gold and silver-lead ore.

Equipment: includes 2 steam boilers, 200 h. p. oil engine, 2 compressors, one 300′ and one 1,000′ hoist. Also five storage oil tanks, ore trailers, etc.

Transportation is by 30-ton caterpillar 75 h. p. tractor owned by the company.

Property was bought for $20,000 cash and 1,000,000 shares in 1909. Reported in 1918, that wulfenite had been found and a small mill had been built to treat it. In June, 1919, an attempt was being made to sell stock at 10c. per share. Prospectus, states Mr. C. J. Price of Topeka, Kansas, a mining engineer of wide experience in both the U. S. and South Africa reports: "Your property has all the ingredients and requisites for the making of a big copper mine."

SAN CARLOS MINING CO. **ARIZONA**

Address: D. Rowley, Gila Bend, Ariz.

Officers: Dora Rowley, pres.; J. C. Rowley, v. p.; Daisy Rowley, sec.-treas.; also directors.

Inc. Oct., 1914, in Arizona. **Cap.**, $1,500,000; shares $1 par, non-assessable; 500,000 issued. Expenditures in 1916, about $2,500.

Property: 11 claims, 220 acres, 18 miles W. and 7 miles N. of Gila Bend, Ariz., said to show contact fissures in rhyolite. Orebody is 8 to 12′ thick. Shoots are from 2 to 36″ wide and ore carries copper, gold and silver. Ground is considered to contain extensions of the Rowley veins.

Development: incline shaft to 238′ depth. An East crosscut was to be driven to main contact. No information for 3 years past.

Edwin Walters, J. F. Price, and others have examined the property.

SLOCUM COPPER CO. **ARIZONA**

Succeeded by the Arizona Cactilone Copper Co., which see.

STURDY GOLD MINING CO. **ARIZONA**

Officers: John Sturdy, pres.-treas., 91 Creighton Road, Crafton, Pa.; E. W. McKay, v. p.; N. Sturdy, sec. and mgr., with H. Q. Turner and Albert Martin, directors.

Inc. June 16, 1915, in Arizona. **Cap.**, $750,000; shares $1 par; outstanding, $500,000. Annual meeting, second Thursday in January.

Property: 6 claims, 100 acres, in the Winifred mining district, 16 miles N. of Phoenix, formerly owned by Fortuna Gold & Copper Co., described in Copper Handbook, Vol. XI. Was acquired by present management at sheriff's sale. Claims are said to show six parallel quartz veins in granite, averaging 4′ in width and carrying gold and silver ore.

Development: two 125′ vertical shafts, with 1,200′ of workings. Claims to have 6,000 tons ore blocked out, average grade $10 per ton.

Equipment: includes a 6 h. p. Fairbanks-Morse gasoline hoist, and a 25-ton mill.

TOMBOY MINES **ARIZONA**

Address: Bruce Hobbs, sec., 29 Otis St., Boston, Mass.

Presumably idle. Described in Vol. XIII.

VULTURE MINES CO. **ARIZONA**

Address: Wickenburg, Ariz.

Officers: Robt. Mackay, pres.; F. W. Rockwell, v. p.; R. T. Sewall, sec., Boston; A. McLean, treas., with F. M. Kimbark, E. I. Marvell, J. B. Sullivan, Jr., directors; Spencer Hutchinson, cons. engr.

Cap., 600,000 shares; par $5; all issued. No bonded indebtedness. 35 Congress St., Boston, Mass., transfer office. R. T. Sewall, registrar. Annual meeting, June 1.

Property: 31 claims, 11 patented, 618 acres, 15 miles S. W. of Wickenburg.

Geology: quartz vein in schist contains gold, with some galena and pyrite, dips 37° and strikes N. 85° E. Pay ore occurs in shoots, the main orebody being 35′ by 300′.

Development: mine is worked by back stoping and waste filling through two inclined shafts 765′ and 595′ deep. Greatest depth of workings, 1,239′; linear extent, 25,000′.

Equipment: includes Ottumwa hoist; gas and steam engine; Sullivan compressor; Cameron pump; 700′ tramway; 125-ton stamp mill with concentrating machinery.

Production: treated in 1912 was 19,689 tons; in 1913, 33,174; in 1914, 36,348; in 1915, 29,968 tons. No recent financial statement has been made. For ten months, 1913, ore averaged $20.54 per ton; recovery, $17.40 per ton; total value, $429,416.

Presumably idle, as no information has been sent us.

WOODBURY COPPER CO. **ARIZONA**

Reported in July, 1916, that H. Cavanaugh and associates of Seattle, Wash., had purchased the property for $200,000 and that work would be begun on the claims. No later returns.

YOUNG MINES CO., LTD. **ARIZONA**

Office: 413 Fleming Bldg., Phoenix, Ariz.

Officers: Geo. U. Young, pres.-gen. mgr.; E. C. Moore, v. p.; G. H. Cunningham, sec.-treas., with Frank H. Parker and W. S. Goldsworthy, directors. G. R. Tingle, supt.

Inc. 1910 in Arizona. **Cap.,** $1,500,000; $1 par; outstanding, 20,000. Annual meeting in June.

Property: the Mammoth group, 12 claims, about 220 acres, 20 miles E. of Mesa, Maricopa county, contains a large disseminated low-grade orebody, said to carry sufficient free milling gold for mining on a large scale by steam shovel or caving. Low-grade dump is said to average $4.50 per ton.

Development: includes 3 shafts, 150′, 320′ and 445′ deep and about 3,000′ of laterals.

Equipment: includes 3 steam hoists, 3 pumps, small compressor, a 20-stamp, 60-ton mill, buildings, etc.

The president reported that: "Property may also be worked on a 350-ton basis on high-grade ore on a 6 to 8-year supply now developed, in addition to 20 years' operation on 1,000 tons per day basis according to engineers' estimates on hand." What was done about it is not known.

MOHAVE COUNTY

AMERICAN FLAG SILVER MINING CO. **ARIZONA**

Office: Kingman, Ariz.

Officers: H. K. Le Claire, pres.; W. C. Rannels, v. p.; Albert J. Rigalli, sec.-treas.

Cap., $1,000,000; par 50 cents. Seeking permission to sell 350,000 shares at 10c. 1,000,000 shares were paid for the property and for organization purposes.

Property. 7 claims, in Maynard district, Mohave county. Reported to have produced rich silver ore in past; idle for about 30 years. Some high grade ruby silver ore has been extracted recently by prospectors.

ARIZONA AMERICAN COPPER CO. **ARIZONA**

B. MasMasters, principal owner, 135 Broadway, New York.

Inc. 1918. in Ariz. **Cap.,** $1,000,000; $1 par; 250,000 shares in treasury. About $400,000 is said to have been spent on the property.

Property: 3 claims, unpatented, 60 shares, located in Mohave county, 75 miles easterly from the St. Thomas, Nevada, terminus of a branch of the Los Angeles and Salt Lake R. R., and 25 miles N. of Peach Springs, Ariz.

Geology: sandstone in flat beds total 450′ thick, underlain by limestone and cut by fissure veins. An "iron dike" cuts formation 150′ from shaft and extends for 2 miles. Ore, both sulphide and oxide, occurs in bunches, 6-8′ thick. A 3′ vein shows ore with 7% copper, 36 oz. silver, and 37% zinc. There are two orebodies, 250′ apart.

Development: by several tunnels and a 70° incline shaft, 218′ deep, with 5 levels.

ARIZONA BASE ORES MINING & MILLING CO. **ARIZONA**

Letter returned unclaimed March, 1919, from former address: c/o C. R. Harris, Kingman, Ariz.

Inc. 1917, in Ariz. **Cap.,** $100,000; 10 cts. par.

Property: in the Wallapai Mtns., Mohave county.

ARIZONA-BUTTE MINES CO. **ARIZONA**

Office: Kingman, Ariz. **Officers:** H. M. Crowther, pres.-mgr.; J. E. Leeper, sec.-treas.

Inc. Feb., 1916, in Arizona. **Cap.,** $150,000; 10 cts. par.

Property: 27 claims, 17 patented, 250 acres; includes the Banner mine and five other one-time producers, 10 miles south of Chloride.

Development: by the 2,300′ Banner tunnel, driving a new 7,500′ tunnel, for which money was secured in July, 1919. The De la Fontaine mine in the Chloride district is opened to depth of 400′ by incline shaft.

Ore: mainly silver-lead, occurs in 8′ vein said to average $15 per ton.

Equipment: 200-ton mill, reported to make a saving of from 75-95% at an average milling cost of 65c. per ton.

Production: totaled $350,000 to end of 1916. In May, 1919, daily shipments were being made.

ARIZONA CHLORIDE MINING CO. **ARIZONA**

Officers: John B. Hughes, pres.-treas.; Edw. B. Hughes, v. p.; I. M. Thompson, sec.; F. W. Jacques, supt.

Inc. in Arizona. **Cap.,** $200,000; par 10 cts.; 1,100,000 issued.

Property: 138 acres, in the Wallapai district, near Chloride, Mohave county. The Windy Point mine is developed by a 145′ shaft in gneiss. Ore is mainly pyrite, arsenopyrite and chalcopyrite, occurring in a fissure vein, 2-4′ wide, with strike N. 42° W. and dip 77° N. E., said to run 3 oz. gold, 486 oz. silver and 21.5% copper p. t. The Bobby Burns group of 7 claims in the same district, acquired in February, 1917, is developed to depth of 250′ by tunnels said to have proved copper ore of commercial value. New shaft now 72′ deep.

Production: totaled $300,000 to end of 1916. Property considered very speculative.

ARIZONA COPPERFIELDS, INC. **ARIZONA**

Company is dead. Was one of the many promoted by George Graham Rice. Fully described in Volume XIII.

ARIZONA-EASTERN MINING CO. **ARIZONA**

Address: P. O. Box 643, Los Angeles, Calif. **Mine Office:** Kingman, Arizona.

Officers and Directors: Wm. Schuette, pres.; S. W. Odell, v. p.; Lewis Lusk, sec.-treas.

Inc. July 9, 1915, in Ariz. **Cap.,** $1,500,000; $1 par; issued 700,000. Bonds authorized, $100,000, none issued.

Property: 23 claims, 1 patented, 375 acres, 2 miles east of Hancock siding, on main line of Santa Fé R. R. and 10 miles south of Kingman, Ariz., includes the Red Hill and Fay mines, showing gold quartz fissure veins in granite porphyry. The mine was worked years ago by Mexicans. Mill tests said to show average value of $11.78 gold per ton, with a 93% recovery in cyanide plant.

Development: by 200′ incline shaft and two 50′ shafts, with 400′ of underground workings.

Equipment: includes gasoline hoist and a 5-ton stamp mill for testing purposes. Company plans further development work. Idle during 1918-1919.

ARIZONA MAMMOTH MINES CO. **ARIZONA**

Mail returned, March, 1919, from Needles, Ariz. W. C. Rannells, mgr.

Installed hoisting plant at property south of Needles, Mohave county; to deepen shaft now down 100′.

ARIZONA MOLYBDENITE CONSOLIDATED **ARIZONA**

Office: 300-304 Los Angeles St., Los Angeles, Calif.

Officers: Theo. F. Bentel, pres.; J. A. Brown, v. p.; J. N. Beardslee, sec.; J. C. Osher, treas., with J. W. Dubbs, L. H. Dutton, and R. L. Van Dusen, directors. E. C. Bradshaw, supt.

Inc. Feb., 1918, in Arizona. **Cap.,** $500,000; 10 cts. par; 3,500,000 issued. Annual meeting, third Saturday in January.

Property: 21 claims, 28 miles from Yucca, Mohave county.

Development: tunnels have opened up molybdenum-copper ore.

Equipment: includes an 80-ton oil flotation plant, which started in June, 1919.

ARIZONA ORE REDUCTION CO. **ARIZONA**

Main Office: 1002 Citizens National Bank Bldg., Los Angeles, Calif. **Mine Office:** Chloride, Ariz.

Officers: R. M. Martin, pres.; Geo. F. Goerner, v. p.-cons. engr.; C. B. Guittard, sec.; L. B. Wood, treas. R. M. Martin, Geo. F. Goerner, B. F. Perkins, L. B. Wood, W. C. Fry, J. W. Brockman, Frank Jenkin, directors.

Inc. 1916 in Arizona. **Cap.,** $1,250,000; par; issued 999,245 shares.

Property: 11 claims, in process of patenting, 1.5 miles S. of Chloride, Mohave county, include the Copper Age, Blossom, Grand Boy and other mines containing 9 parallel fissure veins in granite with strike of N. E.-S. W. and dip of 70-80°, averaging about 2′ wide.

Ore: carbonates and oxides of silver, zinc and copper with gold changing to sulphides at about 60′ depth, and in places percentages of antimony. A representative sample of the sulphide ore is reported to carry: gold 0.02 oz.; silver, 6.6 oz.; lead, 2.1%; copper, 0.10%; zinc, 4.7%; antimony, 2.2%. Estimate of ore reserves are given as 138,178 tons, gross value, $1,617,907, based on metal prices of 1918.

Development and ore extraction has been mainly at the Copper Age mine, with a 360′ shaft, a 2,120′ adit or working tunnel, and 1,450′ of underground workings. On the 170′ level the ore shoot is said to be 300′ long, 3′ wide, and worth $40 per ton in gold, silver, and copper.

Equipment: a 150-ton wet concentrator operated intermittenly, is used to work out the best method of treatment. The machinery on hand consists of a 7″x24″ Sturtevant jaw crusher, Standard ball mills, tables and Deister slimers. Adequate continuous supply of water for milling is a serious problem, the supply showing great fluctuations during the year. A 153,000 gallon reservoir and Dorr thickeners are now installed, and a 750,000 gal. cement tank was being built. The complex nature of the ore makes careful experimental work a prerequisite to success. Three hundred and fifty electric h. p. is used in mine and

mill, auxiliary boilers in reserve. Houses, tools, compressors, etc., have been provided.

ARIZONA-SOUTHWESTERN COPPER CO. **ARIZONA**

Office: 622 Higgins Bldg., Los Angeles, Cal. **Mine office:** Copperville, via Yucca, Mohave Co., Ariz.

Officers: R. H. Weber pres.; Fred Hessel, v. p.; J. H. Hoffman, sec.; C. Hoffman, treas.; preceding officers, W. G. Laidley, T. A. McNeal, C. L. Davidson and E. B. Schermerhorn, directors; John Lefler, mine supt.

Inc. 1907, in Arizona. **Cap.**, $4,000,000; $1 par; issued 3,300,000. Authorized bond issue, $150,000; all outstanding. Annual meeting held in Kingman, Ariz., in April.

Property: 14 claims, 9 patented, 276 acres, including the Pittsburgh mine, in Crow canyon, Cedar Valley district, Hualapai Mountains, 25 miles from Yucca, the nearest rail point. Mine has 2 orebodies, estimated by company to average 30′ in width and to be traceable 2 miles, opened by tunnels of 500′ and 682′, and shafts 400′ and 300′ connected on the 200′ level, with about 5,000′ of workings. Mine, which is quite wet, shows chalcopyrite, galena and sphalerite, estimated by the company to average 0.25% copper, 3% lead, 4% zinc, 10 oz. silver and $1 gold per ton, which seems too high for a large orebody of this type. Company claims to have 100,000 tons of $12 ore on the 200′ level.

Equipment: includes an 85 h. p. electric hoist, steel head-frame, a 12-drill air compressor, smithy and 300-ton concentrator, with 14 Overstrom tables. Planned to continue shaft sinking and do development work on the 400′, 600′ and 800′ levels.

Property has ore, but it is complex, and mining, milling and freight charges high, so that the problem of dividends is one requiring great skill, courage and time, as well as ample funds.

ARIZONA TELLURIUM MINES CO. **ARIZONA**

Mail returned unclaimed, 1919, from Kingman, Ariz.

Officers: Thos. H. Condon, pres.; Geo. A. Shea, sec.-treas., with Carl Bertschinger, W. C. Pedlar, directors.

Property: claims in the Maynard district, 15 miles E. of Kingman.

Development: by 200′ tunnel and shaft. Presumably idle.

ARIZONA VENTURE CORPORATION **ARIZONA**

Reorganized as the Waldron Mining Co., which see.

ARIZONA WASHINGTON MINE. **ARIZONA**

Address: F. E. G. Berry, Mineral Park district, via Chloride, Ariz.

Property: a silver mile reported in September, 1919, to be opening up rich ore.

BELLE UNION MINE. **ARIZONA**

Address: Chloride, Mohave county, Ariz.

BANNER GOLD MINING & MILLING CO. **ARIZONA**

Office: Kingman, Ariz.

Officers: B. L. Vaughn, pres., San Diego, Calif.; J. C. Brian, v. p.; E. E. Bollinger, sec., Kingman, Ariz.

Cap. $1,000,000; $1 par; issued 779,250 shares. 500,000 shares paid for property. May, 1918, offered 50,000 shares at four cents.

Property: 9 claims in the Union Pass district, Mohave county. Mine is said to carry the extension of the rich Sheep Trail vein, and a 400′ shaft has been sunk on milling ore. Shipping ore reported on 400′ level in drift 300′ west of shaft.

BERKLEY MINE **ARIZONA**

Address: T. J. Sparks, Kingman, Ariz.

Property: in 1918, this old silver mine in the Deluge Wash section was pumped out, and said to be operating a 40′ shaft on a 6′ vein, from which high-grade ore was mined.

BULLION HILL MINES CO. **ARIZONA**

Controlled by Knight Investment Co., Provo, Utah.

Officers: J. Knight, pres., Provo, Utah; A. M. McDonald, v. p., Eureka, Utah; W. L. Mangum, sec.-treas., with J. W. Knight and M. C. Godbe, directors; **H. M. Eakin, supt.**

Cap., 1,000,000 shares, par value 10c; all issued. Annual meeting 2nd Wednesday in February.

Property: 4 claims, near the Tennessee mine at Chloride, Ariz. Reported that vein was cut on the 300′ level. In places it is said to be 16′ wide. Property is in prospective state.

CATHARINE MINE. **ARIZONA**

See New Comstock Mining Co.

CERBAT SILVER MINES CO. **ARIZONA**

Office: Kingman, Ariz.

Officers: M. S. McEniry, pres.; E. W. Hokom, sec.-treas., with W. L. Hokom and J. M. Sheridan, directors.

Property: the old Imperial and White Elephant claims in the Wallapai mining district, 12 miles from Kingman and 3½ from Cerbat, Ariz.

Development: White Elephant claim has a 285′ shaft. The Imperial claim is being developed on the 125′ level, using a 15 h. p. hoist.

Company organized to lease property with option privilege. The ore, silver-lead, is treated in the Stiffey custom mill.

Production: to end of 1916 said to have been $300,000.

CERBAT SILVER MINING & MILLING CO. **ARIZONA**

Mine Office: Chloride, Ariz.

Officers: C. C. Perdoe, pres.; F. E. Steele, sec.; P. Potter, treas.

Inc. 1919 in Delaware. **Cap.**, $1,000,000; $5 par; issued 80,000 shares. Is reorganization of original company, whose capital of $1,000,000, $1 par, are exchangeable on basis of 5 of old for 1 of the new company. Transfer agent, Registrar & Transfer Co., N. Y.

Property: company has 10-year lease with 10-year renewal privilege on 8 claims and 3 millsites in the Chloride district, including the Elkhart, Argyle, Edgar, and Victoria millsite, with 9 veins showing. The Elkhart, which adjoins the Tennessee mine 1 mile E. of Chloride, is traversed by a strong vein, in places 10′ wide, with 1′ 5″ of pure galena and 8 feet of galena and silver with some gold and zinc.

Developed by shafts 200′ and 500′ deep, short tunnels, and about 2 miles of workings.

Gross production in past is said to have been about $1,000,000.

Ore reserves are estimated at over $500,000 proven ore, and $1,000,000 probable ore.

Equipment: crude oil hoist, 150-ton concentrating mill, etc. Propose sinking shaft deeper and installing flotation plant. Reported on by F. E. G. Bery.

CHARCOAL CANYON MINING CO. **ARIZONA**

Address: J. P. Ryan, pres.-sec., Chloride, Ariz.

Property: 5 claims, near Cerbat, 9 miles S. of Chloride, Mohave county, Arizona.

Development: by open cut that exposed ore 50′ wide and 200′ long. Thirty tons of this yielded $27 gold per ton. Exploratory work was under way in 1917.

CHLORIDE CERBAT COPPER CO. **ARIZONA**

Office: Chloride, Ariz.

Owners: J. T. Winn, C. P. Richards, Dr. A. W. Kirsch of Prescott.

Property at Mineral Park, near Chloride, Mohave county, opened by about 400′ of workings. Said to show a 3′ vein. Values up to 60 oz. silver and 20% lead, with some copper.

CHLORIDE GOLD MINING CO. **ARIZONA**

Taken over by the Chloride Samoa Mines Co., which see.

CHLORIDE MINING CO. **ARIZONA**

Address: Chloride, Ariz., or W. B. Twitchell, Phoenix, Ariz.

Cap., $2,000,000, $1 par; increased 1917 from 1,500,000, par 10c; 570,000 shares in treasury.

History: the Hidden Treasure mine, owned and operated for 17 years by Thomas Thornton, was transferred to the Chloride Mining Co. in 1915. In 1917, 400,000 shares were sold, and then W. P. Bonbright & Co. of New York, took up 680,000 shares after an examination by their engineer.

Property: Hidden Treasure, Revenue, Chenango and Oro Fino claims, 2½ miles east of town of Chloride.

Geology: strong veins in granite and schist.

Development: 500 tunnel E. on Hidden Treasure vein. Also a crosscut tunnel, driven 760′ N. on Oro Fino claim cutting 4 veins at depth of 234′. The most northerly (No. 1) vein opened 400′ E. and W. drifts disclosing ore for 300′, the west face being in pegmatite.

CHLORIDE QUEEN MINING CO. **ARIZONA**

Office: Phoenix, Ariz. J. M. Kellogg, mgr.

Officers: C. C. Thompson, pres.; R. C. Sanfley, v. p.; R. A. Jarrott, sec.; W. S. Goldworthy, treas.; all of Phoenix, Ariz.

Property: 5 claims and 2 fractions, better known as Sunday School and Silver Mtn. groups near Chloride., Mohave county.

Development: by shaft 300′ deep, with 150′ drift on 200′ level and tunnels 100′ and 200′ long. Report silver ore of commercial grade opened.

Equipment: includes air compressor and hoist.

CHLORIDE SAMOA MINES CO. **ARIZONA**

Office: 622 Higgins Bldg., Los Angeles, Cal. **Mine Office:** Kingman, Mohave county, Ariz.

Officers: L. Hoffman, pres.; A. B. Seelye, v. p.; J. H. Hoffman, sec.-treas., with C. Hoffman and R. Mangold, directors.

Inc. Feb. 26, 1917, in Arizona. **Cap.,** $1,500,000; shares $1 par; non-assessable; 1,019,050 issued.

Property: the Samoa mine, formerly owned by Chloride Gold Mining Co., consists of 6 claims, 1 patented, 125 acres, in Wallapai district, 3½ miles E. of Chloride, Ariz., said to show vertical quartz vein in granite, 8 to 36″ wide and 400′ long. Ore is a sulphide said to carry gold, silver, lead and iron worth $40 per ton. Lead content is given as 8% and iron 24%.

Development: by 300′ shaft and 3,500′ of workings. Crosscut tunnel being driven 1,664′ to open deposit to depth of 710′. Six veins are expected to be cut, all widening in depth, according to a cross section published.

Equipment: 15 h. p. Witte hoist and 2 compressors.

Production: 96 carloads of ore in 1903-1908, the last of 30 tons assaying 1.2 oz. gold, 11.5 oz. silver, 3% lead, worth $28.79 per ton. Total yield about $250,000. In 1918 lessees were working on the south end of property where they encountered some good ore.

Prospectus states that the 6 parallel fissures are substantially identical in character with the Granite Mountain mine of Butte, Montana, and that there is proven calculative ore estimated at $5,000,000, which is interesting if true.

CHLORIDE & TELLURIDE MNG., MLG. & LEASING CO. **ARIZONA**

Address: Bulkeley Wells, 1213 Hobart Bldg., San Francisco, Calif.

Property: 3 claims near the Tennessee mine, 1 mile E. of Chloride, Ariz., stated to have a fissure vein 5′ wide, strike N.-S., intersecting an E.-W. vein. Some rich ore was found on the 175′ level. Presumably idle.

CHLORIDE X-RAY MINING CO. **ARIZONA**

Main office: 33 N. First Ave., Phoenix, Ariz. Mine at Chloride, Ariz.

Officers: T. A. Barker, pres.; S. Chittick, v. p.; A. W. Galpin, sec.; W. H. Mann, treas.; J. Spargo, mine mgr.

Inc. in Arizona. **Cap.,** 1,500,000 shares, par $1, issued 700,000 fully paid non-assessable; no bonds.

Property: Hillside group of 6 claims, in the Chloride district near base of Rainbow Mountain. Developed by a tunnel 743′ long in May, 1917, reported to have 400′ of vein 3½′ wide carrying $30 per ton. Values are in gold, silver and lead. Tunnel is being driven to intercept the X-Ray vein. Property is a prospect that is to be listed on N. Y. Curb and which company says "will thus give our stock-holders a chance to realize speculative profits."

CLEOPATRA COPPER & GOLD MINES CO. **ARIZONA**

Main office: Warner & Nelson, Central Bldg., Phoenix, Ariz.

Officers: E. F. Thompson, pres.; Anson H. Smith, v. p.; J. W. Morgan, sec.-treas., with Harvey Hubbs, directors, all of Kingman, Ariz.

Inc. 1917 in Arizona. **Cap.**, $3,000,000; $1 par; 1,510,000 outstanding. Annual meeting, third Wednesday in January. Arizona Central Bank, Kingman, Ariz., transfer office.

Property: the Cleopatra and Palo Verde groups, 19 unpatented claims, in the Owens mining district, Mohave county, 15 miles from Swansea by road. Claims show gneiss and schist capped by 1 to 20′ of limestone, and cut by quartz porphyry dikes. These rocks are cut by a zone of brecciation and crushing 600′ wide and exposed for 1,200′ in length, that shows iron and copper staining. The ore contains gold and copper, present as carbonates and sulphides; assays of extensive sampling work show values of 2.9% copper with $1.32 gold, 0.3 oz. silver, 87.6% insoluble, and 4.5% iron. Five hundred thousand tons of ore, said to be exposed over 15 acres of ground.

Development: by shallow pits and open cuts. Claim 600,000 tons ore in sight, which is excessive. Stock issue offered at 50 cents.

C. O. D. MINING CO. **ARIZONA**

Address: R. M. Wilde, Kingman, Ariz.

Property: gold mine 16 miles N. of Kingman, Mohave county.

Optioned by Rico Consolidated Mining Co., and first payment of $15,000 made February, 1919. See Rico Consol. Mining Co.

Reported in August, 1919, that mine was taken over by M. B. Dudley, and was being unwatered to 300′ level and machinery installed.

COMMERCIAL MINING CO. **ARIZONA**

Office: care Phelps, Dodge Corp., 99 John St., New York. **Mine offices:** Prescott and Skull Valley, Yavapai county, Ariz. Maj. A. J. Pickerell, gen. mgr. Is controlled by Phelps, Dodge Corporation.

Property: includes the Senator and Snoozer mines, producing high-grade sulphide ore from fissure veins and the Copper Basin mine with 18 claims, patented, in the Copper Basin, about 6 miles from the Santa Fé railroad; also the Copper World mine, 14 miles east of Yucca, Mohave county, reported under option to Charles Adams.

Development: by a 300′ two-compartment shaft, bottomed in good ore and 2 tunnels, that opened up large bodies of 3% oxidized ores. Employs an average of 25 men and ships from 80 to 100 tons per day of 7 to 10% oxidized ore.

Copper Basin mine yields oxidized ores found as segregations in altered monzonite, but despite a promising outcrop, no body of commercial ore has yet been found in depth as on the adjacent Loma Prieta mine. Much of the ore shipped is a cemented stream gravel.

CONTINENTAL CONSOLIDATED COPPER CO. **ARIZONA**

Office: 517 Thacher Bldg., Pueblo, Colo.

Officers: F. E. Wallace, pres.-treas.; G. E. Wallace, v. p.; G. S. Treader, sec. F. E. Wallace, G. E. Wallace, D. E. Arnitt, J. C. McCoy, F. J. Weber, L. T. Gray, directors.

Inc. 1918, in Arizona. **Cap.**, $1,500,000; shares $1 par; outstanding 135,000 shares.

Property: 400 acres, Owens mining district, Mohave county, 40 miles north of Wenden. Ore occurs in 2′ vein in altered schist, course N. W., dip 45°. Developed by prospect pits and 60′ incline shaft. Assays reported as 5.6% copper and $3 to $100 gold.

Prospect has serious transportation difficulties to overcome.

COPPER AGE MINE. **ARIZONA**

Owned by the Arizona Ore Reduction Co., which see.

COPPER FAME MINING CO. **ARIZONA**

Mail returned unclaimed, March, 1919, from former address, P. O. Box 692, Kingman, Ariz.

Officers: S. E. Barron, pres.-treas.; R. L. Gray, v. p.; E. L. Betsworth, sec.; above with F. L. Rogers and C. W. Herndon, directors.

Inc. 1917 in Ariz. **Cap.**, $1,500,000; shares $1 par; 250,000 shares offered the public at 10c. to raise funds for development and equipment. Company paid 700,000 shares of stock to the Gold Cliff Exploration Co. for its property.

Property: 10 claims, 153 acres, in the Cerbat range, Wallapai mining district, Mohave Co., Ariz., 16 miles N. of Kingman. Claims adjoin the Union

Basin Mining Co. property and show quartz bearing fissure veins in igneous rocks, with ore in shoots.

Development: by many shallow shafts, deepest 60′, and a 110′ tunnel with 15′ crosscut. All openings reported to expose ore, assays being given as $4 to $20 gold, 10 to 20 oz. silver, 3 to 30% zinc and 5 to 23% copper, higher values undoubtedly from picked samples. Presumably idle.

COPPERFIELD PORPHYRY COPPER MINING CO. **ARIZONA**

Dead. Mail returned unclaimed, June, 1919, from Kingman, Ariz., stamped "Out of business."

Property was under option, 1916-17 to the Arizona Copperfields, Inc.

Address: Wm. Barrett Ridgely, pres., Felt Bldg., Salt Lake City, Utah, and 40 Exchange Place, New York City (now closed).

Cap., $1,000,000; shares $1 par; 500,000 in treasury.

Property: 200 acres in the Grand Wash, Mineral Park section, Wallapai mining district, Mohave county, Ariz., about 4 miles from Chloride and 22 miles north of Kingman. Ground covers high bluffs, called Ithaca and Goat Peaks, of old turquoise mines, which were drilled some years ago and very low-grade copper ore found. Copperfield group covers lower slopes where waters leaching bluffs would gather. Surface for 1,000′ across said to show copper stain.

Development: by 200′ shallow tunnel, reported to show 2% copper, both as native and sulphide, and 3 churn drill holes. Property is not a new discovery, and the 4 drill-holes used to "indicate" tonnage showed values too low to be of commercial interest. Control of the company was acquired in 1916, by the Arizona Copperfields, Inc., now defunct, a creation of George Graham Rice, which took 89% of the capital stock.

COPPER WORLD MINING CO. **ARIZONA**

See Commercial Mining Co., Arizona.

CUPEL MINING CO. **ARIZONA**

Address: Chloride, Ariz. D. E. Blake, supt.

Reported Nov., 1917 optioned to J. H. Conway. A long abandoned property said to have produced $1,500,000. Shaft 300′ deep. Average assay about 40 oz. silver for drift. Management says there are "large bodies of milling ore under the caved workings" which is interesting, if true.

CYCLOPIC MINE. **ARIZONA**

Owner: Stanley C. Bagg, Chloride, Ariz.

Property: 6 claims in Gold Basin district, 25 miles north of Chloride, in the Cerbat range. Ore occurs in fissure vein, said to average $12 gold per ton. Developed by shafts 75′ deep.

Equipment: includes 75-ton cyanide plant, 12 h. p. hoist and compressor.

DAISELL MINING CO. **ARIZONA**

Mail returned Feb. 21, 1919, from P. O. at Cerbat, marked "Out of Business."

Officers: M. B. Dudley, pres.-mgr.

Property: the old Twins mines at Cerbat, Mohave county. Old shaft 330′ said to have been re-timbered and development work reported under way, 1919, showing good ore.

DISTAFF CHLORIDE MINING CO. **ARIZONA**

Mail returned March, 1919, from Chloride.

Officers: J. R. Evans, pres.; D. L. Parham, v. p.; B. W. Evans, sec.-treas.

Inc. 1916 in Arizona.

Property: 4 claims, 70 acres in Chloride district, Mohave county, Arizona. Ore carries silver, with some gold and lead. Work resumed in October, 1916.

Development: by 285′ shaft with 5 levels. All work on the Distaff vein up to 1917 had been done by lessees.

Equipment: includes 25 h. p. gas. engine, compressor, etc.

Production: totaled $200,000 to end of 1916.

ELKHART MINES CO. **ARIZONA**

See Cerbat Silver Mining & Milling Co.

EMERALD ISLE COPPER CO. **ARIZONA**

Address: Robt. Jacobson, cons. engr., Chloride, Ariz.

Officers: A. J. Brawley, pres.; J. C. Stricker, v. p.; J. H. Conway, treas.; Carl G. Krook, sec., with James Robertson, W. C. Gould and R. C. Jacobson, directors.

Property: about 3 miles S. of Chloride. Reserves said to be 200,000 tons of 2.85% copper ore.

Equipment: with 70-ton experimental leaching plant and crusher at Mineral Park, producing 2,500 lb. electrolytic copper daily in Dec., 1918. Mine has electric power, compressor, etc. No figures are procurable.

EMERSON MINE. **ARIZONA**

Address: E. M. Bind, mgr., Chloride, Ariz.

Property: 6 claims, 5 patented, in Chloride district, Mohave county, Ariz., has an 18″ vein said to carry 19% copper, 3 oz. silver and $2.80 gold per ton.

Development: by 175′ shaft and 3 tunnels, longest 600′, also 108′ winze below one tunnel. Ore carries gold and a little silver. In April, 1917, 18″ of rich copper-silver ore had been opened at 200′.

Equipment: 80 h. p. gas. engine, 6-drill compressor, 25-ton mill, etc.

ENTERPRISE MG., REDUCTION & IMPROVEMENT CO. **ARIZONA**

Kingman, Mohave county, Ariz. Maj. W. A. Mensch, pres. and gen. mgr., 1729 29th St., San Diego, Cal.

Property and equipment reported sold at sheriff's sale for a debt of $2,169 in 1914. Described in Vol. XI, Copper Handbook.

ESTALEAH CERBAT SILVER MINING CO. **ARIZONA**

Address: Barney Harmsen, mgr., Cerbat, via Kingman, Mohave county, Arizona.

Property: formerly owned by J. H. Kane of Cerbat, said to have produced rich ore in the past.

FOUNTAIN HEAD MINE. **ARIZONA**

A. C. Goodwill, Kingman, Ariz., has an option on this mine at Stockton Hill, near Kingman. The vein on the surface is reported to be 80′ wide with values of gold, silver, copper and lead. Tunnel 270′ long has encountered some lead-silver ore.

FRISCO GOLD MINES CO. **ARIZONA**

Office: Jas. A. Roberts, sec., 257 Broadway, New York City, Ray L. Dimmick, mine supt., Kingman, Ariz.

Officers: C. S. Merrill, pres.; Chas. A. Lindsley, v. p., with P. G. Bartlett and Robt. Brown, directors.

Inc. 1913 in Maine. **Cap.,** 3,000,000 shares; 2,920,000 issued.

Property: shows gold-silver ore in veins in rhyolite. Shaft 200′ deep with crosscuts to orebody.

Equipment includes 125-ton cyanide plant, crude oil engine, etc. Operations resumed March, 1919.

GATES AJAR MINING CO. **ARIZONA**

Address: J. L. Craig, 246 S. Thirteen E. St., Salt Lake City, Utah.

Property: near Kingman, Mohave county. A contract was let for 200′ of tunneling in August, 1919.

GENERAL METALS CO. **ARIZONA**

Address: G. W. Peer, mgr., Chloride, Ariz.

Officers: G. W. Peer, pres.; R. M. Martin, v. p.; B. M. Brown, sec.

Property: the Copper Age group of 7 claims, 2 miles S. E. of Chloride, Mohave county, Ariz.

Control of this company is held by the Arizona Ore Reduction Co. of Chloride, which also controls the Immediate Ore Reduction Process, which intended late in 1916 to erect 6 or 8 custom plants in Arizona, using the "Immediate" process.

Development: by shafts, 20 to 250′ deep; a main 500′ shaft and over 2,000′ of workings. Considerable copper ore is said to have been opened.

Equipment: includes 150 ton "Immediate" plant.

No recent returns, presumably idle.

GEORGIA MINING CO. **ARIZONA**

Head office: 210 Judge Bldg., Salt Lake City, Utah. **Mine office:** Chloride, Arizona.

Cap., 1,000,000 shares, 10c par.

Officers: A. O. Jacobson, pres.; A. H. Godbe, v. p.; John Pingree, treas.; E. H. Matson, sec.; above with H. M. Eakin, supt.; F. W. Price, L. R. Eccles, G. S. Holmes, G. S. Holmes, Jr., and P. O. Perkins, directors; W. T. Beardsley, asst. sec.

Property: 2 claims between the Tennessee and Payroll mines, both large producers. Ore carries zinc, lead, copper and gold.

Development: main shaft down 300′. Good ore was cut at 100′ and 200′.

Equipment: gasoline engine, hoist, compressor, and machine-drills. Employs 14 men. Considered promising in 1917, but whether now is not known.

GLADSTONE UNITED METALS CO. **ARIZONA**

Address: Phoenix, Ariz. F. C. Smith, supt., Chloride, Ariz.

Officers: F. C. Smith, pres.; W. B. Twitchell, v. p.; W. T. Smith, sec.-treas.

Inc. 1916 in Arizona. **Cap.,** 150,000 shares, $1 par.

Property: 7 claims, 3 miles east of Chloride, Mohave county, Ariz. Idle several years. Claims show igneous rocks, which at surface show much alteration and subsequent mineralization. Rhyolite dikes run into one main dike, in which are the veins. The Gladstone vein 15′ thick with 6′ of quartz ore on hanging wall side, and altered prophyry between this and narrow foot-wall quartz streak. Dip of vein 80°.

Development: by shaft 140′ deep, sunk on hanging wall, drifts, and tunnel. Said to show a strong vein at 120′, assaying $35 per ton in gold, silver, zinc, copper and lead. Surface showings on Gladstone and Longfellow claims regarded as good.

Equipment: hoist, blacksmith-shop, bunk-house.

Work will be continued on the main vein. A mill is contemplated.

No recent reports.

GOLCONDA CONSOLIDATED **ARIZONA**

Taken over by Union Metal Corporation, which see.

GOLCONDA EXTENSION MINING CO. **ARIZONA**

Address: O. D. M. Gaddis, Kingman, Ariz.

Officers: J. E. Perry, pres.; C. Metcalfe, sec.-treas.; O. D. M. Gaddis, directors.

Cap., 1,000,000 shares, all issued, 85% held by Messrs. Gaddis and Perry.

Property: 19 claims, 3 patented, adjoining the Golconda mine on the N., 16 miles N. of Kingman.. A number of mineralized veins run through property.

Development: by main shaft, down 354′, and considerable openings. Lessees extracted 2,500 tons of $80 ore. At 280′ there is said to be 4′ of gold-silver ore. Plan building milling plant.

Production: totaled $500,000 to end of 1916.

Regarded as promising but needs development. Idle at last accounts.

GOLCONDA MINE. **ARIZONA**

See Union Basin Mining Co.

GOLD BACK MINING CO. **ARIZONA**

Mail returned unclaimed, March, 1919, addressed to Edw. Copley, mgr., Chloride, Ariz.

S. S. Wold, pres, H. T. Widney, sec., both of Pasadena, Cal.

Property: 2 claims owned and 2 under option, 2 miles south of Chloride, Mohave county, Ariz., showing fissure vein carrying complex gold-silver-lead-copper-zinc ore. Development on 150′ level said to show 7′ of ore assaying $5 gold and silver, $20 lead, $15 copper, and $9 zinc (June, 1917).

Larger hoist and compressor were to be installed in 1917, but no recent returns.

GOLDEN CROSS METALS CO. **ARIZONA**

Address: 10 N. Second Ave., Phoenix, Ariz.

Officers: W. B. Twitchell pres.; J. W. Sims, v. p.; Shirley Christy, sec.-treas.; F. C. Smith, supt., Chloride, Ariz.

Cap., $150,000; par 10c; outstanding 882,800 shares.

Property: 2 claims near Chloride, said to have a fissure vein in granite with 8′ of gold ore; pay streak said to be 12″ in width and to assay $20 in gold and 2 to 3 oz. in silver. Opened by a 75′ shaft. Equipment includes a 15 h. p. hoist. Plans sinking shaft to 300′ level. Property has promise.

GOLDEN HAMMER. **ARIZONA**

Owner: F. C. Smith, Chloride, Ariz.

Property in Mineral Park, south of Chloride, developing during 1918 by Mineral Development Co., has reverted to owner. Ore—gold-lead-zinc. Developed by shaft and 300′ tunnel.

GRANBERG SILVER MINES CORPORATION. **ARIZONA**

Office: Oshkosh, Wis. **Mine office:** H. Johnson, Kingman, Ariz.

Officers and Directors: H. O. Granberg, pres.; H. Johnson, v. p.; N. Granberg, sec-treas.

Inc. March, 1918, in Arizona. **Cap.**, $500,000; $1 par; issued 270,000.

Property: 4 unpatented claims in the Black Mtn. Range, Chloride district, said to show 3.5′ fissure vein in pegmatite and schist, course S. 35° E., dip 78°. Ore carries silver and lead, with some gold and zinc.

Development: by 90′ incline shaft with 110′ of underground workings, showing 18″ to 24″ shipping and 18″ low-grade milling ore.

GRAND GULCH MINING CO. **ARIZONA**

Office: 503 McIntyre Bldg., Salt Lake City, Utah.

Officers: Wm. H. McIntyre, pres.; Frank R. Snow, v. p.; W. P. Jennings, sec.-treas.; preceding officers, Jas. E. Jennings, I. W. Little, Jos. A. Jennings, directors; W. P. Jennings, mgr.; S. R. Calloway, supt. St. Thomas, Clark county, Nev.

Inc. Sept. 15, 1874, in Utah. **Cap.**, $30,000; shares 10c par; issued 240,000.

Dividends: total $64,758 to Dec. 31, 1918. Annual meeting, first Monday in February.

Property: 9 claims 1 patented, 180 acres, in the Bentley district of Mohave county, Ariz., but more easily accessible from Nevada than from southern or central Arizona, owing to the barrier to access presented by the Grand cañon of the Colorado river.

Geology: property shows sandstone and limestone carrying an apparently circular zone of copper impregnations, also having copper in the bedding planes. Ores occur as cuprite, melaconite, malachite, azurite and chalcocite, estimated by management to assay 10% to 35% copper and 4 oz. silver per ton. Shipped some cars of 50% ore.

Development: by a 500′ shaft. Mine is 45 miles from St. Thomas, Nev., railroad terminal on the Salt Lake Route. The mine has been in practically continuous operation since 1899.

Equipment: includes a 22 h. p. gasoline hoist, good for 800′ depth, 50 h. p. semi-Diesel engine, air-compressor, etc. There are 9 buildings and a small and antiquated smelter, of no present value.

Production: in 1918 shipped 1020 tons of ore containing 11% to 35% copper. Property temporarily closed down.

GRANITE POINT SILVER-LEAD MNG. DEV. CO. **ARIZONA**

Operating an old-time silver-lead mine in the Wallapai range, Mohave county, near the Leviathan molybdenum mine. Property was being reopened by E. Hausman and W. D. Kinsey, of Jerome, Ariz., in 1917.

Development: by 300′ tunnel which is to be driven 1,800′. Average sample of the main ledge is reported to assay $16.40 in gold-silver-lead.

Believed to be idle. Mail returned unclaimed, March, 1919.

HACKBERRY CONSOLIDATED MINING CO. **ARIZONA**

Office: 303 Title Ins. Bldg., Los Angeles, Calif. **Mine office:** Hackberry, Arizona.

Officers: G. S. Holmes, pres., Salt Lake City; Chas. E. Green, sec., with C. W. Herndon, directors. Wm. Neagle, mgr.

Inc. March, 1917. **Cap.**, $2,000,000; $1 par; listed on New York Curb; $1,000,000 issued.

Property: the old Hackberry mine, located in 1874 by W. B. Ridenour, in the Peacock district, 26 miles N. W. of Kingman, Arizona.

The mine is credited with a production of $2,000,000 in high-grade silver ore. In the early days a 500′ incline shaft, giving a vertical depth of 360′ was sunk on the vein. At this depth water stopped operations. A new shaft sunk on vein to depth of 900′, has, it is said, developed 200,000 tons milling ore above the 600′ level, containing 20 oz. silver, $1.50 in gold, besides lead and zinc. Vein is said to be from 4 to 16′ wide, stopes up to 400′ long. High-grade ore is also found in the vein. The 600′ level has been driven 700′, and 278 samples averaged 32 oz. silver per ton.

Equipment: over $500,000 has been spent on development and machinery, including a 250-ton flotation mill finished in April, 1919, employing ball-mills and four K. & K. flotation machines. Recovery was 85% in September. The monthly income was then between $30,000 and $40,000.

In Dec., 1919, the mill was closed on account of insufficient ground open for stoping, but high-grade silver ore was to be shipped to smelter.

HIGHLAND MINING & MILLING CO. **ARIZONA**

Address: C. B. Bell, Chloride, Ariz., and L. R. Meyers, Minneapolis, Minnesota.

Property: formerly owned by the Middle Golconda Mines Co. The Middle Golconda, Golconda, and O'Dea mines were consolidated in April, 1919. The second named has been a big zinc producer.

Geology: veins in igneous rocks carry zinc ore, with small amount of lead, occurs in shoots, or expansions of the vein, 6 to 20′ wide.

Development: funds are now available for development of the group. The Golconda has been opened to a vertical depth of 800′. A tunnel is to be driven to cut out the veins of the group at 1,000′ depth.

HOLMES MIDNIGHT MINES CO. **ARIZONA**

Reported sold in 1916 to G. H. Holmes, Salt Lake City, Utah, for $250,000 and transfered to company; 85% of stock held by Mr. Holmes and by Jim Murray of Butte, Mont.

Property: 6 claims, 1½ miles S. of Chloride, Mohave county, Ariz., said to have 25,000 tons of gold-copper ore developed above 300′ level. Orebody on 100′ level, 56′ thick, averages 10% zinc and $7 gold.

Equipment: includes 10-stamp mill and concentrator, with hoist good for 1,000′.

Production: total $100,000 to end of 1916; no data since then.

HOME PASTIME MINE. **ARIZONA**

Address: J. M. Prisk or J. E. Hoover, Mineral Park, via Chloride, Mohave county, Ariz.

Property: formerly known as the Rattlesnake, a producer of rich silver ore. Main shaft is 300′ deep.

By September, 1919, the 80′ level had been cleaned out and 8′ of 40 oz. silver ore, with some gold, was exposed. A 12 to 18″ streak reported to have assayed up to 204 oz. per ton. One carload shipment made.

HUGHES ARIZONA COPPER CO. **ARIZONA**

Office: Continental Sec. & Inv. Co., 607 McIntyre Bldg., Salt Lake City, Utah.

Officers: J. B. Hughes, pres.-treas.; E. B. Hughes, v. p.-mgr.; H. M. Parsons, sec.

Inc. 1916. **Cap.**, $1,000,000; $1 par; 500,000 shares outstanding; in trust for development purposes, 500,000 shares.

Property: 5 claims known as the Copperhill and Alma mines, 2½ miles S. E. of Chloride, Ariz. Also has a 2-year lease on the Bay State mine of the Arizona-Bay State Co., providing for a 15% royalty on all ore extracted. Veins are well defined, 10′ to 20′ wide and traceable 3,000′ across claims.

Development: by 500′ tunnel said to be driven on the vein, and for about half this distance, in ore. A shaft has been started and was 100′ deep, May, 1917. Prospecting by core drills in 1918 is said to have shown satisfactory results.

Lessees working on the Bay State claim near the Midnight, say the ore carries antimony besides copper, silver, lead and zinc values.

A highly speculative venture.

ILLINOIS EXPLORATION CO. **ARIZONA**

Address: W. J. Jennings, Kingman, Ariz.

Officers: H. C. Chapin, pres.; Lucille Roberts, sec.

Property: undeveloped claims in the Chemehuevos mountains, west of Kingman.

JEMISON MINES CO. **ARIZONA**

Head office: Wallace, Idaho. **Mine office:** Chloride, Ariz.

Officers: G. W. Kays, pres.; Henry Kehoe, v. p.; Charles McKinnis, sec.-treas. and gen. mgr., with C. G. Crook and J. P. Smith, directors.

Inc. 1917 in Arizona. **Cap.**, $1,500,000; shares $1 par; non-assessable.

Property: 4 claims and fractions, 17 miles N. of Kingman in the Wallapai district, Mohave county, Ariz., ½ mile from the well-known Golconda mine at Chloride.

Development: main tunnel 500′ long, being extended E. 350′ to connect with old workings above. Ore-shoot has been proven continuous for 300′ and is from 3 to 7′ wide, with $25 to $48 per ton in gold, silver and copper values. A shoot carrying arsenopyrite on the foot-wall contains as high as 10 oz. gold per ton. Near this shoot a shaft is being sunk in ore from the main tunnel, hand-sorted ore paying half the expenses. In 1918, lessees were shipping some ore.

Equipment: 25 h. p. Fairbanks-Morse hoist, 5-drill compressor, pump, houses, etc.

JUNO MINE. **ARIZONA**

Address: Wm. Miller or Mrs. Sophy Loy, Long Beach, Calif.

Property: one of the earliest locations in the Chloride district, Mohave county.

Development: by 570′ shaft and 2,000′ open-cut. **Production:** totaled $500,000 to end of 1916. No recent information received.

KEYSTONE CONSOLIDATED MINING CO. **ARIZONA**

Address: 908 City Natl. Bank Bldg., Los Angeles, Calif.

Officers: G. S. Holmes, pres.; W. O. Kay, v. p.; T. H. Fitzgerald, sec.-mgr.; John Schneider, treas., with A. Patterson and A. McNally, directors; F. W. Sherman, supt.

Inc. May, 1916, in Arizona. **Cap.** $2,000,000; $1 par; assessable; all outstanding. Bonds authorized $660,000; outstanding $125,000.

Property: 8 patented claims, including the Keystone mine, in Mineral Park, Cerbat Range, formerly owned by Ross D. McCausland of Kingman.

Ore: lead-silver-zinc-copper bearing, containing 2 to 4% copper, 12 to 24% zinc and over 30 oz. silver per ton, as sampled from dumps. Past production said to be $150,000.

Development: by 300′ shaft, with three levels and total of 3500′ underground workings.

Equipment: mill has been remodeled, using the Richmond flotation system and accessories to treat dump ore and if successful, mine will be reopened. Claim to have ore reserves of 100,000 tons.

Probably a fair mine, but had a wrongly-designed plant rushed up before it was needed. Company was consolidated with the Silver Keystone Co. in 1917. Examined by Fred Close, Wm. Nagle and M. McIntyre.

Production: totaled $150,000 to end of 1916.

KINGMAN ZINC MINING CO. **ARIZONA**

Office: B. X. Dawson, Kingman, Ariz.

Cap., $1,000,000; shares $1 par; 800,000 shares outstanding.

Property: 6 miles from A. T. & S. F. R. R. in the Chloride district. Some hand-sorted silver-zinc ore has been shipped by lessees.

Not favorably regarded, as the promotions of Mr. B. X. D. are looked upon with suspicion by many people.

LA ANOZIRA GOLD MINING CO. **ARIZONA**

According to statement of vice-president and engineer, company went out of business in 1917. For full description see Vol. XIII, p. 371.

LEVIATHAN MINES CO. **ARIZONA**

Office: 512 Sellwood Bldg., Duluth, Minn. **Mine office:** Yucca, Ariz.

Officers: Theo. Hollister, pres.; G. Carlson, v. p.; C. P. Craig, sec.; C. S. Tremelling, treas.; E. M. Kelly, supt.

Inc. Oct. 14, 1914, in Arizona. **Cap.,** $1,000,000; $1 par; 893,902 shares issued. Annual meeting first Tuesday in December.

Property: the Whale & Copper Wonder mines, 7 claims, about 120 acres, in the Copper canyon, Cedar mining district, Mohave county, Ariz., shows copper-molybdenite-silver ore in 2 quartz veins traversing an altered granite. The main orebody said to be 7′ wide and proven for 600′ in length; runs N. 8° E. and dips 80° E. Ore said to average 1% molybdenum, with some copper and silver. Vein reported to be 14′ wide at 100′ level.

Development: 250′ shaft and 2 tunnels 60′ and 400′ long with 252′ and 400′ drifts.

Ore reserves: estimated at 100,000 tons blocked out.

Equipment: includes 100 h. p. and 50 h. p. oil engines, with complete concentrating plant of 50-70 tons daily capacity. Refining plant at Vernon, Cal., for retreating concentrates and manufacture of ammonium molybdate, molybdic acid, calcium molybdate, etc.

Operations suspended December, 1919, owing to poor market for mobydenum.

LOS ANGELES GEM CO. **ARIZONA**

Office: Los Angeles, Cal. Mail returned unclaimed, August, 1918, from Mine office: Kingman, Mohave county. E. E. Peck, pres. and gen. mgr. C. W. Morrell, sec.-treas.

Property includes a variscite mine in Esmeralda Co., Nev., but the principal property is the George Washington group of 6 claims in Mineral Park, near Kingman. This property carries a vein of 18 to 24″ width, developed by a 143′ upper tunnel and a 370′ lower tunnel, said to show ore assaying up to 4% copper, 200 oz. silver and $4 gold per ton. The company mined turquoise from the claims for some years, before developing copper.

Equipment: includes gasoline hoist. No recent information received.

McCRACKEN SILVER-LEAD MINES CO. **ARIZONA**

Office: 622 Higgins Bldg., Los Angeles, Cal. **Mine P. O.:** Yucca, Ariz. Mines at McCracken, Ariz.

Officers: W. B. Van Horne, pres.; H. H. Mather, v. p.; J. H. Hoffman, sec.-treas.; Leonard Hoffman, gen. mgr.

Cap., $1,500,000; $1 par; 1,200,000 issued.

Property: owns a group of 10 claims and operates the adjoining Ostego mine under control, all located about 30 miles S. E. of Havaland, Mohave county.

Development: by tunnels and shafts, aggregating 2,500′ of workings. Company estimates ore reserves of about 400,000 tons worth $15 per ton. Mill ore contains from 5 to 15% lead and 6 to 15 oz. silver per ton. Two carloads crude ore shipped are reported to have returned 71% lead, 4.3 oz. silver.

Equipment: includes air-compressor, hoisting engine and 100-ton mill, employing dry concentration. The first shipment of concentrate was made late in September, 1919.

MERRIMAC MINE. **ARIZONA**

Owned by Geo. Cleeland of Philadelphia, Pa., but bonded to J. C. Rankin in June, 1917. A. W. Henning, supt.

Property: a mile west of Chloride, is developed by 400′ incline shaft and new shaft sunk in 1917. The vein is said to be 22′ wide, and cuts through porphyry and diorite. Ore carries gold, silver, lead and zinc.

Production: totaled $175,000 to end of 1916. Nothing reported since then.

MIDDLE GOLCONDA MINES CO. **ARIZONA**

Name changed to Highland Mining & Milling Co., which see.

MINNESOTA-CONNOR MINING & MILLING CO. **ARIZONA**

Address: P. S. Virgin, mgr., Chloride, Ariz.

Officers: H. B. Hanford, pres.; J. T. Jackson, v. p.; J. S. Freemann, sec.; J. O. Kerbaugh, treas.; the first three at Philadelphia, Pa.

Property: 13 claims, 1½ miles S. of Chloride, Mohave county; said to carry the outcrops of 17 distinct veins.

Development: by 725′ vertical steel-lined shaft, also 4 inclines from 100 to 530′ deep. At 600′ depth the main vein is 15 to 25′ wide, but of low grade. At 700′ it is 38′ wide, also poor. West of the shaft is a 20′ vein, the Pluto, which is expected to join with the Minnesota below 700′.

Equipment: three 100 h. p. boilers, 75 h. p. hoist, 900 cu. ft. compressor, lighting plant, mill engine and 150-ton concentrator.

Production: totaled $1,150,000 to end of 1916. Work was suspended late in 1916 for want of funds. Believed to be idle.

MISSOURI-MOHAVE MINING CO. **ARIZONA**

Address: G. W. Marks, mgr., Cerbat, via Kingman, Ariz.

Property: in the Cerbat range, reported to have opened up a 4′ vein of lead-zinc ore carrying gold, on the 100′ level. Driving tunnel north of shaft to cut the vein.

MOHAVE MOLYBDENUM CO. **ARIZONA**

Address: L. P. Morel, sec.-treas., Oatman, Ariz.

Officers: C. A. Martin, pres., Oatman, Ariz.; D. T. Boone, v. p., Kingman, Ariz.

Inc. 1918. **Cap.**, $150,000; 10c par; 600.000 shares paid for property.

Property: 11 claims in Maynard district, Wallapai Mountains, developing some molybdenum veins. A prospect.

MOLLY GIBSON-CHLORIDE MINES CO. **ARIZONA**

Address: Chloride, Ariz.

Officers: R. C. Ferguson, pres.-mgr.; J. C. Wilson, treas., Kingman, Arizona.

Inc. in Arizona.

Property: 3 claims, 1,000′, S. W. of the Tennessee mine, Chloride district, Mohave county, Ariz. Ore carries silver and lead, with some gold and copper in two fissures as far as opened to 70′ depth.

Production: totaled $100,000 to 1916.

Property is a meritorious prospect, which present management plans to develop by sinking a 200′ shaft.

Equipment: includes a 25 h. p. hoist, and a 10x10″ Sullivan compressor.

Property is being promoted by W. B. Twitchell of Phoenix and others.

MONTORO MINING CO. **ARIZONA**

Address: 300 Wright Bldg., Denver, Colo., and Chloride, Ariz.

Officers: A. J. Fowler, pres.; J. L. Smith, v. p.; E. L. Brock, sec.-treas.; H. L. McCarn, mgr.

Cap., $500,000; shares $1 par.

Company organized in 1919 to take over the property of Rainbow Mountain Mining Co.

Property: 9 claims, unpatented, on Rainbow Mt., 2 miles E. of Chloride, Wallapai mining district, Mohave county. Claims said to show a vertical vein containing gold-silver-lead-zinc ore.

Development: work totals 3,000′ including 780′ of tunnels and 450′ shaft, with 4 levels opened up. Former company claimed to have 10,000 tons of ore partly blocked out, May, 1917, mostly on South ore-shoot.

Equipment: includes an 80 h. p. hoist and 2-mile aerial tram, 300 cu. ft. compressor, Cornish pump.

Former management planned driving a 3,000′ crosscut tunnel to cut vein at 1,000′.

Production: shipments to Needles smelter, totaling 3,000 tons, of silver-gold-lead ore, have yielded $140,000 to end of 1916. None reported since.

NANCY LEE MINING CO. **ARIZONA**

Address: P. O. Box 27, Bisbee, Ariz.

Officers: F. T. Bragonier, pres.; Robt. Ferguson, v. p.; H. J. Hierl, sec.-treas.; foregoing with W. E. McKee, Dr. W. A. Holt, R. Brown, directors.

Inc. 1915 in Arizona. **Cap.** $1,000,000; $1 par; issued 420,000 shares.

Property: 6 claims, 3 fractions and mill site in Secret Pass district, 9 miles N. of Oatman. Elevation 3,000′, water on property. Claims show N.-W.-S. E. fissures 4′ to 12′ wide in andesite, filled with a close-grained, dense rhyolite, with strike faults and shrinkage cracks.

Development: by 180′ incline shaft and connecting tunnel 320′ long; total workings, 1,000′. No work done during 1916-1919. Vein assays from a trace to $12.50 per ton. Values are mostly in gold, with some silver.

Examined by John Tait Milliken and R. D. Johnson. Mine warrants further development.

NEEDLES MINING & SMELTING CO. **ARIZONA**

Company was liquidated Dec., 1917, and its property and assets turned over to the U. S. S. R. & M. Co., which see. **Works office:** Needles, San Bernardino county, Calif. A. P. Anderson, gen. mgr.; D. R. Muir, mgr., of this and the Gold Roads Mines Co., Needles, Calif., and Goldroad, Ariz.

Inc. 1909, in Me., as successor of Arizona-Mexican Mng. & Sm. Co. For full description see Vol. XIII. The lease on the Tennessee mine (a producer of many millions of dollars) has been relinquished, and property bought by Schuykill Mining Co., which see.

Property: Champion mines, 12 mines north of Kingman, consists of the following unpatented claims: Champion, Champion No. 2, and Primrose, 52.75 acres. These claims, like the Banner group, were acquired as a prospect and some development work was done which yielded a small tonnage of gold, silver, lead and zinc ore, which was shipped to the company's mill at Needles. They are now being worked by lessees.

Champion was shipping about one car daily to Needles.

The Stockton Hill group of mines, at Stockton Hill, Mohave county, Ariz., 290.5 acres. No work is being done on this group at present.

The milling plant at Needles, Calif., a concentrating plant of 125 tons daily capacity, equipped with crushers, jigs, tables and a flotation plant, the latter for the recovery of zinc values from tailings. It also treats small tonnage of custom ores. The plant is thoroughly modern and well-equipped for economic work.

Production: to the end of 1916, the Champion produced over $200,000.

NEW COMSTOCK MINING CO. **ARIZONA**

Address: W. A. Howard, mgr., Pyramid, via Kingman, Mohave county, Arizona.

Property: the Catharine mine, west of Kingman in Union Pass section, near Pyramid. Claims show a limestone-granite contact with a fissure vein containing copper and a 12″ quartz vein containing bismuth. The 400′ shaft is said to show 12′ of $30 ore, at a depth of 200′. In September, 1919, the adjoining property was acquired for $15,000 cash.

NEW JERSEY MINING CO. **ARIZONA**

Mail returned from former address. Ed. Mingle, mgr., Chloride, Ariz. Described in Vol. XIII.

OATMAN GOLD TOP MINE **ARIZONA**

J. P. Loftus and J. K. Turner, of Goldfield, Nev., operators. Mine is in the Secret Pass district, 10 miles from Oatman, Ariz.

Has 30-ton ball and amalgamating mill, but whether it treated any ore cannot be said.

ORO-PLATA MINE **ARIZONA**

Mail returned from former address. O. B. Stanton, supt., Kingman, Mohave county, Ariz., and 101 Wall St., N. Y. Property is a gold mine which produced lead-zinc ore, with gold and silver values.

Development: by 280′ shaft; equipped with gasoline hoist. Mine has mill with 2 Nissen stamps. Credited with production of $500,000 in gold and silver up to 1917.

PAYROLL MINE **ARIZONA**

Address: A. W. Henning, mgr., Chloride, Ariz.; T. B. Scott, New York, owner. Reported under 10-year lease to F. L. Martin.

Property: 1½ miles E. of Chloride, Mohave county.

Development: by 400′ vertical shaft. On the bottom level over 290′ has been driven in ore, the shoot being from 1 to 8′ wide. At 200′ the vein was 12′ wide for 290′. Minerals are mostly zinc, with a little gold and silver.

Equipment: electric hoist,, compressor, etc.

Production: totaled $50,000 to end of 1916.

Shipping 35 tons of lead-zinc ore per day to mill at Needles at last report.

POLARIS MINING CO. **ARIZONA**

Office: 520 Lyceum Bldg., Duluth, Minn.

Officers: W. A. Eaton, pres.; J. O. Davis, v. p.; G. L. Maycroft, sec.-treas.; above with A. E. Fritz, G. A. Eaton, O. E. Dahly, B. P. Wheeler and G. D. Tulian, directors.

Inc. 1916 in Minn. **Cap.,** $1,000,000; shares $1 par; 294,281 issued. Company is successor of the Summit Gold Mng. Co., which in turn succeeded Summit Copper Co. Stockholders of Summit Gold Mng. Co. were offered stock in Polaris, share for share with payment of 25c a share.

Property: 21 claims, 5 patented, known as the Klondyke mine, about 400 acres and a mill site, adjoining the Golconda mine on the south, in the Virginia district, Mohave county, about 22 miles N. W. of Chloride, the nearest railway station.

Geology: of district is described in U. S. Geol. Survey Bull. No. 397. Claims said to show Golconda, Tub, and Blackfoot veins, and 5 others.

Ore is a gold-bearing quartz occurs in a vein up to 50′ in width. In 1897 a 10-stamp amalgamation mill was erected near the property, and mine is credited with production of 3,000-4,000 tons of ore running from $8 to $37 per ton. Gold is finely disseminated, and as only a 32% extraction could be made, operations were suspended.

Development: by 300′ tunnel.

Transportation, water, etc., are some of the difficult problems confronting the company.

No recent returns.

QUEEN BEE MINE **ARIZONA**

Address: M. B. Dudley, owner, Mineral Park, via Kingman, Ariz.

Property: an old silver-gold mine sold in August, 1919, by James Uncapher. Surface outcrops were rich, and lessees in recent years have extracted considerable shipping ore.

RAINBOW MOUNTAIN MINING CO. **ARIZONA**

Described in Vol. XIII.

Company liquidated and property conveyed to a new company, the Montoro Mining Co.

REDEMPTION COPPER MINING & MILLING CO. **ARIZONA**

Dead. Lost its property, 1914.

The mine near Chloride, Mohave county, Ariz., was sold to Dr. M. Taylor Uhler, Philadelphia, in 1917. See Vol. XII.

RED GAP GOLD MINES CO. **ARIZONA**

Officers: C. C. Ward, pres.; C. W. Hernden, v. p.; C. M. Pedley, sec.-treas.

Inc. 1917, in Arizona. **Cap.,** $1,500,000; shares $1 par.

Property: a group of claims in the Weaver district, 25 miles N. W. of Chloride, developed by tunnels and drifts said to expose veins from 10-12′ wide, showing gold-silver values. A prospect. Reported optioned in 1918 to Eastern capitalists.

RICO CONSOLIDATED MINING CO. **ARIZONA**

Superseded by Rico Exploration Co.

RICO EXPLORATION CO. **ARIZONA**

Address: 1101 Citizens Bank Bldg., Cleveland, Ohio.

Officers: M. A. Monaghan, pres.; C. J. Weideman, sec.-treas.; M. C. Cleveland, v. p.-mgr., Kingman, Ariz.

Inc. in Arizona. **Cap.,** $500,000, increased from $100,000 in August, 1919.

Company recently took over property of Rico Cons. Mining Co., reported in March, 1919, that a first payment of $15,000 had been made.

Property: the Rico and C. O. D. mines, 20 miles N. of Kingman, Mohave county. The C. O. D. has a past production of $1,500,000 in silver and gold. The new company has added a gas engine and a compressor and was planning to sink below the old workings.

RURAL-BUCKEYE MINES **ARIZONA**

Address: W. W. Widdowson, mgr., via Kingman, Ariz.

Property: in Mineral Park district, near Kingman. Reported in 1919 that the Rural and Buckeye gold-silver mines had been taken over by M. B. Dudley and associates. The Rural has a 200′ shaft, the Buckeye a 700′ tunnel. Estimated to have 22,000 tons good milling ore in mine and 8,000 tons milling ore on the dumps.

Equipment: includes electrically-driven hoist, compressor, pump; also machine-shop, dwellings, water supply, etc. A 100-ton mill under construction in 1919.

SCHUYKILL MINING CO. **ARIZONA**

Address: M. J. Keily, supt., Chloride, Ariz. H. A. Broughton, pres., San Francisco, Calif.

Property: 2 patented claims, on the S. adjoining the Tennessee mine, Chloride district, Mohave county. In March, 1918, company purchased, for cash, the Tennessee mine from the Wallapai Mining Co., original owners. This mine consists of the Empire No. 2, Tennessee, Great Lead and Tennessee South patented claims.

The ore contains gold, silver, lead and zinc in varying proportions and occurs in a fissure vein between pegmatite and schist, striking north and south. The ore shoot averages about 300′ in length and 6′ in width and has been followed down to the 1,170′ level. The ore is being extracted through a shaft which up to date has reached a depth of 1,400′. Indications are that the ore shoot will be followed in undiminishing strength to a much greater depth than has been yet achieved.

The original property of the Schuykill Mining Co. is developed by 800′ incline shaft and levels at each 100′. The vein is almost vertical, dips slightly E. and strikes N. 9° W. At 500′ the shoot is 5′ wide. In a tunnel connected with the 200′ level, the shoot is 8′ wide.

Equipment: 100 h. p. steam hoist, 108 h. p. gas engine, 460 cu. ft. Sullivan angle-compound compressor, lighting plant, etc. Company has added new electric equipment to the Tennessee mine and was planning on a mill.

SENATE SILVER MINING CO. **ARIZONA**

Address: Kingman, Ariz.

Officers: C. C. Spicer, pres.; A. G. Keating, v. p.; J. N. Harper, treas.; S. M. Warmbath, treas.; with P. C. Thorne, directors.

Inc. in Arizona. **Cap.,** $150,000; 10c par; 50,000 shares issued.

Property: 4 claims, 3 miles from Hackberry, and 30 miles from Kingman. Reported that development would be carried through vertical shaft of Hackberry Cons. until company sinks its own shaft, which was 200′ deep September, 1919, and still sinking on vein with 30″ of 48 oz. silver ore.

Equipment: includes 25 h. p. hoist and a compressor. Is a prospect.

SILVER HILL MINING & MILLING CO. **ARIZONA**

Mail marked "out of business," returned from former address, Chloride, Ariz., in July, 1919. Described in Vol. XIII.

SILVER KEYSTONE CO. **ARIZONA**

Address: F. W. Sherman, supt., Chloride, Ariz.

Consolidated with Keystone Consolidated Mining Co., whose mill treated ore from both mines. No recent returns.

SILVER KNIGHT MINE **ARIZONA**

Address: Chas. Parisia, mgr., Chloride, Ariz. T. N. Barndall, Pittsburgh, Pa., owner.

Property: 2 claims, said to be on the S. extension of the Tennessee vein, Chloride district, Mohave county.

Development: by vertical shaft, reported to have opened good lead ore.

SOUTHWESTERN COPPER CO. **ARIZONA**

See Arizona-Southwestern Copper Co.

STANDARD MINERALS CO. **ARIZONA**

Address: 116 W. Center St., Anaheim, Cal.

Officers: G. M. Simpson, pres.-supt, Box 727, Kingman, Ariz.; L. C. Deming, v. p.; C. C. Randall, sec.-treas.; with H. L. Seares, directors, all of Anaheim.

Inc. Nov., 1917, in Arizona. **Cap.**, $2,000,000; $1 par; non-assessable outstanding, 1,500,000.

The company acquired the property of the Telluride Chief Mining Co. See Vol. XIII.

Property: 25 claims, unpatented, 450 acres, in Hualapai range, 20 miles S. E. of Kingman, has molybdenite and silver in quartz vein in granite. Claims 50,000 tons of ore blocked out.

Development: 355′ vertical shaft, with 2,000′ of workings. On 200 and 300′ levels a large tonnage of 1% molybdenite ore has been opened.

Equipment: includes 100-ton flotation mill which started operating in March, 1919; a 40 h. p. hoist and 500 cu. ft. compressor, with 25, 80, and 120-h. p. oil engines.

Management states that $151,000 was spent in 1918 in development and equipment. Production not reported.

STENE CONS. COPPER CO. **ARIZONA**

(Successors to R. M. Stene Mines, Ltd.)

Exec. office:. 40 Wall St., New York City. **Operating office:** Phoenix, Arizona.

Officers: R. M. Stene, pres.; Col. Julius Leonori Nichols, v. p.; C. B. Christy, sec.-treas., Phoenix, Ariz.; with L. W. Coggins, C. T. Washburn, C. W. Clawson, F. L. Patton, Jr., directors. A. P. Dittmar, gen. supt. U. S. Corporation Co., transfer and registrar. Promoted by Globe Syndicate, and Frey & Co.

Inc. Dec. 3rd, 1917, in Arizona. **Cap.**, $3,000,000; $1 par; issued 1,381,233.

Balance sheet of August, 1918, shows: 333,334 shares paid for Riverside group and 650,000 shares for Oregonian group, besides $5,900 cash. Smelter returns test shipment $1,358, cash received from sale of stock R. M. Stene Mines Co., $24,374.

Promotion stock to directors, attorneys, etc., 135,387 shares; to R. M. Stene for stock due by Stene Mines Co., 28,680 shares; shares sold, old company, 166,666; new company, 67,166. New stock issued for leaching plant, etc., 606,267 shares. A Globe syndicate underwrote this stock in July, 1919.

Property: 785 acres, the Oregonian group, 6 claims, and the Riverside group, 34 claims, in Mohave and Yuma counties, 12 miles N. E. of Swansea. The Oregonian group, 6 claims, was purchased for 650,000 shares in 1918. This tract on the north side of the Bill Williams river has a flat orebody in part covered by gravel. The orebody is reported to be 1,400′ long, to average 250′ wide and from 6′ to 30′ thick. Fifty-one samples are reported to average 8.1% copper. Mr. Donohue estimated 275,000 tons of 2.5% ore.

The Riverside group covers a canyon cut by the river through upturned schists with a flat fault fracture showing copper ore in rather sporadic occurrence. The development work thus far done on the group is disappointing, but the waterpower right may prove quite valuable.

Company reports August 3, 1919, arrangements made to install 300-ton crushing and sampling plant, bins and power unit, with 150-ton leaching plant, also compressor, quarry track and power equipment, etc.

The Keystone track drill No. 5 and a Keystone steam shovel were to be ordered and a bridge built across the river at the dam-site.

The acquisition of the Oregonian group as recommended by the examining engineer gives the company a producing property, while Riverside claims will be developed later.

The Stene Development Corporation, 701 Madison Ave., New York, is fiscal agent for the Stene Cons. Copper Co.

TELLURIDE CHIEF MINING CO. **ARIZONA**

Described in Vol. XIII. Property acquired by Standard Minerals Co., which see.

TELLURIDE & CHLORIDE LEASING M. & M. CO. **ARIZONA**

Mail returned from former address, Chloride, Ariz.; G. R. Harkness, v. p.; J. M. McMillan, sec.-treas.

Property: the Schenectady mine, 3 claims and a millsite, in Chloride district, only 585′ north of Tennessee mine, has 5′ fissure vein, crossed by Genevieve vein.

Development: sinking a shaft to 400′ depth in June, 1917, with good silver ore reported at 225′.

Production: totaled $10,000 to end of 1916. Probably idle.

TENNESSEE MINE **ARIZONA**

Chloride, Ariz. See Schuykill Mining Co.

TINTIC MINE **ARIZONA**

Property: 1½ miles W. of Chloride, Mohave county, Ariz.

Development: to 100′ depth. Vein is from 3 to 5′ wide, and considered promising.

Production: totaled $100,000 of gold to end of 1916. No recent information.

TIPPERARY MINING CO. **ARIZONA**

Address: Oatman, Ariz.

Property: in October, 1919, company purchased the McKesson mines, 6 miles W. of Wallapai Station, Mohave county, and was to install machinery from its property at Oatman.

TOWNE MINING CO. **ARIZONA**

Address: J. E. Shank, sec.-treas., Chloride, Ariz.; S. S. Jones, pres.; T. J. Murphy, v. p.; with Dan Murphy and J. M. Francis, directors.

Property: the Towne mine, 1½ miles S. of Chloride, Mohave county, developed by 225′ vertical shaft.

Production: totaled $1,125,000 to 1916, mostly silver ore. Smelter returns show carloads assaying 7 oz. gold and 600 oz. silver per ton. For this production the ore was selected. Mine is idle at present, but management states that financing will be undertaken in the fall of 1919 and work resumed.

UNION BASIN MINING CO. **ARIZONA**

Office: 67 Milk St., Boston, Mass.

Plant was burned down in 1917; insurance collected; funds invested. Company in process of dissolution. Property sold for $35,000 to C. B. Bell. Described in Vol. XIII.

UNION METALS CORPORATION **ARIZONA**

Address: Frank F. Peard, 30 Broad St., New York City. A. W. Clapp, mgr., Golconda, Ariz.

Property: Fredonia and Fredonia No. 2 lode claims, N. of Kingman, in the Wallapai mining district, Mohave county, formerly owned by the Golconda Consolidated, said to have developed a strong lead-zinc vein carrying gold and silver.

UTAH-ARIZONA GOLD & COPPER MINING CO. **ARIZONA**

Office: 626 Dooly Bldg., Salt Lake City, Utah.

Officers: Heber S. Cutler, pres.; J. F. Shelley, v. p.-gen, mgr., Shelley, Idaho; John W. Geiger, sec.-treas.; with W. J. Burton, Geo. F. Shelley and M. Thomas, directors.

Inc. Nov. 11, 1907, in Arizona. **Cap.,** $1,000,000; $1 par; issued 961,023 Annual meeting, second Tuesday in September.

Property: 60 claims, unpatented, about 1,200 acres, and a 20-acre mill site, in the Weaver district, 18 miles N. W. of Chloride, Mohave county, Ariz., the nearest rail point. Claims show quartz veins traversing granite and mica-schist, carrying gold-copper ore. Property includes the Golden Gate mine, developed by two incline shafts of 125′ and 135′, on parallel veins, and several short tunnels, with total of about 2,000′ of workings.

Equipment: includes a 5-stamp mill, idle since 1914. Management stated that it expected to start development in fall of 1919.

WALDRON MINING CO. **ARIZONA**

Office: 535 Chamber of Commerce Bldg., Pasadena, Cal. **Mine office:** Venture Camp, Kingman, Mohave county, Ariz. Geo. H. Hill, mgr.; W. Van Doren, sec.

A reorganization, 1918, of the Arizona Venture Corp'n, which owned 5 groups, 12 claims, about 240 acres, near the Old Diamond Joe mine, developed by tunnel, and by 600′ shaft.

Equipment: includes hoist, air compressor, electric power plant and a mill.

Company also owned the Waldron group at Deluge, Wash., and at last accounts was sinking a shaft to 500′ level, with crosscut on 400′ level, showing 4′ 6″ of $23.60 ore. In 1915 management announced production of "lenzite" in commercial quantity, used for wireless telegraphy, in crystals valued at $5 each. The Lenzite Crystal Corporation was incorporated for this purpose.

The commercial value of property and patents remains to be proved.

WALLAPAI CHIEF MINING CO. **ARIZONA**

Address: S. C. Hall, 648 S. Olive St., Los Angeles, Cal., or Kingman, Arizona.

Officers: C. F. Eyton, pres.; J. W. Squires, v. p.; S. C. Hall, sec.-treas.; with H. T. Rudisill and E. A. Gord, directors.

Inc. April, 1916, in Arizona. **Cap.,** $2,000,000; shares $1 par; non-assessable; 1,000,000 outstanding.

Property: 5 claims in Maynard district, near Kingman, Mohave county, Arizona.

At last report sinking was under way to open a gold-silver vein in quartzite.

WALNUT CREEK MINING & MILLING CO. **ARIZONA**

Address: Kingman, Mohave County, Ariz. C. E. Worten, pres.; R. P. Wheelock, mgr.

Property: 9 miles S. of Kingman, developed by a tunnel 800′ long. December, 1918, said to have crosscut 20′ of vein material showing some copper ore, and footwall had not been reached.

WASHINGTON-ARIZONA COPPER CO. **ARIZONA**

Address: E. D. Reese, mgr., Kingman, Ariz.

Property: the George Washington claims in Mineral Park district, Mohave county, said to have a large tonnage of copper-silver ore.

Development: by 3 tunnels and a shaft to a depth of several hundred feet.

In August, 1917, a 300-ton mill, using the Fields flotation process, was reported ready to start operations. In July, 1918, reported that company had been reorganized and work would be resumed, and in June, 1919, that stopes were being opened. In July the mill was said to be making a fine grade of concentrate, high in silver.

WESTERN ORE CONCENTRATION CO. **ARIZONA**

Mail returned, June, 1919, from former address.

F. E. Steffy, gen. mgr., Chloride, Ariz. Company operates a 250-ton custom plant including a 9x15″ Blake crusher, two 14x30″ Reliance rolls, Marcy ball mill, Hancock jig, 10 Wilfley tables and K. & K. flotation unit.

WRIGLEY EXPLORATION CO. **ARIZONA**

Company liquidated. Described in Vol. XIII.

YUCCA-ARIZONA COPPER CO. **ARIZONA**

Property sold by court order several years ago and company presumably dead. Described in Vol. XIII.

YUCCA TUNGSTEN MINING CO. **ARIZONA**

Address: Harvey Klotsch, mgr., Yucca, Mohave County, Ariz.

Property: 26 claims, 25 miles N. of Edmaier Mining Co. (tungsten mine), in Cedar Valley district, shows a 5′ vein of ore, carrying 5% tungstic acid and 1% to 3% copper.

Development: comprises a 250′ shaft and 1,300′ of drift tunnels, 200′ apart vertically. Company operates a 50-ton mill; two flotation units were added in 1918. A dividend of $20,000 was paid in September, 1918.

OATMAN DISTRICT, MOHAVE COUNTY

ADAMS MINING CO. **ARIZONA**

Address: 620 I. W. Hellman Bldg., Los Angeles, Calif. **Mine office:** Oatman, Ariz.

Officers: E. H. Newland, pres.; N. A. D'Arcy, sec.-treas.-gen, mgr., with C. H. Palmer, Jr., and M. Lines, directors. Thos. Kilker, supt.

Inc. Dec., 1915, in Arizona. **Cap.** $100,000; 10c par; issued 734,000. Annual meeting, first Monday in February. Listed on Los Angeles Stock Exchange.

Property: 9 claims in the Black Range section, adjoining the Nellie.

Development: by 420′ shaft, crosscuts and drifts, said to show 3′ of ore assaying $20 per ton.

Equipment: includes 80 h. p. engine and pumps. Closed down in 1917, but reported in July, 1919, to be getting good results from development.

ALCYONE MINING CO. **ARIZONA**

Office: Oatman, Ariz.

Officers. W. O. Wright, pres.; Niels Buck, v. p.; Chas. F. Pugh, sec.-treas., with H. C. Topp and H. T. Becker, directors. Chas. F. Pugh, mgr.

Inc. Nov., 1915, in Arizona. **Cap.** $100,000; par 10c; 700,000 issued.

Property: 4 claims, now being patented, in San Francisco district, 2½ miles south of Oatman. Mine shows a quartz fissure vein in andesite; strike N. 80° E., dip 68°. Ore, free milling gold, said by company to run $42 per ton.

Development: by 415′ incline shaft and 800′ underground workings. Drifting east on the 400′ level to strike the ore-shoot at last accounts. No ore blocked out as yet.

Equipment: 60 h. p. hoist, compressor, etc. Management plans further drifting and sinking.

AOTMAN PIONEER GOLD MINES, INC. **ARIZONA**

Address: Oatman, Ariz. **Officers:** R. G. Tryon, pres.; Geo. F. Moser, sec.-mgr.

Inc. in 1915. **Cap.** $1,500,000; $1 par; all outstanding.

Property: 6 patented claims, including the Pioneer, formerly owned by the Pioneer Cons. Mines Co., 2 miles from Oatman. The Pioneer vein, one of the largest of the district, is covered for 4,000′ by company's claims.

Development: by 420′ main Pioneer shaft and several hundred feet of crosscuts and drifts on the 100′, 200′ and 400′ levels, exposing above the 200′ level 17,000 tons of $9.20 ore north of the shaft and $100,000 south, or a total of $256,400 gross. No estimate is made of the lower-grade ore below the 400′ level, and the high-grade shoot is bottomed.

In the Treadwell mine a 340′ shaft with levels at 100′, 200 and 300′ exposes 12,800 tons of an average value of $5.62, which is about the cost of handling such ore in the district.

The 35 Parallel mine has a 220′ shaft connecting on the 150′ level with a tunnel. The work is all in ore, exposing 8,500 tons of $13.30 ore.

Equipment: includes 10-stamp mill, 80 h. p. engine, compressor and 2 hoists.

Property has merit, but the high cost of mining and milling the ores of the Oatman district must be overcome before the low-grade material in this and other mines can be successfully handled. The property is large and though ore is of low grade, mine is said to have merit. A detailed report by Geo. F. Moser was made in March, 1917. No information available since then.

ARGO MINES CO. **ARIZONA**

Address: Oatman, Mohave Co., Ariz.

Officers: S. S. Jones, pres.-gen. mgr.; J. M. Francis, v. p.; J. E. Shank, sec.-treas., with J. S. Withers and Wm. Bates, directors.

Inc. in Arizona. **Cap.** $1,000,000; $1 par; 410,000 shares held in treasury. Listed on Los Angeles Stock Exchange.

Property: 9 claims in the Oatman district, shows a vein 40′ to 130′ wide on surface, stated to be a continuation of the Tom Reed vein.

Development: a two-compartment shaft 605′ deep.

Equipment: includes a hoist with 1,000′ capacity, and a 360 cu. ft. air compressor.

Is one of many boom-day mines of this district.

ARIZONA CENTRAL GOLD MINES CO. **ARIZONA**

Now controlled by Arizona Divide Mining Co. of Nevada, which see.

ARIZONA EAGLE MINING CO. **ARIZONA**

Dead. See Vol. XIII of this book.

ARIZONA GOLD STAR MINING CO. **ARIZONA**

Office: 347 Title Insurance Bldg., Los Angeles, Cal.

Officers: R. Mansard, pres.; R. H. Sayers, v. p.; M. M. Miles, sec.-treas.

Cap., $100,000; 10c par; issued $50,000.

Property: owns the Valkyrie and La Paz claims, 40 acres, 2 miles W. of the Gold Road mine, in the Tom Reed-Gold Road mining district, Mohave county. Developed by 100′ shaft, to be sunk to 400′ depth. Equipped with hoist and compressor.

Company is supposedly dead.

ARIZONA MOSSBACK MINES CO. **ARIZONA**

Office: Oatman, Ariz.

Officers: Chas. W. Maier, pres.; William H. Holcomb, v. p.; M. E. Kempley, sec.-treas.; with Jesse W. Speidel, Lee C. Paull, D. Garth Hearne, and C. H. Burlock (mgr.), directors. Jack Lamb, supt.

Inc. Sept. 4, 1917, in Arizona. **Cap.,** $1,000,000; $1 par; issued 750,000. Bonds authorized, $400,000; none issued. Annual meeting, second Monday in January. Registrar of stock, M. E. Kempley, Kingman, Ariz.

Property: 5 patented claims, 100 shares, 4 miles northerly from Oatman, Mohave county.

Geology: Andesite-porphyry is cut but by a fissure vein having a dip of 76° S. E. down to depth of 400′, where it changes to N. W. and S. E. course. Ore-shoots are 250′ and 300′ long. Ore is free milling, assaying $10 per ton in gold and silver.

Development: by 700′ vertical shaft with 1,500′ of underground workings. Ore reserves are estimated by company at 500,000 tons.

Equipment: includes 40 h. p. hoist, compressor, 60 h. p. gas engine, pump.

ARIZONA REX MINING CO. **ARIZONA**

Office: 1202 Hollingsworth Bldg., Los Angeles, Cal.

Officers: Frank A. Keith, pres.; J. L. McIver, v. p.; R. I. Rogers, sec.-treas., with Geo. W. Long, W. K. Ridenour and S. W. Mudd, directors.

Inc. Sept., 1915, in Arizona. **Cap.,** $1,000,000; $1 par; 666,700 shares outstanding. Annual meeting, first Monday in December.

Property: 14 claims, at Oatman, Mohave county, only slightly developed. Presumably idle.

ARIZONA TOM REED GOLD MINES CO. **ARIZONA**

Oatman, Mohave Co., Ariz. **Officers:** Geo. F. Moser, pres.; Chas. S. Seeley, sec.; C. L. Moser, v. p.; Geo. F. Moser, gen. mgr.

Inc. July, 1915.

Cap., $1,000,000; $1 par; issued 657,903. Stock listed in Los Angeles and San Francicco.

Property: owns 7 claims, 97 acres, and has a lease and bond on the Snowball group, 90 acres, all adjoining the property of Aotman Pioneer Gold Mines, Inc., on the north. Main ledge of the Pioneer continues into company's claims.

Development: by several shafts 10′ to 100′ in depth and on the 400′ level by a crosscut from the Aotman Pioneer. Company sinking a main working shaft on the Trio claim at last accounts.

BIG JIM CONSOLIDATED MINING CO. **ARIZONA**

Office: 591 I. W. Hellman Bldg., Los Angeles, Cal. **Mine office:** Oatman, Mohave county, Ariz.

Officers: C. C. Spicer, pres.; Lester M. Dull, v. p.; S. M. Warmbath, sec.-treas., with Elmer M. Bray and C. W. Pope, directors. A. G. Keating, supt.

Inc. 1917 in Arizona. **Cap.,** $1,500,000; shares $1 par; non-assessable; 1,250,000 shares outstanding. Stock listed on Los Angeles and San Francisco exchanges. Is the successor of Big Jim Mng., which see.

Property: 7 claims, unpatented, in the Tom Reed-gold Road mining district. The Bluebird group is 3,000′ west of the Tom Reed. Ore is gold, occurring in andesite.

Development: 400′ shaft on the Bluebird group, reported to cut the vein in a crosscut on the 200′ level.

Equipment: includes 25 h. p. gasoline hoist and Ingersoll-Rand compressor. There has been no production and property is still in the development stage.

Regarded as a speculation, but with good ground, worthy of prospecting.

BIG JIM GOLD MINING CO. **ARIZONA**

Dissolved by vote of stockholders, April 24, 1917. The Big Jim and Monarch claims were sold to the United Eastern Mng. Co. in 1917, the owners of Big Jim G. Mng. Co.'s stock receiving 1/6 shares of United Eastern stock and one share of Big Jim Cons. Mng. Co. stock.

BLACK RANGE MINING CO **ARIZONA**

Address: Oatman, Mohave county, Ariz.

Officers: D. P. Wright, pres. and mgr.; Theodore Peterson, v. p.; Del Sherer, sec.-treas.

Inc. Oct. 30, 1913, in Ariz. **Cap.,** $1,000,000; shares $1 par; non-assessable; outstanding, 700,000. Listed on Los Angeles Exchange. Annual meeting, first Tuesday in November.

Property: 8 claims, 2 patented, 155 acres, 5 miles south of Oatman. Shows quartz veins in andesite. Ore is said to run from $2 to $20 per ton. Developed by 300′ shaft, with 600′ of workings.

Equipment: includes a gasoline hoist, air-compressor, and pumps. Property is still in the development stage, but was closed in June, 1919.

BLANTON GOLD BULLION MINE CO. **ARIZONA**

Address: Oatman, Ariz.

Officers: Chas. P. Blanton, pres. and gen. mgr.; B. Ginsberg, v. p.; Herman Marks, sec.-treas.; with Louis Dorfman, directors.

Reported to have a gold property in the Mossback section.

BOUNDARY CONE GOLD MINES CO. **ARIZONA**

Oatman, Ariz. **Officers:** F. H. Biles, pres.; J. D. L. Williams, Rex Arms Apt., Los Angeles, sec.; Calvin Hartwell, treas.; preceding, with W. F. Ball, S. M. Barnes, T. C. Job, directors. Frank Dryden, supt.

Inc. in Arizona. **Cap.,** $1,500,000; shares $1 par; outstanding 1,198,000 shares. Listed on Los Angeles Stock Exchange.

Property: 8 claims, 82½ acres, patented, 1 mile S. W. of Oatman. **Ore:** gold.

Development: shaft 775′ deep, January, 1919, with about 4,500′ of workings. On the 450′ level management reported an ore-shoot 150′ long, 15′ in width, with average assays of $14 per ton, and on the 550′ level to have a shoot that was 150′ long when work was stopped and shaft-sinking resumed. Also said to have opened up considerable milling grade of ore in rather thin stringers. Shaft makes 15,000 gal. of water daily, handled by bucket.

Equipment: hoist, 300 cu. ft. air compressor, blacksmith shop. Plans cross-cutting to vein on 750′ level, development of orebody and erection of a mill. Idle March, 1919.

CARTER GOLD MINING CO. **ARIZONA**

Oatman, Ariz. E. A. Shaw, pres.; Henry Lovin, v. p.; W. K. Ridenour, sec.; H. H. Watkins, treas. Dan Bosque, in charge.

Inc. in Arizona. **Cap.,** $1,000,000; shares $1 par.

Property: New York, Giant and Gold Cross patented claims, 55 acres, in Tom Reed-Gold Road mining district, near Oatman, Mohave county, Ariz. Developed by incline shaft 350′ deep, with several hundred feet of workings on the 150 and 250′ levels. The vein on the 150′ level was said to be 12′ wide, but of small value. On the 250′ level management reported that the vein was over 7′ wide and averaged $8.60 gold per ton. On the 350′ level 1,200′ of drifting was done.

In January, 1919, company was reported idle and surface equipment was reported sold.

CASEY JONES MINING CO. **ARIZONA**

Oatman, Ariz. **Officers:** J. M. Francis, pres.; V. S. Rowley, v. p.; J. E. Shank, sec.-treas., with J. J. Casey and H. M. Caswell, directors.

Inc. in Ariz. **Cap.,** $100,000; 10c par; 600,000 shares in treasury. Listed in San Francisco.

Owns the Swallow group, 14 claims, 176 acres, adjoining the Oatman Gold, and the Argo and Tom Reed properties. Property in the development stage.

CLARISSA MINING & MILLING CO. **ARIZONA**

Gold Road, Mohave county, Ariz. E. M. Rabb, pres.; A. W. Sydnor, v. p.; treas.; F. T. Bragonier, sec.

Inc. 1915, in Ariz. **Cap.,** $1,000,000; shares $1 par, non-assessable; 550,000 shares in treasury. Owns 7 claims, 80 acres, adjoining the United Western on the north of Oatman, Ariz. Company cut 4′ of quartz vein matter at 65′. Idle, 1919.

CONE MINING & MILLING CO. **ARIZONA**

Office: 132 Edgerly Bldg., Fresno, Cal.

Officers: J. P. Eaton, pres.; M. J. Walsh, v. p.; Hugh Sparkman, sec.-treas.

Inc. Aug., 1911, in Arizona. **Cap.,** $1,500,000; $1 par; 778,875 shares issued.

Property: 12 claims, unpatented, 240 acres, 2½ miles S. W. of Oatman, in the Tom Reed-Gold Road district, Mohave county, Ariz. Ore occurs in veins in rhyolite dike, traversing ground from E. to W.

Development: 235′ shaft with crosscutting to reach ledge on 200′ level.

Equipment: includes a 15 h. p. Fairbanks-Morse hoist.

CRESCENT MINING CO. **ARIZONA**

Geo. W. Pierce, mgr., Oatman, Ariz.

Has 1,000′ tunnel, driven to cut ore-shoot found 300′ above. No reports since 1917.

CROWN CITY GOLD MINES CO. **ARIZONA**

Idle. Last address: John C. Dalton, 6 Union Savings Bank Bldg., Pasadena, Cal. See Vol. XII.

DOME MINING CO. **ARIZONA**

Mail returned unclaimed from Los Angeles, Calif., Phoenix and Oatman. Mine is at Oatman, Ariz.

Directors: C. P. Campbell, pres.; C. C. Spicer, v. p.; A. M. Wheelock, sec.-treas.

Inc. Oct. 9, 1915, in Arizona. **Cap.,** $100,000; shares 10c par, non-assessable; 500,000 shares in treasury. Annual meeting, last Saturday in Sept. Listed on Los Angeles Exchange. Company reports $1,000 in treasury, April 17, 1916.

Property: 32 acres, unpatented, at Oatman, Mohave Co., Ariz. Developed by 40′ shaft and a little trenching. Management states that a hoist will soon be added. Property is a prospect, idle, and probably moribund.

EAST BLACK RANGE MINING CO. **ARIZONA**

Address: W. S. Tarbell, 668 I. W. Hellman Bldg., Los Angeles, Cal.

Inc. 1916, to operate 6 claims adjoining the Black Range Mng. Co., at Oatman, Ariz. Fifty thousand shares of stock were offered to the public in April, 1916, at 15c a share.

Is a prospect of unproven merit.

ESPERANZA EXPLORATION CO. **ARIZONA**

Address: Joseph Krauss, pres.-mgr., P. O. Box 149, Oatman, Ariz.

Officers: E. L. Terwilliger, v. p.; Jos. Kielen, sec.-treas.

Inc. Dec. 6, 1915, in Ariz. **Cap.,** $150,000; shares 10c par; 884,000 issued Operating expenses, 1916, $35,000.

Property: 10 claims, 170 acres, in San Francisco mining district, which show an E.-W. 15′ fissure vein, with 15° dip N. Ore carries gold, average value being $3 per ton.

Development: by 217′ shaft. **Equipment:** 25 h. p. engine, 320 cu. ft. compressor, etc.

FESSENDEN GOLD MINING CO. **ARIZONA**

Property closed for 2 years, and company practically out of existence.

Address: Oatman, Ariz.

Officers: M. A. Fessenden, pres. (Kay mine Canyon, Ariz.) F. W. Crosley, v. p.; H. A. Culloden, sec.-treas., with J. O. A. Carper and C. M. Moses, directors.

Inc. in Arizona. **Cap.,** $100,000; shares 10c par; treasury, 250,000 shares Listed in Los Angeles.

Property: the Sunlight and Moonlight claims, 40 acres, adjoining the United Eastern on the north, at Oatman. Developed by 500′ shaft and equipped with 3-drill compressor. No ore was found.

GILT EDGE MINES CO. **ARIZONA**

Address: Oatman, Ariz.

Officers: E. A. Burns, pres.; E. A. Shaw, v. p.; S. W. Klass, sec.-treas., Kingman, Ariz.

Inc. in Arizona. **Cap.,** $150,000; shares 10c par 800,000 in treasury. Listed on San Francisco and Los Angeles exchanges.

Property: 95 acres, 2 miles S. W. of Oatman, adjoining the Old Vivian mine, said to show 4 parallel veins varying from 4′ to 60′ in width.

Development: 4 tunnels, one claimed to have opened a vein for 50′, with gold values from $5 to $12 per ton. Company sank a shaft, 250′ deep, April 26, 1916, at which depth altered andesite was found, said to show quartz and spar of fair value. Crosscutting done on the 100′ and 200′ levels. Sinking to 600′ was contemplated.

Equipment: includes 25 h. p. hoist and a 52 h. p. air compressor. Presumably idle.

GIRARD MINING CO. **ARIZONA**

Address: Oatman, Mohave county, Ariz. H. B. Magill, sole owner. Company is not incorporated.

Property: 6 claims, also leases on the Della claim of the Tango group. Test shipment of 300 sacks (5 tons) of ore to smelter in 1919 netted $14.12 per ton. This ore was taken from the outcrop, as a general sample, because assays of hand samples were so erratic as to be untrustworthy. Tango group has strong persistent "dike-vein", and the Girard group, 3 cross veins.

GOLD CLIFF EXPLORATION CO. **ARIZONA**

Address: P. O. Box 412, Oatman, Ariz.

Officers: Stephen E. Barren, pres. and mgr., Oatman; H. H. Alvey, sec.; Thos. Devine, treas.; Axel E. Johnson and Asa W. Le Barron, directors.

Inc. 1914, in Arizona. **Cap.,** $1,000,000; shares $1 par; 136,212 shares sold; 363,788 shares in treasury.

Property: 19 claims, 285 acres, adjoining the Tom Reed Gold Mines Co. property, near Oatman. Developed by 53 shallow openings.

In 1916 company sold to the Copper Fame Mining Co. 10 claims in the Chloride district, Cerbat Mountains, between the Tennessee and Golconda mines. The price was 700,000 shares of Copper Fame stock.

Is a prospect. Presumably idle, 1919.

GOLD DUST MINING CO. **ARIZONA**

Successor to the Orion Mining & Milling Co.

Office: 733 Central Bldg., Los Angeles, Calif. **Mine office:** Oatman, Mohave county, Arizona.

Officers: G. E. Burnell, pres.; C. J. Rhodes, v. p.; Wm. H. Wise, sec.-treas.

Inc. 1919. **Cap.**, $1,000,000; shares 10c par; issued 700,000 shares. Listed on Los Angeles Stock Exchange.

Property: 170 acres, all patented, at Oatman. Has been developing for several years by different companies. Vein said to be 8′ wide on 200′ level with milling ore of $8 to $15 per ton in gold, increasing in width and value on 300′ level. Several thousand tons of milling ore was reported as developed.

Development: by several shafts from 100 to 550′ deep. A 100′ tunnel, drifts and crosscuts. Drifting on the 500′ level, in March, 1919.

Equipment: includes 360′ cu. ft. compressor, 75 h. p. electric hoist, old stamp-mill and cyanide plant. In July, 1919, efforts were being directed toward opening enough ore to keep the mill running.

Regarded favorably as a prospect.

GOLD KEY MINING CO. **ARIZONA**

Office: 733 Central Bldg., Los Angeles, Calif. Mine near Old Trails, Mohave county, Ariz.

Officers: W. H. Wise, pres.; H. M. Hall, v. p.; B. E. Shaw, sec.; with W. K. Ridenour and Raymond A. Carr, directors.

Inc. 1915, in Arizona. **Cap.**, $1,250,000; shares $1 par. Stricken from New York Curb listing, August, 1918.

Property: the Treasure Key group, 4 claims, 50 acres, between the Boundary Cone and Orion groups, west of Old Trails and near Oatman, Ariz. Contains the Oatman type fissure veins in andesite, showing gold quartz ore. The one under development is 20′ wide.

Development: by a 310′ shaft with drifts on 300′ level. The east drift exposes an ore-shoot 75′ long and 4′-6′ wide, showing 3′ of $30 ore. A second shoot 75′ to the west is said to average $12. No recent information received. Property is a likely prospect.

GOLD ORE MINING CO. **ARIZONA**

Address: A. C. Werden, Goldroad, Ariz.

Officers: A. C. Werden, pres.-mgr.; S. M. Warmbath, v. p.; I. W. Werden, sec.; A. F. Pollock, treas., with E. A. Shaw, directors.

Inc. in Arizona. Cap., $1,000,000; shares $1 par; 819,310 issued. Listed on Los Angeles Stock Exchange. H. E. Teter & Co., Los Angeles, transfer agents; Security Trust and Savings Bank, Los Angeles, registrar.

Property: 6 claims, 120 acres, ½ mile N. of the Gold Road mine, Mohave county, which the Gold Ore is said to resemble and which has yielded $5,000,000.

Development: by 680′ main shaft and over 2,000′ of drifts, etc. Levels have been driven at 350′, 530′, 650′ E. and W. along the vein. On the bottom level is a shoot 4′-6′ wide, 75′ long and 200′ high. In 1916 the Gold Road mill treated 2,300 tons from the 530′ level, returning $14.50 net per ton. Reserves are placed at 30,000 tons of $15 to $20 ore.

Equipment: a good road has been constructed and the 300-ton Gold Road cyanide mill leased for ore treatment, about a third capacity to be used for a start. In March, 1919, company was expecting to resume operations.

GOLD RANGE DEVELOPMENT CO. **ARIZONA**

Office: Oatman, Ariz.

Officers. F. T. Torpey, pres.; M. M. Miles, sec., Los Angeles, Calif. E. M. Rogers, supt.

Inc., 1918. **Cap.,** $150,000; 10c par.

Property: April, 1918, proposes to purchase 7 claims formerly owned by the Gold Range Mining & Milling Co. in the San Francisco mining district, near Oatman. Shaft 300′ deep. Some gold ore developed, said to assay $4 to $8.

GOLD RANGE MINING & MILLING CO. **ARIZONA**

See Gold Range Development Co.

GOLD REED MINING & MILLING CO. **ARIZONA**

Address: J. C. Connors, Colorado Springs, Colo. **Mine office:** Oatman, Ariz., T. L. Welp, supt.

Property: claims in Oatman district, Ariz., developed by 570′ shaft and drifts.

GOLD ROAD ANNEX MINING CO. **ARIZONA**

Office: Goldroad, Mohave Co., Ariz. L. M. Hopkins, pres.

Property: near Gold Road mine, Oatman district, Ariz. Machinery installed for sinking shaft to 500′. Prospects fair. No recent reports.

GOLD ROAD BONANZA MINING CO. **ARIZONA**

Address: Goldroad, Ariz. **Officers:** F. T. Torpey, pres. and treas.; W. B. Ross. v. p.; W. P. DeWolf, sec. E. M. Rogers, supt.

Inc. in Arizona. **Cap.,** $1,000,000; shares assessable, $1 par. In treasury, 250,000 shares. Listed in Los Angeles.

Property: 90 acres, adjoining the Gold Road mine on the S. W. Shaft sunk 600′, with considerable drifting. Vein on the 450′ level said to be 2′ to 6′ wide and for 100′ averaging $12 per ton. Operations were resumed in 1919 and the shaft was to be sunk another 150′, to 700′.

GOLD ROAD MINES CO. **ARIZONA**

Address: D. R. Muir, mgr., Goldroad, Ariz.

Inc. in Maine. **Cap.,** 400,000 shares; $5 par; entirely owned by U. S. Smelting, Refining & Mining Co., which see for officers.

Property: 15 patented claims, 216.52 acres at Goldroad, Mohave county, 22 miles west of Kingman, on the Santa Fe R. R.

Ore: gold-bearing quartz occurring in a fissure vein with E. W. strike. Company owns about 1¼ miles on the strike of this vein. The mine had a good record of production prior to its purchase by this company in 1912. Stoping operations had been carried down to the 500′ level and were extended on the strike of the vein and also in depth to the 900′ level. Assay value of ore diminishes with depth as far as explored to date, and only a small percentage of ore found on the 800′ level is of commercial grade, though the vein continues strong and persistent.

Development: to a depth of 1,100′ by 5 miles of workings. There are 2 shafts, one reaching the 800′ and the other the 900′ level, equipped with cages and skips. Property is fully equipped with power house, air compressors, shops, warehouse and dwellings. Ore is reduced at mine by crushers and Marcy mills and piped to the 300-ton cyanide mill, located within a few hundred feet of the mine. Electric power is purchased from power plant at Kingman.

The mine has considerable unexplored territory, besides that which has been worked, and the mine workings contain territory worthy of further work. Reserves reported at 200,000 tons of $15 ore. Operations suspended during 1918 account of high costs, but resumed 1919.

GOLD TRAIL MINING CO. **ARIZONA**

Leased to Grant McKesson and J. Marines, Goldroad, Ariz.

Office: D. A. McMillan, pres., Kingman, Ariz.

Inc. in Ariz. **Cap.,** $1,500,000; $1 par; 695,817 shares outstanding.

Property: 10 unpatented claims, 18 miles from Kingman.

Development: by short tunnels and a 90′ shaft. Ore said to occur in 5″ contact veins between andesite and rhyolite.

GOLD TRAILS MINING & MILLING CO. **ARIZONA**

See Gold Trail Mining Co.

GREEN QUARTZ GOLD MINING CO. **ARIZONA**

Address: Oatman, Ariz.

Inc. 1917 in Arizona. **Cap.,** $1,000,000; $1 par; 500,000 shares in treasury.

Property: has 3 veins all of usual Oatman type, with gangue of quartz, calcite, adularia, etc., containing free gold and telluride. Vein croppings are from 4′ to 20′ wide and show 3′ to 4′ of pay ore at several points.

An arrastra run on the property for years, yielded a living to former owner, treating surface ores only. Property has water enough for a mill and is reported to "have more ore than any of the properties around it and a darned sight more than the Nellie or Black Range."

GREY EAGLE DEVELOPMENT CO. **ARIZONA**

Office: Oatman, Ariz.

Property: in the Oatman district, developed by 3 incline and 1 vertical shaft, deepest 400′, connecting with 1,600′ adit tunnel at 340′ depth. Sinking winze to connect with Aztec property. Vein is in granite; ore-shoot is stated to be

"over 500′ long on the 200′ level and to have yielded shipments of 500 tons that averaged 0.83 oz. per ton."

Production during the '70's and '80's said to have been about $750,000.

HIGHLAND CHIEF GOLD MINING CO. **ARIZONA**

Offices: Alliance, Ohio and Oatman, Ariz.

Officers: Chas. Thompson, pres.; Carl Tanner, v. p.-gen. mgr.; F. W. Fuller, sec.-treas.; with John Eyer, and Creighton Thompson, directors.

Inc. Aug., 1919, in Ohio. **Cap.,** $30,000; par 2c; non-assessable. Purposes selling 750,000 shares.

Property: 15 claims, 200 acres in the Black Range near Oatman, shows quartz veins in andesite. Ore is free milling and is said to assay $4 to $13 gold per ton.

Development: a 690′ tunnel. Present company plans continuing development.

IVANHOE CONSOLIDATED MINES CO. **ARIZONA**

Reorganized April, 1918, as Ivanhoe Gold Mining Co., which see.

IVANHOE GOLD MINING CO., REORGANIZED **ARIZONA**

Office: 591 I. W. Hellman Bldg., Los Angeles, Calif. **Mine office:** Oatman, Ariz. Ed Carter, mgr., Oatman, Ariz.

Cap., $150,000; 10c par; assessable. Formerly Ivanhoe Consolidated Mines Co., but reorganized April, 1918, under above title. Assessment of 1c per share was due June 10, 1918, to pay debts and to contiuue exploration.

Property: 5 claims and 2 fractions in N. W. part of Oatman district, and covering 3,000′ along the strike of the veins.

Development: by 500′ shaft and a total of over 2,500′, up to mid-1919, when work was resumed on 500′ level of the Nancy Lee claim, where 60′ of low grade ore was cut at 204′ from shaft.

Property considered of promise.

JEROME-OATMAN MINING CO. **ARIZONA**

Office: Jerome, Ariz. **Mine office:** Oatman, Ariz.

Officers: Walter C. Miller, pres.; D. J. Shea, v. p.; S. F. Denison, sec.; H. W. Lewis, treas.; with H. E. Campbell and Henry Lovin, directors. Jas. P. Rice, supt.

Inc. July, 1915, in Arizona. **Cap.,** $150,000; shares 10c par; 442,251 shares in treasury, Oct., 1915.

Property: 11 claims, unpatented, in San Francisco mining district, 3 miles N. W. of Oatman, Mohave county, shows gold-silver ore in quartz cutting andesite and rhyolite. The veins run N. W.-S. E. and dip N. 70°.

Shut down in 1917 on account of water on the 390′ level, machinery being unable to cope with it. As practically no commercial ore was proved by 390′ shaft and 600′ of drifts, the resumption of work is indefinite. Claims were being patented in 1917. No news since then.

LAZY BOY GOLD MINES CO. **ARIZONA**

Address: Oatman, Ariz.

Officers: W. K. Ridenour, pres.-treas.; J. A. George, sec.; J. H. More, v. p.

Inc. Sept. 9, 1915, in Ariz. **Cap.,** $1,000,000; shares $1 par; 604,500 issued. Listed on San Francisco Exchange.

Spent $51,000 on development work, 1916-1917. Had $4,000 cash on hand, March 1, 1919.

Property: 9 claims, 150 acres, in San Francisco mining district, Mohave Co., Ariz., shows several veins in andesite carrying gold values.

Development: by 220′ vertical shaft, with total workings of 750′.

Equipment: includes 300 cu. ft. compressor, 3 jackhammer drills, 40 h. p. gasoline hoist. Is considered one of the good prospects of the camp.

LEXINGTON-ARIZONA MINING CO. **ARIZONA**

Office: I. W. Hellman Bldg., Los Angeles, Calif. **Mine office:** Oldtrails, Arizona.

Officers: Dr. C. H. Phinney, pres.; Dr. C. M. Heberton, v. p.; H. R. Woods, sec.-treas., with R. M. Keeney and C. E. Woods, directors. H. E. Woods, mgr.

Inc. Feb. 12, 1912, in Ariz. **Cap.,** $1,000,000; shares $1 par; 894,000 shares issued. Stock listed on Los Angeles Stock Exchange. Annual meeting, 4th Tuesday in September.

Property: 15 claims, 8 patented, 155 acres, at Oldtrails, in the Tom Reed-Goldroad district, shows fissure veins, from 6′-25′ wide, running N. W.-S. E. and dipping 75° N.-N. E. Ore occurs as quartz-spar, in andesite, and is said to assay from $2-$14 gold per ton.

Development: by numerous shafts from 45′ to 280′ in depth, the 3-compartment vertical shaft is to be sunk deeper.

Equipment: includes hoist, compressor, Cornish pump and electrical pumping equipment. Company also owns the townsite of Oldtrails.

LOST TREASURE MINING CO. **ARIZONA**

Address: Oatman, Mohave county, Ariz.

Officers: Geo. W. Long, pres.; J. F. McConnell, v. p.; J. L. McIver, sec.-treas.; J. E. Strumquist and L. J. Hammell, directors.

Inc. 1915, in Ariz. **Cap.,** $150,000; shares 10c par.

Property: the Gold Ore Extension Nos. 1 and 6, 120 acres, at Goldroad, adjoining the Gold Ore on the N. and W., and claimed to carry the extension of the Gold Ore vein. A 100′ vertical shaft is now being sunk. The mine is one of the many new prospects in the Tom Reed district yet to be proved.

Idle since 1917.

LUCKY BOY MINING & MILLING CO. **ARIZONA**

Office: 581 I. W. Hellman Bldg., Los Angeles, Calif. **Mine office:** Oatman, Ariz.

Officers: F. W. Remy, pres.; N. A. D'Arcy, v. p.; W. S. Tarbell, sec.-treas.-gen. mgr.; R. A. Watson, supt.

Inc. 1915 in Ariz. **Cap.,** 1,000,000 shares; 10c par; 775,000 shares outstanding. Stock listed on San Francisco and Los Angeles Exchanges.

Property: 200 acres in the Tom Reed district, adjoining the Telluride on the S. and the Tom Reed on the S. W., said to show gold ore occurring in stringers of quartz and calcite. The shaft on the Friday claim is 425′ deep. Crosscut lacks about 100′ to cut vein. The Friday, Lucky Boy, Lucky Boy Annex, and Hackshaw No. 6 claims reported April 1, 1919, leased on a royalty basis for a period of 5 years. In July, work was proceeding on the 450′ level, but in December, 1919, operations were reported suspended.

Equipment: includes 25 h. p. hoist, 200 cu. ft. air-compressor, 35 h. p. engine, compressor and jackhammer drills, installed in 1915. Property considered promising.

LUCKY SAM MINING CO. **ARIZONA**

Office: 678 I. W. Hellman Bldg., Los Angeles, Calif.

Officers: W. S. Tarbell, pres.; G. M. Gilbert, v. p.; Geo. E. Fairhead, sec.-treas.; L. C. Randall, supt.

Inc. 1915, in Ariz. **Cap.,** $100,000; shares 10c par.

Property: 12 claims, 235 acres, in the Tom Reed district, Mohave county, carries 2 main parallel veins, 4-6′ wide. Developed by 2 shafts, deepest 163′. A prospect and probably idle.

LUCKY SEVEN GOLD MINING CO. **ARIZONA**

Mail returned unclaimed, March, 1919, addressed to A. L. Krous, pres., Oatman, Ariz.; H. E. Bonnell, sec.

Property: the Eva group at Oatman. Also has bond and lease on the Ibex mine, 4 miles from Klinefelder, near Needles, Calif., from which several carloads of ore shipped ran $37 per ton. Developed by 227′ shaft.

Presumably idle.

MIDWAY MINING & MILLING CO. **ARIZONA**

Office: 632 Laughlin Bldg., Los Angeles, Calif. **Mine address:** Oatman, Arizona.

Officers: W. Atkinson, pres.; D. A. McMillan, v. p.; Kasson Avery, sec.-treas., with F. E. Shaffer, S. I. Wellman, C. H. Burlock, James A. Fay, directors.

Cap., $2,000,000; 10c par.

Property: 14 claims, said to adjoin the ground of the Arizona Mossback Mines Co. The Moss vein is traceable across the property and is reported as being from 20′ to 100′ wide, outcrops assaying 50c. to $4 gold per ton. Shaft 145′ deep showed $5.80 gold ore. Intend sinking shaft to 500′. A prospect.

MOHAWK CENTRAL MINING CO. **ARIZONA**

Address: Colin Timmons, Oatman, Ariz.

Property: the Mohawk mine at Mammoth, a once profitable silver-gold mine. In recent years, the lead molybdate of the dumps and old workings has proven valuable here as it has at the adjacent Mammoth mine. Ground recently churn-drilled. Plan resumption of mining and treatment of tailings from milling operations of former company.

MOSS MINES CO. **ARIZONA**

Office and mines: Goldroad, Ariz.

Officers: A. C. Worden, pres.; L. F. Hammel, v. p.; I. W. Worden, sec.-treas.

Cap., $150,000; 10c par; 250,000 shares issued as promotion stock; total issued 513,781 shares.

Property: one claim. This is a well-known old mine that has produced some exceptional gold ore, though only opened to a shallow depth.

MURDOCK MINING & MILLING CO. **ARIZONA**

Address: Oatman, Mohave County, Ariz.

Officers: S. R. Porter, pres.-treas.-supt.; D. Gibson, v. p.-sec.; F. L. Porter, asst. sec., with D. P. Wright and G. D. Page, directors.

Inc. Dec. 3, 1915, in Ariz. **Cap.,** $1,000,000; $1 par; 690,000 issued. Transfer office and registrar: Security Transfer & Registrar Co., New York.

Property: near Oatman, shows a vein in andesite. Ore is gold-bearing and of the usual dense quartz type.

NAVY GROUP M. & M. CO. **ARIZONA**

Office: 912 Higgins Bldg., Los Angeles, Calif.

Officers: Dr. Geo. P. Waller, pres.; F. M. Townsend; sec.-treas.; R. E. Zuver, agent at Gold Road, Ariz.

Inc. 1915. **Cap.,** $1,000,000; shares $1 par.

Property: 3 claims, 48.26 acres, in Tom Reed-Goldroad district, Mohave county, developed by 750′ tunnel. A prospect. Presumably idle, 1919.

NELLIE GOLD MINING CO. **ARIZONA**

Address: Oatman, Ariz.

Controlled by Howland Bancroft and Julius Bache. Mine operations are carried on by the Woods Investment Co. of Los Angeles, who also control the Lexington and have a big interest in the Lazy Boy and United Western.

NELLIE MINING CO. **ARIZONA**

Mine office: Oldtrails, Mohave county, Ariz.

Officers: F. M. Woods, pres.; R. C. Wilson, v. p.; E. T. Walmsley, sec.-treas.; H. E. Woods, mgr., with C. S. Buck, directors.

Inc. July 3, 1906, amended Aug. 4, 1915, in Ariz. **Cap.,** $1,000,000; shares $1 par. Stock is listed on the San Francisco, Salt Lake and Los Angeles Exchanges. Registration Surety Co., 205 Russ Bldg., San Francisco, registrar. Annual meeting, first Wednesday in June.

Property: 11 claims, 190 acres, in Tom Reed-Goldroad mining district, 5 miles S. of Oldtrails, shows a fissure vein in andesite and andesite tuff, with gangue consisting principally of fine grain quartz and adularia and calcite. The values are exclusively gold, although traces of copper stain are found in the 2 altered dikes which strike out from the main lode, having a general strike N. 52° W., with dip about 55° N. E. Assays said to average $5.90 gold per ton. Developed by 530′ 2-compartment vertical shaft.

Reported that on the 350′ level 200′ of drifting opened ore worth up to $35 per ton. At 435′, in shaft No. 2, vein is reported to be 24′ wide, and on 500′ level 25′ wide, 10′ of it assaying $5.31 per ton. Closed down early in 1917; re-opened Feb., 1919, and drifting on 500′ level to encounter ore-shoot outcropping on surface 300′ east.

Equipment: includes 100 h. p. gas hoist, 55 h. p. compressor, pumps, 3,600′ water pipe line, bunk and boarding houses. Property reported on by A. G. Keating.

NEVADA-ARIZONA MINES CO **ARIZONA**

Office: 510 Odd Fellows Bldg., St. Louis, Mo. **Mine office:** Hackberry, Mohave county, Ariz.

Officers: John Schmoll, pres.; Chas. E. Hamilton, v. p.; A. E. Louis, sec.; J. Wm. Seller, treas., with J. Phillips, Aug. Richter, Jr., C. D. Morley, Edward J. Ryan and Wm. Burmeister, directors. T. D. Walsh, supt.

Cap., $1,500,000; shares $1 par. Reported, March, 1919, to have issued $150,000 in bonds; indebtedness, $28,569.

Property: 17 patented claims, about 340 acres, in the Music Mountains, said to show gold and silver values. Ore occurs in fissure veins, 4-10′ wide, in granite formation. Average assays reported at from $10-$50 per ton.

Development: includes the 700′ Lucknow shaft and 700′ Roosevelt tunnel, latter in milling ore for 200′. At depth of 515′ the Lucknow vein is reported to be 12′ wide, of good grade ore.

Equipment: includes compressor and gas hoist. Company erected a small concentrator with a Chilean mill, which started work in Oct., 1913. No production data, if any, available.

OATMAN CRESCENT MINING CO. **ARIZONA**

Office: 25 Broad St., New York. **Mine office:** Oatman, Ariz.

Officers: Geo. W. Peirce, pres.-gen. mgr.; W. T. Esser, v. p.; Gowen Peirce, sec.-treas., with A. G. Reynolds, directors.

Inc. 1915. **Cap.,** 1,000,000 shares; 10c par; 650,000 issued. Security Transfer & Registrar Co., New York, registrar and transfer agents.

Property: 9 claims, 170 acres, 4 miles S. E. of Oatman said to show 3 strong veins outcropping at surface for 3,000′ in length and giving average assays of $6.13 per ton in gold. The veins strike N. W. and dip steeply S. The Highland Chief vein, from 10-40′ wide, consists of altered and brecciated wall rock, with quartz and calcite, associated with black oxide of manganese.

Development: by tunnel, several shallow pits and openings. In 1916, 1,200′ of drifting and tunnel work was done. Drift was said to be within 200′ of ore zone, June, 1917. No later information.

Equipment: includes 50 h. p. engine, compressor, jackhammers, etc. Is regarded as a promising prospect.

OATMAN GOLD MINING & MILLING CO. **ARIZONA**

Address: Kingman, Ariz. Eli Hilty , pres.-mgr.; S. W. Klass, sec.

Inc. 1915, in Arizona. **Cap.,** $1,000,000; shares $1 par.

Property: 10 claims, about 160 acres, in the Tom Reed-Goldroad mining district, shows several well-defined veins with stringers of quartz and calcite carrying free gold.

The Kokomo vein is a fault fissure, 40′ wide at surface, and said to show for 4,500′ on company's ground, with strike N. 62° W., and dip 80° N. E., cutting the andesite, or occurring in a contact between rhyolite and andesite.

Development: a 500′ shaft was sunk on the Kokomo vein in 1915, and crosscuts were run N. and S.

Equipment: includes compressor and 25 h. p. hoist. A prospect. No recent information. Reported on by E. W. Brooks.

OATMAN-JUMBO M. & M. CO. **ARIZONA**

Mail returned from Oatman, Ariz. Described in Vol. XIII.

OATMAN NORTH STAR MINES CO. **ARIZONA**

Address: Oatman, Ariz. A. O. Parsons, pres., with C. E. Gilman, R. R. Moore and Lloyd Trevis, directors.

Inc. 1915, in Ariz. **Cap.,** $150,000; shares 10c par. Stock is listed on San Francisco and Los Angeles Exchanges.

Property: 17 claims, 250 acres, at Oatman, claimed to carry extension of Tom Reed vein system was sinking a 400′ shaft in 1916. No later information.

OATMAN SOUTHERN MINING & MILLING CO. **ARIZONA**

Oatman, Ariz. No returns, 1919. Probably idle. Described in Vol. XIII.

OATMAN SYNDICATE MINING CO. **ARIZONA**

Oatman, Ariz. **Officers:** J. L. McIver, pres.-mgr.; Geo. W. Long, v. p.; C. W. Herndon, sec.-treas.

Inc. Oct. 29, 1915, in Ariz. **Cap.,** $100,000; shares 10c; 500,000 shares issued. Valley Bank, Phoenix, Ariz., transfer agent.

Property: the Putney group, 11 claims, 4 patented, about 200 acres, 6 miles S. of Oatman, embraces about 3,500′ on the main Black Range-Nellie lode system. Mine shows a quartz contact deposit surrounded by andesite, rhyolite and granite, with N. W. strike and dip of 45°.

Development: by 400′ vertical shaft. Drifts run both ways on the vein from the 400′ level.

Equipment: includes 40 h. p. hoist, 5 drill compressor and gasoline power.

OATMAN UNITED GOLD MINING CO. **ARIZONA**

Address: Oatman, Ariz.

Officers. A. F. Andrews, pres.; O. Wimpenny, v. p.; L. Ashmun, sec.-treas.; J. K. Turner, cons. engr.

Inc. 1917, in Ariz. **Cap.,** $200,000; 10c par, assessable; issued 1,588,143 shares. Listed on Los Angeles Stock Exchange.

Company took over the Oatman United Mines Co.

Property: 120 acres surveyed for patent, 1½ miles N. E. of Oatman, adjoining United Eastern on N. and Tom Reed on S. W., said to show five gold bearing fissure veins in andesite and along andesite rhyolite contact.

Development: 580′ shaft, to be sunk to 800. and 1,300′ of crosscuts on 400′ level in April, 1919. In August, exploration was under way on 600′ level.

Equipment: includes 5-drills compressor, 40 h. p. hoist and 50 h. p. hoist and 50 h. p. engine. A prospect.

OATMAN UNITED MINES CO. **ARIZONA**

Company taken over by Oatman United Gold Mining Co., which see.

ORION MINING & MILLING CO. **ARIZONA**

Succeeded by Gold Dust Mining Co., which see.

PITTSBURG MINING & MILLING CO. **ARIZONA**

Oatman, Ariz. **Officers:** L. P. Hansen. pres.-treas.; H. J. Walsh, v. p.; S. R. Porter, asst. sec.; above are directors; Jas. McLachlan, sec.

Inc. Jan. 31, 1912, in Arizona. **Cap.,** $1,500,000; outstanding April 1, 1916, $723,300; shares $1 par, assessable. Security Transfer & Registrar Co., New York City, transfer agent and registrar. Listed on New York Curb as a prospect, but stricken off list on Dec. 26, 1919.

Property: 11 claims, 220 acres, 1 mile W. from Goldroad and 1½ miles N. W. from Oatman, is said to show 3 distinct veins. The main vein strikes E.-W., dips N. 80°, and has a width of 6′ to 40′ along an outcrop said to be traceable for over 5,000′, in which distance it shows two faults. Vein filling is chiefly quartz, with some calcite. Paralleling the main vein and 20′ from it there is another vein 4′ to 8′ in width and nearly vertical, which is supposed to intersect the main vein. Near the center of the property these two veins merge and form one vein 40′ wide. A third or footwall vein parallels the main vein and has a similar dip; at east end of property this vein is 200′ back in the footwall; but is supposed to join main vein near center of property.

Development: 300′ double compartment vertical shaft, sunk on E. end of Pittsburgh claim between main and hanging-wall veins; water prevented sinking deeper; at this level 125′ of work has been done, but to date the ledge where opened has been low-grade. Total workings, about 1,000′.

Equipment: includes a 20 h. p. gasoline hoist. Nothing reported since 1916.

RECORD LODE MINING CO. **ARIZONA**

Address: J. J. McCarthy, supt. Oatman, Ariz.

Officers. Chas. A. L. Gehrmann, pres.; Lee R. Myers, v. p.; L. L. Wallace, sec.-treas., with J. J. McCarthy, directors.

Inc. Jan., 1916, in Arizona. **Cap.,** $250,000; shares 25c par.

Property: 10 claims, located on Hardy vein. **Equipment:** hoist, compressor, etc. Developing since 1917. An incline shaft was sunk on the vein to

250′ level where vein left the shaft. At last accounts shaft was 500′ deep and crosscutting was in progress.

RED LION MINING CO. **ARIZONA**

Address: Oatman, Ariz. Frank W. Strong, pres. Mine lies between the Ben Harrison and Gray Eagle claims, supposedly on the Tom Reed vein.

Development: in Feb., 1919, the proposed 400′ shaft was down 260′, and some crosscutting was being done on the 225′ level, and a hoist added to the equipment.

SECRET PASS GOLD TOP MINING CO. **ARIZONA**

Address: J. P. Loftus, 1615 Martel Ave., Hollywood, Cal.; and Kingman, Ariz.

Officers: J. P. Loftus, pres.; C. S. Sprague, v. p.; G. P. Loftus, sec.-treas., with F. Kemp, J. K. Turner and S. L. Carpenter, directors.

Inc. May 30, 1916, in Arizona. **Cap.,** $100,000; shares 10c par, non-assessable; 587,000 issued.

Property: 5 claims, 100 acres, in Oatman district, Mohave county. Open cuts and other shallow workings show 5,000 tons of $6 to $15 gold ore developed.

Equipment: 30-ton plant, including 3′ Hardinge ball mill. Operating in 1918, but no recent returns received.

SUN DIAL GOLD MINING CO. **ARIZONA**

A. F. Carper, supt., Oatman, Ariz. Is one of the big crop of wildcats born in Oatman since the strike in the United Eastern.

SUNNYSIDE MINING CO. **ARIZONA**

Office: Oatman, Mohave county, Ariz.

Officers: C. H. Palmer, Jr., pres.; F. A. Keith, v. p.; R. I. Rogers, sec.-treas., with S. W. Mudd, Philip Wiseman, P. L. Mullen and M. R. Sullivan, directors.

Inc. in Ariz. **Cap.,** $1,500,000; $1 par.

Property: Sunnyside group of 3 claims, 2 miles S. E. of Oatman, said to have a vein with assay values of from $2 to $8 gold per ton. Development on vein at 400′ level, considered promising. Property is in the development stage. Idle since 1917.

TELLURIDE M., M. & DEV. CO. **ARIZONA**

Office: Oatman, Ariz.

Officers: J. L. McIver, pres.; Geo. G. M. Mackay, v. p.; Byron Campbell, sec.-treas., with W. Matthie and J. B. Dowd, directors.

Inc. 1915, in Ariz. **Cap.,** $220,000; increased May, 1919, to $300,000; shares 20c. par; treasury shares, May 1, 1917, 175,516.

Property: 14 claims, 177 acres, at Oatman, Mohave county, said to carry gold ore of milling grade.

Development: by 580′ shaft with crosscutting and drifting on 475′ and 535′ levels.

Equipment: includes 40 h. p. White & Middleton engine, double-friction hoist, Fairbanks-Morse and Chicago Pneumatic compressors, mine buildings, etc.

Mine examined in Jan., 1917, by Etienne A. Ritter, who discusses the geology and development in 13 pages. He suggested diamond-drilling, and considers that the property is well situated, also that some important bodies of commercial ore should be uncovered. Exploration was under way in Sept., 1919.

TIMES MINING CO. **ARIZONA**

Mail returned, 1918, from former address, Oatman, Ariz. Described in Vol., XIII.

TOM REED APEX MINING CO. **ARIZONA**

Address: Oatman, Ariz.

Is a prospect, on which company was reported developing a strong vein exposed on Ricebird claims. In 1916, 50,000 shares were offered at 15c. each.

Letters returned unanswered in July, 1917, and no report since then.

TOM REED GOLD MINES CO. **ARIZONA**

Office: 606 Chamber of Commerce Bldg., Pasadena, Calif. **Mine office:** Oatman, Ariz.

Officers: S. S. Wold, pres.; Chas. Mushrush, v. p.; W. J. Lawrence, sec.; J. W. Roach, treas., with O. Keck, and E. S. Harwood, directors. W. B. Phelps, mgr.

Inc. Dec. 17, 1906 in Arizona. **Cap.,** $1,000,000; $1 par; outstanding, 909,555. No bond issues, mortgages or indebtedness. Listed on Los Angeles Stock Exchange.

For year ending April 1, 1918, total mine earnings were $644,350. Mining, milling and development costs of $450,310 materially reduced this. Net profit for year, $10,008. For year ending April, 1919, net operating profit was $315,591; less depreciation and depletion, $129,165; left $184,426, carried to surplus.

Dividends: aggregate over $2,600,000. The first dividend of 6% was paid in 1908, and a second dividend of 3% was paid in 1910. Since then dividends averaged 4½% per month for five years. In 1916, 10½c. per share was paid. Dividends were resumed in Nov., 1918, at rate of 2% per month.

History: the mine was discovered in 1900, 20 years after the discovery of the Gold Roads mine nearby. Early development proved unsuccessful and in 1904 the mine was sold for $75,000, one-tenth cash. The purchasers failed to meet payments and the property passed to the Title Insurance & Trust Co. of Los Angeles, representing creditors, for $45,000. The present company was formed and deeper developments undertaken. The Ben Harrison shaft was then 150′ deep and the Tom Reed 90′. The first shoot of commercial ore was encountered on the 150′ level.

Property: 29 claims, 12 patented, in three distinct groups, 431 acres Also owns water rights and mill sites in Cottonwood Canyon. Thus far most of production has been from the Tom Reed group, but development on the Black Eagle group promises early production.

Geology: the claims cover the outcrop of the big Tom Reed lode, one of the typical quartz-adularia veins of the district, which has been reopened and crushed by strike faulting with enrichment of the primary ore. The ore-shoots persist to the deepest level developed (1,400′), with no change in size or value. Ore is gold-bearing; average value about $9 per ton in 1918.

At 400′ depth in the Aztec claim there was opened 1,000′ of milling ore, but results on 500′ level were disappointing, although late in 1919 some high-grade ore had been opened showing good width. Here the management had expected to develop ore of a much higher grade than that on the level above. Reported in June, 1919, that a 6′ vein of $15 ore had been opened on 400′ level of the Bald Eagle claim.

Reserves: April 1, 1919, estimated as 65,800 tons.

Development: to a depth of 1,400′, vertical, with total workings of approximately 4 miles. New work totalled 5,477′ in 1918. The Red Cloud shaft was down 700′ in August, 1919.

Equipment: working shaft has a 150 h. p. electric hoist. Power is supplied by the Desert Light & Power Co., Kingman. There are 3 compressors with capacity of 4,000 cu. ft.

The mill, re-built in 1917, of 300 tons capacity, has ball-mills, classifiers and counter-current decantation system of cyanidation. Mine has machine-shops, supply store, hospital, recreation hall, etc. Present equipment cost more than $300,000.

Production: for year ending March 31, 1918, 81,114 tons ore treated, average assay $7.595; tails averaged $0.446. Mining and milling costs were remarkably low, $5.25 per ton, including all overhead, taxes and depreciation. During the year ending April 1, 1919, there was treated 88,525 tons of ore, average value, $9.09 per ton; tails averaged $0.37. Mining and milling costs were $5.31 per ton, of which $2.09 was for milling and $3.21 was for mining. Total costs were $5.87 per ton. During the year 36,524 oz. gold, and 17,229 oz. silver were produced.

Property is a good one, and equipment complete. During the past several years there have been many changes in the Tom Reed management, the last being in Sept., 1917. The new mill is working well and profitably treating lower-grade ore, but management is not so liberal about information as formerly.

Reported in April, 1919, the company had brought suit against United Eastern Mng. Co., claiming apex rights, the case involving the Big Jim claims.

TOM REED, JR., MINING CO. **ARIZONA**

Mail returned 1918, from former office, Citizens' Bank Bldg., Los Angeles, Calif. No recent reports, probably idle. Described in Vol. XIII.

UNITED EASTERN MINING CO. **ARIZONA**

Office: Oatman, Ariz.

Officers: Philip Wiseman, pres.; F. A. Keith and G. W. Long, v. p.; R. I. Rogers, treas., with S. W. Mudd, J. L. McIver, W. K. Ridenour, Geo. D. Nordenholt, D. C. Jackling, and R. C. Nowland, directors; W. K. Keith, sec. and purchasing agent. J. A. Burgess, gen. mgr.

Inc. in 1913, in Ariz. **Cap.**, $1,500,000; $1 par; outstanding, 1,363,000; Equitable Trust Co., New York, Security Trust & Savings Bank, Los Angeles, transfer offices. Listed on Los Angeles Stock Exchange and on New York and Boston Curbs.

Dividends: started in July, 1917, at rate of 5c per share monthly, in 1918, 62c. per share was paid; in 1919, 7c. monthly has been paid since February. Total dividends to 1919 were $1,253,960. In future, distributions are to be made quarterly. On Jan. 28, 1920, the first quarterly of 21c. was paid.

Property: 27 claims, 300 acres, patented, at Oatman. Mohave county, adjoining the Tom Reed mine on the N., and covering the N. W. extension of Tom Reed vein; 26 miles S. W. of Kingman, the nearest rail point.

In April, 1917, the Big Jim mine adjoining was purchased for 160,000 United Eastern shares, or over $800,000.

Geology: deposit consists of a vein, irregularly banded with quartz, in andesite. Geology of the district is complex, composed of andesite flows with rhyolite intrusions, and has been studied by many engineers. Veins outcrop either as prominent silicified ribs or as shallow depressions in the andesites, all showing more or less brecciated rock fragments cemented by calcite or quartz. Ore occurs as a series of lenses pinching vertically and horizontally within the vein-filling. Gold is seldom found near the surface in commercial quantities. The gold is extremely fine, so fine grinding is necessary. None of the mines are wet.

Development: main shaft 1,500′ deep, with crosscuts opening the vein on the 300′, 465′, 565′, 665′, 815′, and 915′ levels. Ore has been developed to the 8th or 965′ level. In August, 1919, a large deposit was opened on the 1,400′ level. During 1918 the amount of ore opened by development work was greater than that taken out, so there has been an increase in ore reserves. Ore blocked out on Jan. 1, 1919, was 265,363 tons with gross value of $6,467,005, assuring a 3 years mill supply. Main shaft will be sunk to 1,600′ depth.

Equipment: complete, with electrically driven hoists, compressors, and 285-ton mill. It includes Marcy ball mills, tube mills, and the counter-current system of cyanidation.

The United Eastern mine and mill are described by Otto Wartenweiler in the November, 1917, Bull. of the A. I. M. E.; and the mill operations during 1917 and 1918, by W. O. North, in Bull. 152 of the A. I. M. & M. E., Aug., 1919.

The machinery includes an Allis-Chalmers double-drum 150 h. p. electric hoist, 150 h. p. 888 cu. ft. Ingersoll-Rand compressor, 200-ton coarse ore bin, No. 6 Telsmith gyratory crusher driven by 50 h. p. motor, 400-ton mill ore bin, 2 No. 64½ Marcy mills driven by 100 h. p. motors, Dorr classifiers, three 5x6′ Allis-Chalmers ball-mills driven by 75 h. p. motors, Callow tanks, 6 Dorr 40x12′ thickeners, 7 Dorr 24x14′ agitators, 16 diaphragm pumps, Krogh centrifugal pumps, Merrill classifying and zinc dust precipitating presses, refinery and the necessary cyaniding accessories. The whole surface equipment including water system, houses, roads, etc., cost $248,468.

Production:

Year	Tons Ore Milled	Average Value	% Rec.	Cost per Ton Mining	Cost per Ton Milling	Total Operating
1919*.....	87,310	$20.71	.....	.....	.....	$9.50
1918.....	92,339	23.16	96.95	$4.728	$2.216	8.501
1917.....	84,548	22.42	96.41	4.181	2.159	7.283

* 11 months.

In 1917 the metal extracted was 85,918 oz. of gold and 43,989 oz. of silver; and in 1918, it was 97,827 oz. and 52,485 oz., respectively.

Analysis of the balance sheet and mine records show that while current earnings are not up to those of former years, that mining and milling costs are slowly being lowered, though checked by the new wage scale. The management is reticent and conservative, and very efficient.

UNITED NORTH MINES CO. ARIZONA

Mail returned 1919, from former address, 434 I. W. Hellman Bldg., Los Angeles. **Mine office:** Oatman, Ariz.

Officers: C. T. Howland, pres.; W. H. Thomas, sec. and treas.

Inc. 1915, in Ariz. **Cap.,** 1,000,000 shares; par 10c; in treasury, 500,000. Listed on Los Angeles Stock Exchange.

Property: the Lion, Kennedy Fraction, and Poorman claims, 40 acres, between United Eastern and Gold Road mines, N. of west end of Fessenden claims.

Equipment: 25 h. p. gasoline hoist, compressors, etc. Sinking 2-compartment shaft to explore two veins. In Dec., 1916, $2 to $12 ore had been opened on 400′ level, the vein being 50′ wide. No recent information.

UNITED WESTERN MINES CO. ARIZONA

Address: Oatman, Ariz.

Officers: W. K. Ridenour, pres. and treas.; H. E. Woods, v. p., with S. E. Vermilyea, E. H. Newland and M. Lines, directors.

Inc. in Arizona. **Cap.,** $1,000,000; shares $1 par; in treasury, 600,000. Listed on San Francisco and Los Angeles Stock Exchanges. Was listed as a prospect on New York Curb, but was stricken from the list in Aug, 1918.

Property: 4 claims, 65 acres, one mile S. W. of Oatman, Mohave county, crossed by main road connecting Gold Road and Oatman, and adjoining property of the United Eastern Company along what appears to be a continuation of the main ore zone of that property. Also owns the Oofty Goofty group and water rights 4 miles N. W. of Oatman, total, 125 acres. Ore is free-milling gold, containing little silver. Pay ore occurs in shoots of undetermined extension. Development shows strong vein on the upper levels but below milling grade. On 505′ level the vein is large, wet, and reported to show milling value.

Development: comprises a shaft 500′ deep with crosscuts at 200′ and 500′. At the latter depth a heavy flow of water from the vein temporarily stopped work, 1916.

Equipment: includes 50 h. p. hoist, compressor, buildings, etc.

Property a good prospect, but drifting alone can determine its value. No recent information.

VIVIAN MINING CO. ARIZONA

Office: Merchants' National Bank Bldg., Los Angeles, Calif. **Mine** office: Oatman, Ariz.

Officers: E. M. Ross, pres.; G. A. Hancock, v. p.-gen. mgr.; E. A. Olson, sec.; the foregoing and E. P. Thom, C. Leonhardt, R. Deving, directors. Farmers' & Merchants' National Bank, treas.

Inc. in Cal. **Cap.,** $500,000; $1 par; outstanding, 410,292. No bonded indebtedness. Annual meeting, first Saturday in July.

Property: 11 claims, 183 acres, 2½ miles W. of Oatman, Mohave county.

Development: 450′ shaft; workings, 5,400′.

Equipment: two 40 h. p. oil engines, steam compressor, 8 h. p. hoist, electric light plant, buildings, etc. Was developing in 1917, being financed by assessments. No later report. Probably idle.

WEST GOLD ROAD MINING CO. **ARIZONA**

Office: Crocker Bldg., San Francisco, Calif.

Officers: T. C. Petersen, pres.; R. L. Mann, v. p.; Gurdon Bradley, sec.

Inc. in Calif. **Cap.,** $1,000,000; shares $1 par.

Property: 5 claims, 63 acres, near Oatman, said to contain the W. extension of the Gold Road vein.

Development: consists of main shaft 455′ deep, and several crosscuts and drifts. No later news.

WINCHESTER GOLD MINING CO. **ARIZONA**

Address: L. E. Hesla, Prescott, Ariz.

Officers: L. E. Hesla, pres.-treas.; A. W. Bark, v. p.; C. F. Paul, sec., with C. J. Dalken and O. H. Hesla, directors.

Inc. July, 1915, in Arizona. **Cap.,** $1,500,000; $1 par; 535,000 outstanding. Annual meeting, first Monday in July.

Property: 6 claims and 2 fractions, 140 acres, 2 miles W. of Oatman, Ariz. During 1916 owners spent $3,500 on prospecting and report good surface results. A lode 17′ wide assayed from a trace to $2.30 gold per ton at depth of 50′. Another 30′ shaft, 1,000′ away, opened $7 ore. Placer work years ago yielded considerable gold on part of the property. Company does not reply to requests for information.

PIMA COUNTY

ACME MINING & REDUCTION CO. **ARIZONA**

Idle. Mail returned from former address in Tucson, Ariz. See Vol. XI, Copper Handbook.

AJO CONSOLIDATED COPPER CO. **ARIZONA**

Property purchased in 1917 by New Cornelia Copper Co., which see. Fully described in Vol. XII.

AJO CORNELIA COPPER CO. **ARIZONA**

Address: P. O. Box 78, Miami, Ariz.

Officers: Ed. J. Grant, pres.-mgr.; J. D. Elliott, sec.-treas., with I. L. Greninger and J. B. Johnston, directors.

Inc. Dec. 11, 1916, in Arizona. **Cap.,** $1,500,000; $1 par; 768,000 shares outstanding.

Property: 14 claims, 280 acres, adjoining the Ajo Consolidated at Ajo, Pima county, carries a lenticular deposit of carbonate and sulphide ore in rhyolite, developed by a 40′ shaft.

The State Corporation Commission, after inspection of the company's books, ordered a public sale of the Ajo Cornelia property to be held March 8, 1919, to satisfy a claim of the E. I. Longyear Co. for $2,000.

Company is apparently dead. Both the president and the secretary-treasurer are reported to have left Miami without delegating any one to take their places.

AJO GUNSIGHT MINING CO. **ARIZONA**

Address: Ajo, Ariz.

Property in the Gunsight mountains, 20 miles S. E. of Ajo, is said to show a main vein 25′ wide, with gold values of from $10 to $20 per ton for small block of developed ore.

AJO PIMA COPPER CO. **ARIZONA**

Address: H. B. Thomas, care Valley Bank, Ajo, Ariz.

Controlled by H. B. Thomas, C. B. Zingg, Emory Orr, and R. M. Boller.

Property: 24 claims, 480 acres; one group of 20 claims adjoining and lying continguous to New Cornelia Copper Co., the remainder lying separate and apart from main group, about 2,000′ in a southerly direction, all in the Ajo district, Pima county. The general geology is said to be identical with that of New Cornelia and Ajo Consolidated, and surface indications are considered good.

Development: by shallow shafts and trenches on numerous outcrops. One shaft is down 25′ on a stringer of high-grade copper ore pitching toward the contact, which is highly mineralized and can be traced through property for

several thousand feet. Shallow pits along this formation have exposed good ore.

Company is seeking capital for development.

ALPHA COPPER MINING CO. **ARIZONA**

Office. 34 S. Stone Ave., Tucson, Ariz.

Officers: John W. Bogan, pres.; R. J. Monahan, v. p.-mgr.; Geo. P. Myers, sec., with F. S. Lockwood, J. L. Toohey, J. W. Bogan and John Nelson, directors.

Inc. Oct. 7, 1916, in Ariz. **Cap.,** $1,000,000; $1 par; increased from $500,000 March 16, 1917; 350,000 shares in treasury. Last offering of 100,000 shares at 50c. made in May, 1917.

Property: 22 claims, comprising about 450 acres, including the Pima and Fries groups, situated midway between Mineral Hill and Twin Buttes camps, San Xavier district, Pima county.

The tract is underlain by granite capped on the hills by quartzite and traversed by two different sets of veins, both metalliferous. The fracturing is complex and the veins associated with porphyry dikes, andesite dikes and wide breccia zones.

Ore: carries silver and copper as chalcopyrite and gray copper (tennantite) with silicious gangue. The Pima mine, opened to 150′ in depth, 1876, produced $85,000 in silver.

Development: by 215′ shaft on the Pima vein with levels at 150′ and 200′ cutting 2 veins, 4′ to 5′ wide, with stopes above 150′ level yielding ore that is said to average $16.35 per ton with copper at 25c. and silver at 65c.

Equipment: adequate for existing needs only, includes 2 gasoline engine hoists, pumps.

Reported on by W. Tovote, who said property appears to have merit.

AMERICAN MOLYBDENUM CO. **ARIZONA**

Mail returned unclaimed, March, 1919, from Tucson, Ariz.

Inc. 1917 in Arizona, for the purpose of handling contracts of consumers of molybdenum and for the development of their properties in the Sierra Colorado and Old Hat districts, Pima county.

ARIZONA BELMONT MINING CO. **ARIZONA**

Office: Bullitt Bldg., Philadelphia, Pa. **Mine:** Silverbell, Pima County, Ariz. Meyer Schamberg, pres.; N. S. Keith, treas.

Inc. in 1911 in Arizona. **Cap.,** $1,000,000; $1 par; issued 870,000.

Property: 4 claims, adjoin the Imperial Copper Co. at Silver bell, on the east and northeast and are developed by 392′ shaft. Operations suspended in 1913.

ARIZONA CONSOLIDATED COPPER & MINING CORP. **ARIZONA**

Name changed in Feb., 1919, to Liberty Silver Mines Co., which see.

ARIZONA COPPER MINING CO. **ARIZONA**

Office: Tucson, Ariz.

Officers: John U. Mettler, pres.; V. Brunner, sec.-treas., with Leo J. Wachs and Jos. Brunner, directors.

Inc. Aug. 1, 1901, in Arizona. **Cap.,** $1,000,000; $1 par; 183,000 shares outstanding June, 1919.

Property: 22 claims, 440 acres, 16 miles W. of Tucson, in Amole mining district, Pima county. Developed by 100′ tunnel and 300′ shaft, said to show a vein carrying 2% copper. Ore occurs in porphyry and limestone and carries much iron.

Equipment: includes hoist, engine and several buildings.

ARIZONA CORNELIA MINES CO. **ARIZONA**

Mail returned unclaimed, April, 1919, from former office, Tucson, Arizona.

Officers: John Nelson, v. p.-treas.; Tom K. Richey, sec., with John Latz and M. C. Adams, directors.

Inc. 1917 in Ariz. **Cap.,** $2,000,000; $1 par.

Property: 7 claims, adjoining the New Cornelia in the Ajo district, Pima county. Probably idle.

ARIZONA MOLYBDENUM CO. **ARIZONA**

Address: F. J. Wharton, pres., Tucson, Ariz.

Inc. 1917, in Ariz. **Cap.**, $300,000.

Property: 10 claims, about 200 acres near Yucca, in the Baboquivari mountains, Pima county, about 35 miles from Twin Buttes, slightly developed by several shallow shafts.

Ore: occurs a pegmatite carrying molybdenite, chalcopyrite and galena, in veins of quartz-feldspar, 4-10′ wide, with S. E. strike, traversing coarse-grained granite. Samples reported to assay 2.2 oz. silver, 1.8 oz. gold and 3.9% copper. A 50-ton flotation plant constructed in 1917, was reported to be producing 1,500 lb. of concentrate daily, running 18% molybdenum.

Reports in August, 1919, stated that a K. & K. flotation machine was recently installed, and the recovery was 83% of the molybdenite and 66% of the copper, making a 25% and 24% concentrate, respectively. This test was on old tailing pile.

ARIZONA PAYMASTER MINING & MILLING CO. **ARIZONA**

Address: Edmund E. Walton, supt., Twin Buttes, Ariz.

Property: about 27 miles south of Tucson, is an old silver-lead mine on which work has recently been started. Has shaft 100′ deep.

One of many mines boomed by recent high metal prices.

ARIZONA RAY COPPER CO. **ARIZONA**

Name changed to New Arizona Ray Copper Co., which see.

ARIZONA-TONOPAH MINING & MILLING CO. **ARIZONA**

Office: 503 Delta Bldg., Los Angeles, Calif. **Mine office:** 30 E. Congress St., Tucson, Arizona.

Officers: Jos. Dixon, pres.; R. D. Dunn, v. p.; Geo. Ankers, sec.-treas.; with Countess Mirafiori and W. L. Shaffer, directors.

Inc. Jan., 1916, in Arizona. **Cap.**, $1,000,000; $1 par; 500,000 outstanding. Annual meeting, first Monday in January.

Property: 34 claims, 688 acres, in Amole mining district next to the Arizona-Tucson and Saginaw mines in Pima county, 9 miles S. W. of Tucson, shows granitic schists, limestone, andesite and rhyolite, carrying a sulphide deposit, proved for 100′ and said to assay from 1-5½% copper, with gold and silver.

Development: by 185′ tunnel with 73′ shaft at end. Idle, 1917; management reports steady development and installation of additional equipment since July, 1918. The shaft is to be sunk to 200′. Another prospect shaft, 1,500′ N. W. of the main shaft, passed through some 17 oz. silver ore, and is being sunk to the 200′ foot point. Not favorably regarded.

ARIZONA-TUCSON COPPER CO. **ARIZONA**

Officers: Harwood Robbins, pres., Riverside, Calif.; J. J. Freeman, sec.; Glendale, Cal.; B. F. Dogett, treas.; T. E. Kelso, gen. mgr.

Property: 32 patented claims, in Amole mining district, next to the Arizona-Tonopah and Saginaw mines, 8 miles S. W. of Tucson.

Development: by former owners to depth of 130′ by shaft. Ore carries gray copper, and selected samples assay about 26½% copper, $18 gold, and 12 oz. silver per ton. Present company started sinking a 2-compartment shaft, which will be continued to the 300′ level. In Aug., 1919, a rich shoot of copper-gold ore was opened.

Equipment: 60 h. p. Fairbanks-Morse crude oil engine, 20 h. p. distillate engine, hoist, head-frame, dwellings, etc.

ATLAS MINING CO. **ARIZONA**

Defunct. L. & K. W. Gano, Cincinnati, Ohio, owners. J. F. O. Reilly, Silverbell, Arizona, agent.

Property: 6 claims, 5 mill sites, all patented; one mile N. W. of the Silverbell post office. Property located 1879, and equipped with 40-ton smelter in 1888, which operated for years on rich surface ores, but unable to handle sulphide ores, closed down 1889. Operation by lessees since then, with extraction of small tonnages of rich copper sulphide ore and of zinc carbonate.

BEACH MINES, INC. **ARIZONA**

Address: Tucson, Ariz.

Officers: Geo. M. Beach, pres.-gen. mgr.; John B. Wright, v. p.; Wm. Trueheart, sec.-treas., with Jas. M. Treachey, J. W. Hopkins, Geo. R. Darnell, all of Tucson, and L. H. Hyatt, of Chicago, directors.

Inc. June, 1917, in Ariz. **Cap.,** $2,500,000.

Property: 40 claims, 800 acres, in Ventana and Baboquivari mining districts, Pima county, 65 miles S. W. of Tucson, said to show veins in diorite and schist. Veins said to vary in width from a few inches up to several feet; they carry copper sulphide with gold and silver values, the ore assaying up to 5% copper, 6.3 oz. silver, and 0.15 oz. gold per ton.

Development: by tunnels and shallow shafts; in Sept., 1919, one tunnel was said to be in 200′. Property is in the prospect class.

BLACK BESS MINING CO. **ARIZONA**

Office: 33 Davison Ave., Highland Park, Mich.

Officers: I. N. Potter, pres.; J. W. Travers, v. p.; H. L. Hall, sec.; Levi Stanton, treas.; J. L. Austin, counsel; preceding with A. W. Bramwell and S. E. Hall, directors.

Inc. 1918 in Arizona. **Cap.,** $600,000; shares $10 par; non-assessable.

Property: 10 claims near the Bullion Bar, 7 miles west of Gunsight, Pima county, known as the Submarine group. Shaft 200′ deep. Vein on the 50′ and 80′ levels said to have 20″ of excellent free milling gold ore, containing tungsten and molybdenum. Reported idle Jan., 1919. Mail returned unclaimed, March, 1919, from Ajo.

BLACK PRINCE METAL PRODUCTION CO. **ARIZONA**

March, 1919, mail returned unclaimed from Ajo and from Tucson, Arizona.

Officers: J. D. Johnson, pres.; O. H. Finn, v. p.; E. W. Oakley, sec,

Cap., $1,000,000; shares 50c par.

Property: 16 claims, also bond and lease for $25,000 on three more in the Sierra Blanca or Quijota Mountains, 40 miles southeast of Ajo. In 1917 or 1918 Arizona Corp. Commission refused permit to sell stock on the ground that the company was operating property which did not belong to it, but which had been taken over on lease and bond.

Assays reported by an optimist for a block of ground 40′ wide and 80′ long are 30% lead, 4.9% copper, 6 oz. silver.

Reported idle, Dec., 1918, payments on bond and lease overdue two months.

BLANCHE ROSE MINING CO. **ARIZONA**

Practically dead. At Twin Butte. Company relocated land of the bankrupt Chesterfield Copper Co., described in Vol. XI, Copper Handbook.

See Esperanza Mine.

BULLION BAR MINING & DEVELOPMENT CO. **ARIZONA**

Address: I. N. Potter, 33 Davison Ave., Highland Park, Mich.; A. W. Bramwell, Ajo, Arizona.

Officers. I. N. Potter, pres.; J. W. Travers, v. p. and gen. mgr.; H. L. Hall, sec.; S. E. Potter, treas.; J. L. Austin, counsel; Levi Stanton, supt., with A. W. Bramwell, directors.

Inc. 1918, in Arizona. **Cap.,** $300,000; shares $10 par.

Property: 8 claims, 24 miles east of Ajo, in the Gunsight district, showing a 5′ vein on a contact between basalt and granite. Values as given are from $4 to $50 free milling gold per ton with about 1½% tungsten. Developed by 150′ shaft. Planning erection of 10-stamp mill.

BUSH-BAXTER MINING CO. **ARIZONA**

A close corporation. Fully described in Vol. XIII.

CABABI MINING CO. **ARIZONA**

Secretary and address: E. H. Emerick, 321 Law Bldg., Indianapolis, Ind.

Mine P. O.: Camp Cababi, via Tucson, Pima Co., Ariz.

Officers: Allen W. Conduitt, pres.; with E. J. Scoonover, Albert Off and R. A. Wilcox, directors.

Inc. 1908, in Arizona. **Cap.,** $1,500,000; shares $1 par; non-assessable; issued $1,250,000. Annual meeting, third Monday in June.

Property: 50 claims, about 1,000 acres, 35 claims patented, also 2 mill sites of 5 acres, situated in the Cababi mountains, 69 miles S. W. of Tucson.

Development: by numerous shallow shafts, and main shaft 450′ sunk on the Picacho claim, includes an antigua, reopened about 1860, by Francisco Padrea, and which, years ago, was a small producer of silver-bearing copper and lead ores.

Equipment: includes a steam hoist good for 500′, an adobe store building and several frame structures and tents utilized as dwellings.

A full report on the property made Oct., 1912, by C. J. Price, mg. engr., shows 2,240 tons of ore, valued at $28,485, on dumps. Manager reported 10,000 tons high-grade ore blocked out April 25, 1913. Mine now idle, but company claims it will be reopened when rail transportation is afforded.

CALCUTTA GROUP. **ARIZONA**

Owners: W. E. Murphy, Phillip Contzen, Tucson, Ariz.

Property in the Twin Butte district reported August, 1917, bonded to a Butte, Mont., company for $60,000.

CARDIGAN COPPER CO. **ARIZONA**

Office: Ajo, Ariz.

Officers: J. E. Suits, pres.; H. E. Frederickson, sec.

Inc. in Arizona. **Cap.,** $1,000,000.

Owned certain leases and options in the Ajo district, 2½ miles S. of Ajo. Ore occurs in a contact vein. Shipments made from a depth of 85′ are said to have returned 12% copper, 36 oz. silver. In March, 1919, mail returned unclaimed, stamped "company dissolved."

COLONIAL COPPER CO. **ARIZONA**

Norwood, Mass. Geo. H. Morrill, former president, reported that company was sold out on foreclosure sale, March, 1916. See Vol. XIII.

COPPER BUTTE MINES CO. **ARIZONA**

Office: 906 New York Life Bldg., Minneapolis, Minn. and Phoenix, Ariz.

Officers: Ace. P. Abell, pres.; Wm. H. Lucia, v. p. E. B. Crabtree, sec.-treas.

Inc. 1904, in Arizona. **Cap.,** $6,000,000; shares $10 par.

Property. 8 patented and 8 unpatented claims, 4 miles N. W. of the Ray Consolidated.

The ore deposit is a mineralized breccia, consisting of schistose rock with fragments of quartz, diabase, granite and limestone; the ores are the oxides and silicates of copper. Mine is fully described in Vol. XII.

Development: by several shafts, deepest 300′ and 6 tunnels. Report orebody 85′ wide at depth of 185′ containing 4 to 7% copper.

Was shipping a car of ore daily until closed down, Jan., 1919.

CORNCOB MNG. & DEV. CO. **ARIZONA**

See Korncob M. & Dev. Co.

CORNELIA AJO COPPER CO. **ARIZONA**

Name changed to Cornelia Cons. Copper Co., which see.

CORNELIA CONSOLIDATED COPPER CO. **ARIZONA**

Name changed from Cornelia Ajo Copper Co., April, 1918 to avoid confusing it with other Ajo companies.

Office: 8 West 40th St., New York City, and Southern Arizona Bank and Trust Bldg., Tucson, Arizona. Mine address: Ajo, Pima county, Arizona.

Officers: J. A. Hunter, pres.; J. S. Keegan, v. p.; W. O. Mickel, sec.; Jacob Schaefer, treas.; J. A. Hunter, J. S. Keegan, H. B. Haines, T. F. Martin, H. B. Monroe, H. L. Martin and J. B. Wright, directors. Security Transfer & Registrar Co., transfer agents; Corporation Trust Co., registrar.

Inc. 1916, in Delaware. **Cap.,** $2,500,000; shares $1 par; 1,340,000 outstanding; fully paid and non-assessable.

Stated Jan., 1918, Cornelia Extension Copper Co. held 1,079,000 shares of Cornelia Ajo stock.

Property: 29 mining claims, making a contiguous group with combined area of about 500 acres, on the southern slope of the Ajo Mountains adjoining the New Cornelia Company's holdings at Ajo, Ariz. The Monzonite

Copper Company's holding of six full claims were purchased in 1918; the property is west of the Cornelia Consolidated Copper Company's main holdings, and is said to be on monzonite domes appearing in that section.

Geology: in general is similar to that of the New Cornelia Copper Co., which see. The monzonite dips west-southwest under the rhyolite, and company expects it will be encountered at the Bull Dog shaft (now 40′ deep) at a depth of 100′. Samples from the shallow shafts and open cuts are reported to run from 1.5 to 38% copper.

Development: nothing reported for 1918. Old development consists of open-cuts, trenches, and shallow shafts up to 50′ deep. Company states property will be tested by 3 diamond-drill holes and the Bull Dog shaft will be sunk to a depth of 500′. Drilling was started in Oct., 1919, and by end of December ore hole was down 350′ in favorable ground.

CORNELIA WEST MINING CO. **ARIZONA**

E. E. Ganz, trustee, Phoenix, Ariz.

Company organized by Phoenix, Ariz., people to take over the 12 claims of Geo. Sayer adjoining the the New Cornelia Copper Co. The contract cost of the property was $37,500. It was reported that company would incorporate for $7,500,000, shares $5 each. Very little development work has as yet been done to show value of the property.

COWBOY MINING & SMELTING CO. **ARIZONA**

Owners: O. S. Stapley and associates of Mesa. **Address:** A. Bell, Twin Butte, Ariz.

Property: 18 claims in the Twin Butte district, formerly known as the Old Mormon claims. Ore reported to average 7 oz. silver and carries arsenic. Developed by shaft 300′ deep besides numerous old caved shafts and tunnels. Old workings stated to have shown large bodies of disseminated chalcopyrite ore.

Equipment. includes 25 h. p. gasoline engine and a 3 drill compressor.

DAILY ARIZONA CONSOLIDATED COPPER CO. **ARIZONA**

Address: 48 West Pennington St., Tucson, Ariz.

Officers: Dr. W. H. Martin, pres., Kokomo, Ind.; J. G. Hancock, v. p.; R. W. Langworthy, sec., Tucson; W. H. Daily, v. p. and gen. mgr., Tucson; J. W. Daily, treas. and supt.

Cap., $2,000,000; shares $1 par; 1,000,000 shares issued in payment for property; 627,000 shares in treasury; 125,000 to be sold at 50c. to pay for proposed mill.

Property: 22 claims, about 400 acres in the Old Hat mining district, near Oracle, Pima county, developed by 2,000′ of work, mostly by tunnels, longest 400′, but including several shallow shafts. This work develops 70,000 tons of sulphide ore averaging 3% copper and $2 in gold and silver. The Princess orebody is said to be 300′ long, 50′ wide and opened to depth of 500′. The Road, the Bull Dog and the Precious metal orebodies are barely prospected as yet. Ore as shipped will average 6% copper and $2.00 in gold and silver.

Geology: the ore is a garnet rock carrying chalcopyrite; it is an inclined bed of limestone altered and mineralized by contact metamorphism. Though of low average grade, there are local masses of richer shipping ore. The deposit is quite similar to that of the adjacent mine owned by Phelps Dodge Corp. Company will erect 100-ton flotation plant in 1920 to cost $40,000. The deposits are large, and is a sufficient tonnage is proven by development, can be mined and milled by flotation methods at a profit, provided cheap transportation is possible, since the mine is on a high mountain top and far from a railway. In Sept., 1919, a new State highway started from Oracle to the Old Hat district, a distance of 22 miles, to be paid for by U. S. Government and State of Arizona, at cost of $160,000.

Equipment: includes 100 h. p. boiler, compressor, drill sharpener several buildings, a 2½-ton truck, drills, tools, assay office, and dwellings.

DAWSON METALLURGICAL CO. **ARIZONA**

Address: Tucson, Ariz.

Officers: W. A. Doyle, pres.; Dr. O. B. Dawson, v. p.; Randolph Langworthy, sec.-treas.

Inc. in Arizona. **Cap.**, $300,000; par $10. Owns the Dawson furnace patents in the U. S. and Mexico. Reported that one of the furnaces has recently been completed, at a cost of $60,000-$75,000, near the Narragansett mine at Rosemont, 42 miles S. W. of Tucson, and that smelter costs would be only $3 a ton under this method.

The process, as described in the prospectus of the company, "has been devised to treat copper ores, carbonates, oxides, silicates, and sulphides, lead and tin ores in any form." After crushing, the ore is heated to a temperature of 1,700 degrees F., "at which temperature the gangue cracks and opens up, exposing the mineral, which is now oxide of copper, to the action of the re-agent which produces the actual reduction to metallic copper. The re-agent is carbon, slightly moist. When the required temperature has been reached, the carbon is charged into the furnace and all outlets closed. A considerable pressure is immediately obtained in the furnace, due to the formation of carbonic oxide and hydrogén gases. These gases combine with the oxygen of the oxide of copper, leaving the copper in the state of metallic copper in the form of shots or globules."

DAYLIGHT MINING CO. **ARIZONA**

Address: Tucson, Ariz. Has a lease on part of property of Rosemont Copper Co., which see.

DOS CABEZAS GOLD RIDGE MINING CO. **ARIZONA**

Office: P. O. Box 987, Tucson, Ariz. **Mine address:** A. J. Welty, gen. mgr., Dos Cabezas, Ariz.

Officers: J. H. Huntsman, pres.; S. B. Brown, v. p. and W. A. Julian, sec.-treas.

Inc. in Ariz. **Cap.**, $1,000,000; shares $1 par; issued. Annual meeting first Monday in January.

Property: 10 claims, in the Dos Cabezas mining district, said to show a schistose fissure vein in granite and limestone carrying gold, silver and copper values as sulphides. Oreshoot reported as 4 to 34′ in width with assays from $12 to $1,912.

Development: by new 700′ tunnel, a 200′ shaft and old 1,700′ tunnel to be connected by winze with new tunnel 125′ below. Equipped with 30 h. p. hoist. Said to have 75,000 tons of ore partly developed. Employed 20 men in 1917, but how many now is unknown. In 1918, the company directors authorized the construction of a mill.

EL TIRO COPPER CO. **ARIZONA**

For full description of property, see Vol. XIII.

Address: G. D. Bouton, v. p.; Drexel Bldg., Philadelphia, Pa. **Mine office:** Percy Williams, mgr., Silverbell, Ariz.

Company reports "all properties, real and personal, of El Tiro Copper Co., were sold at public sale at Tucson, Ariz., Jan. 15, 1919, under mortgage foreclosure sale instituted by the Empire Trust Co., trustee for bondholders, and brought a sum only sufficient to refund the Receivers' certificates that had been issued for the preservation of the properties, the Trustees' fees, attorney's fees, Receiver's compensation, court costs, etc., etc., leaving nothing for distribution to bondholders." It is reported the property was purchased by G. D. Bouton as trustee for the bondholders, and is being operated by him under a 5-year lease and option. Employing 35 men and shipping 450 tons of ore monthly.

EMERY-WHITCOMB TUNGSTEN CO. **ARIZONA**

Acquired by International Tungsten Corp., which see.

Reported James H. Emery had filed suit in the Supreme Court, Dec., 1918, to foreclose on a mortgage for $25,000 held on the Emery-Whitcomb Tungsten Co. and the National Tungsten Co.

ESPERANZA MINE **ARIZONA**

Near Twin Buttes, Pima county, Arizona. Under operation, 1917, by Messrs. E. A. Pike, J. C. Shell and Edward Thornton.

Mine was owned in 1913 by the Chesterfield Copper Co. which went into bankruptcy. Company was reorganized in 1914 as the Blanche Rose Mining Co., but has not operated since 1914 and is practically dead. Present lessees have shipped several carloads of ore.

GLANCE MINE **ARIZONA**

Address: J. E. Wood, city collector, Tucson, Ariz. Dan Ellison, supt.

Property: formerly known as the Providencia, 1 mile west of Lincoln Camp, Papago district, bonded by J. E. Wood and W. G. Hurd. Ore occurs in 40′ vein in andesite.

Assays reported as high as 100 oz. silver, 58% copper per ton. Shipment of 14 tons from depth of 30′ said to have returned $200 per ton.

GLANCE MINING CO. **ARIZONA**

Address: Twin Buttes, Ariz.

Officers: E. G. Bush, pres., treas. and gen. mgr.; S. J. Gunn, supt.; G. H. Langworthy, sec. Is a close corporation.

Inc. in Ariz., in 1916.

Property: 3 claims, patented, held under option for old Twin Buttes Mining & Smelting Co., and a 2-year lease on the Twin Buttes railroad. The ore occurs in shoots at intersection of cross fractures with a main fissure in altered limestone near and roughly parallel to a granite contact. The ores contain copper glance, chalcopyrite and iron pyrite, with rather low gold-silver contents, and run 7% to 9% by smelter return. The last oreshoot developed is 15′ wide and averages 12% copper. The Glance mine has a 625′ shaft. No late news to hand.

GORDON COPPER CO. **ARIZONA**

Address: Tucson, Ariz.

Holdings are 10 undeveloped copper claims in the Rincon district, 15 miles east of Tucson.

GOULD PROPERTY **ARIZONA**

Under bond and lease to R. McClelland, Newhouse Bldg., Salt Lake City, Utah. Mail returned unclaimed, March, 1919. A. W. Beck, supt.

Property: 12 claims in the Amole district, 18 miles W. of Tucson, adjoins Mile Wide mine. Shaft 350′ deep. Ore on 100′ level said to average 3.5% copper.

GROWLER MINES **ARIZONA**

Owner: Geo. H. Morrill, 155 Pearl St., Boston, Mass. Bought at sheriff's sale.

Property: 26 patented claims, 15 miles S. W. of Ajo, with a quartz vein, developed by shafts 330′, 260′ and 135′ deep, and a tunnel 185′ long. Ore carries copper with precious metal values.

Equipment: 26 and 70 h. p., steam hoists and an 8 h. p. pump.

Shipments: last shipment of ore made in Sept., 1917, netted $1,000 or $20 per ton. Property worked for many years, though only in a small way.

GUNSIGHT MINE **ARIZONA**

Operators: J. D. Mitchell, L. L. Scott, Paul Fernald, of Ajo, have 10-year bond and lease.

Owners: First National Bank, Canyon City, Texas.

Property: the old Gunsight mine bought at sheriff's sale in 1918. Reported to show a fissure vein in granodiorite, pay streak varying from 12″ to 6′ in width, with lead and silver value. Old workings said to show ore averaging above $20 per ton.

Development: 400′ shaft, various tunnels, etc., totaling over 2,000′.

Property seems to warrant development.

GUNSIGHT DETROIT MINING & MILLING CO. **ARIZONA**

Address: M. Quinner, supt., Ajo, Ariz. or N. Potter, Detroit, Mich.

Property: includes the Bullion Bar and the Black Bess mines. Ore is gold and tungsten. There is an old mill belonging to the property in which ore extracted by lessors is treated.

GUNSIGHT GOLD & TUNGSTEN MINING CO. **ARIZONA**

Office. Ajo, Pima county, Ariz.

Officers: J. W. Mayes, pres.; F. V. Lee, v. p.; Chas. Luke, v. p.; J. T. Hoyt, treas.; E. S. Smith, sec.-mgr., preceding with A. W. Bramwell, and J. J. Sullivan, directors. Edward Hardie, supt. Annual meeting, third Tuesday in January.

Inc. 1918 in Arizona. **Cap.,** $500,000 $1 par; non-assessable.

Property: 17 claims, comprising the Aster and Wonder groups at Walls Wells, near Gunsight. Ore treated carries about $15 gold per ton and some scheelite (tungsten).

Ores from the Old Gunsight, Black Bess, Bullion Bar and other mines being treated in old 5-stamp mill using Wilfley tables and pan amalgamators. Building a new 50-ton ball-mill in March, 1919.

HELVETIA COPPER CO. **ARIZONA**

Office: 907 Metropolitan Life Bldg., Minneapolis, Minn. **Mine and works office:** Helvetia, Pima county, Ariz.

Officers: C. C. Prindle, pres.; Chas. W. Sexton, v. p. and sec.; preceding, with William A. Paine, Jas. H. Seager, John S. Pillsbury, Russell M. Bennett and John R. Van Derlip, directors; Robt. H. Gross, treas.

Inc. March 3, 1899, in New Jersey, and reorganized Oct. 4, 1905, in Arizona. **Cap.,** $5,000,000; shares $25 par, in $250,000 full-paid and $4,750,000 assessable stock; fully issued. Listed on Boston Stock Exchange. Levied 50c. assessments, payable July 20, 1908; April, 1909; February, 1910, and Feb. 15, 1911, the latter assessment rendering the stock $15 paid. Last assessment of 50c. was paid in August, 1919. State Street Trust Co., Boston, registrar; Boston Safe Deposit & Trust Co., transfer agent. Annual meeting, first Monday after first Tuesday in October.

Financial statement of Dec. 31, 1916, is as follows: Capital stock, $3,100,000; expenditures to date for mining property, $2,181,786; for development, $806,429; for equipment, $40,250; treasurer's account, $69,887; unpaid assessments, $35,363; interest, $12,141; ore account, $46,461; general expense, $34,428; taxes, $1,327.

Property: 38 patented claims, also 8 patented mill-sites and 960 acres of scrip land, giving total holdings of 1,673 acres, 30 miles S. E. of Tucson, at Helvetia, at the west foot of the Santa Rita mountains, 18 miles south of Vail, on the Southern Pacific, and El Paso & Southwestern railroad.

Geology: the formations, resembling those of Bisbee, include Carboniferous and older limestones lying north of a great granite mass with porphyritic intrusions. The limestone has many iron outcrops, underlain by orebodies occurring as replacements. These have an average strike of N. 35° W., with average dip of 45°, carrying ore of 2 to 4% copper.

For full description of properties and developments, see Vol. XI, Copper Handbook.

It is said that company spent over $2,000,000 trying to develop property into a paying copper mine, but was unsuccessful in discovering any large body of commercial ore. During the war some molybdenum and copper ores were shipped at a profit. Company now has leases on some oil-land near San Antonio, Texas, and by Oct., 1919, had drilled six holes, which were yielding a total of 52 barrels of high gravity oil per day. These wells are below 1,300'. Considerable speculation resulted from these developments and the stock advanced several hundred per cent. in price.

HORSESHOE BASIN GOLD MINING CO. **ARIZONA**

Now the Lowell Gold Mining Co., which see.

IMPERIAL COPPER CO. **ARIZONA**

Defunct. (Was a subsidiary of Development Co. of America).

Property: 52 patented claims now owned by Am. Sm. Ref. Co., 120 Broadway, New York City.

INTERNATIONAL TUNGSTEN CORPORATION **ARIZONA**

Office: 42 Broadway, New York.

Officers: Hiram Whitcomb, pres.; Richard Lounsbury, treas.; C. E. Greenough, sec.; A. A. Westerhouse, asst. sec.

Inc. June 16, 1916, in Virginia. **Cap.,** $10,000,000; shares $10 par. Company acquired entire capital stock of the Emery-Whitcomb Tungsten Co. and the National Tungsten Co., both incorporated in Arizona.

Property: 8 patented claims, 143 acres, and 18 unpatented claims, 350 acres, all contiguous, in the Arivaca mining district, county, 65 miles S. W. of Tucson and 23 miles from Amada on the So. Pac. R. R. Claims are said to cover an area of granite, rhyolite and diorite, the latter with quartz-filled fissures

containing tungsten ore. Two of the veins are said to traverse the property for over 10,000′ with widths ranging from 2½′ to 12′; one ore-shoot claimed to be 12′ wide, 175′ long and containing 1% tungstic oxide, WO_3.

Development: mainly by tunnels, longest 500′ with several shafts, deepest 156′, which is said to be sunk on a 30′ vein that traverses the property for a mile; 15′ of this vein is said to contain rich tungsten ore; the balance, 2½% copper sulphide ore, "which taken together constitutes a mammoth mine." Ore reserves are undoubtedly greatly over-estimated.

Equipment: includes a hoist, compressor and a 7½-ton auto. truck for delivering ore to the mill. The 10-stamp mill has three 50 h. p. gas engines. Blake crusher, gyratory crusher, 8 Wilfley tables, Johnson vanner and 2 small air compressors. After a shut-down of several months, work was resumed, May 1, 1917. Mill treats 100 tons daily, yielding 1 ton of 65% tungsten concentrate.

Reported in Dec., 1918, that James H. Emery had filed suit in the Superior Court to foreclose on a mortgage for $25,000 held on the Emery-Whitcomb Tungsten Co. and the National Tungsten Co., subsidiaries of the International Tungsten Co.

LIBERTY SILVER MINES CO. ARIZONA

Formerly the Arizona Consolidated Copper and Mining Company, name changed by permission of the Arizona Corporation Commission, February, 1918.

Office: 25 Broad St., New York City. **Mines:** Greaterville, Pima Co., Arizona.

Officers: C. H. James, pres.; M. J. Fink, v. p.; E. A. Abrahams, sec.-treas., preceding with J. B. Anderson and J. C. Anderson, directors.

Inc. 1918 in Ariz. **Cap.,** $1,500,000; $1 par; issued in payment for properties 750,000 shares. Security Transfer & Registrar Co., N. Y., transfer agent.

Property: 15 claims at Greaterville, Tucson district, Pima county, reported to show 10 veins varying in width from a few inches to 20′, occurring as a stockwork. A 30″ sample at 90′ depth reported to have assayed $2.80 gold, 16.9 oz. silver, 2.2% copper, 41.2% lead, 12.1% zinc. Developed by several shafts, deepest 180′.

Regarded as a prospect whose ore appears to be pockety.

LITTLE AJO COPPER MINING CO. ARIZONA

Officers: W. A. Knox, pres., Apex, Mo.; C. C. Wheeler, v. p.; O. T. Richey, sec.; C. E. Walker, treas., all of Tucson, Ariz.

Inc. 1917. **Cap.,** $1,000,000; shares $1 par. First allotment of 100,000 shares treasury stock offered at 25 cents.

Property: 3 claims adjoining the mines of the New Cornelia, Ajo Consolidated and Cornelia Ajo, at Ajo, Arizona. Greater portion of the claims is covered with conglomerate, while the bottom of a 50′ shaft is said to show slightly altered porphyry. Prospecting is being carried on by diamond-drilling. At 1,000′, low-grade copper ore is said to have been encountered, continuing to bottom or 1,720′ in sulphides. In Sept., 1919, this hole was 1,900′ deep in mineralized ground.

LOWELL GOLD MINING CO. ARIZONA

Formerly Horseshoe Basin Gold Mining Co.

Address: A. F. Borrego, sec.-treas., Bisbee, Ariz. **Mine:** Quijotoa, Pima county, Ariz.

Officers: J. L. Winters, pres.; J. P. Williamson, v. p.

Cap. 200,000 shares.

Property: six claims in the Quijotoa mountains, with a 28″ vein said to assay from $6 to $28 in free milling gold. Developed by numerous pits and an 80′ prospect shaft.

MAGNATE COPPER CO. ARIZONA

Address: M. Brooks, sec.-treas., Liberty Bldg., Philadelphia, Pa.

Officers: C. Z. Jones, pres.; Carl M. Kneass, v. p.; T. M. Smith, gen. mgr.

Inc. Nov. 19, 1916, in Del. **Cap.,** $5,000,000; shares $1 par; 2,499,500 in treasury. Listed on New York Curb.

Property: 29 claims, in Twin Buttes district, Pima county; 32 miles from Tucson and 4½ miles from railway at Twin Buttes. Reported to have option on Lucky Strike and Mesa mines.

Geology: surface shows characteristics of producing porphyry-copper areas. Basal rock is a grano-diorite of varying grain. Most of the area is covered by a dense fine grained rock very greatly altered, but probably monzonite. Mineralization proceeded along dominant N. E.-S. W. fractures, which are filled with quartz, pyrite and chalcopyrite. Erosion with oxidation of the pyrite, forming acid water, further changed the altered rock and formed a deposit of disseminated ore whose extent is not yet determined.

Development: by shafts, 150′, 118′ and 40′ deep, also by 3 drill holes. From the 118′ or No. 3 shaft, levels were driven at 35′ and 85′ depths with 625′ of workings. The deposit thus far developed shows veins and stringers of high-grade copper glance as a network in the disseminated material. Careful sampling showed 1½ to 2½% copper, 1½ oz. silver per ton. Ore contains a cupriferous turquoise.

Diamond drill has more than confirmed favorable predictions based on surface examination. Holes No. 1 and 2, indicate a blanket deposit 65′ thick; hole No. 3 is reported to show over 100′ of ore. Assays ran from 1.77 to 2.2% copper as averages. The overburden is slight.

Is an attractive prospect, with possibilities of development into a big "porphyry" copper.

MATT PERRY MINING & MILLING CO. **ARIZONA**

This gold property, near Quijotoa, 80 miles west of Tucson, is reported under bond and lease to A. F. Borrego, and J. R. Hibbs. Property has an old mill which is to be overhauled.

MICHIGAN & ARIZONA DEVELOPMENT CO. **ARIZONA**

Office: 905 Metropolitan Life Bldg., Minneapolis, Minn. Mine near Helvetia, Pima Co., Ariz.

Officers: C. C. Prindle, pres.; R. M. Bennett, v. p.; Chas. W. Sexton, sec.-treas. This company reorganized the Helvetia Copper Co., under a plan explained in Vol. V. Formerly owned a considerable share interest in the Helvetia.

MIDDLETON MINE, INC. **ARIZONA**

Address: H. C. Clark, Tucson, Ariz.; Bevil G. Granville, cons. eng.; Paul Henshaw, supt.

Property: 40 miles S. W. of Casa Grande in the Black Range district. Planning erection of leaching plant.

MIDLAND COPPER CO. **ARIZONA**

Office: E. G. Bush, P. O. Box 1197, Tucson, Ariz. **Mine:** Twin Buttes, Arizona.

Officers: E. G. Bush, pres.-treas.-mgr.; J. R. Ricketson, v. p.; G. H. Langworthy, sec.; S. J. Gunn, supt.

Inc. in Arizona **Cap.**, $2,000,000; $5 par, non-assessable, issued 600,000.

Property: 5 claims in the Twin Buttes district. Silver-copper sulphide ore occurs in contact veins between porphyry and limestone with dip of 55°, course E. W.

Development: by incline shaft 550′ deep and 400′ of underground workings. In August, 1919, 5′ of 5% ore was cut at 250′.

Equipment: 25 h. p. distillate engine, compressor, etc.

Production: 8 months of 1918, gave 4,842 tons of ore, yielding 783,493 lb. copper and 8,901 oz. silver.

MILE WIDE COPPER CO. **ARIZONA**

Main office: Tucson, Ariz.

Officers: C. P. Reiniger, pres. and mgr.; L. E. Jettinghoff, sec.; Prescott Lyon, treas. The president with C. W. Freeman, E. C. Carter, W. H. Singer and F. C. Douds, directors. Annual meeting, July 7th.

Inc. May, 1916, in Arizona. **Cap.**, $5,000,000; shares $5 par, all outstanding.

Property: about 55 unpatented mining claims and 2 mill sites, about 1,400 acres; on the south side of Amole Peak, 18 miles from Tucson. Claims are divided into groups: the Copper King, Orient, Copper Mountain and Esperanza, with the Oro Fina placer claims and Copper King and Copper Crown mill sites.

Geology: a number of intrusions of quartz-porphyry, granite-porphyry and some andesite between beds of limestone, have caused considerable alteration and metamorphism. A striking feature of the topography is the dike-like amphibole and garnet outcrops. The general strike of the contact is N. E.-S. W. with 45 to 65° dip to the southeast. The change of dip is very noticeable, becoming flatter the greater the distance from Amole Peak. This system has been cut at right angles by system of vertical slips and faults. At some of the intersections of these two systems a circulation of mineral solutions depositing pyrite and chalcopyrite resulted in the replacement of the limestone. These replacements are the orebodies, having a width of 5′ to 8′ and a length of 15′ to 20′, and probably the same in height. Three such bodies of chalcopyrite ore have been cut on the 200′ level. In places there are bunches of high-grade chalcopyrite.

On the opposite side of the mountain and much nearer the railroad several of the claims held by the company shows several apparently isolated contact metamorphic deposits consisting largely of garnet containing chalcopyrite, and averaging in the exposures seen, about 2½% copper. The limited development does not disclose the limits of any of the orebodies, but their surface exposures are not great.

Development: main development on the Copper King group is by 300′ incline shaft with levels at 100′ and 200′. Station being cut at 300′.

Production: During 1918 reported as shipping 4 cars monthly, averaging about 8% copper to the Sasco smelter, from three of the ore "pockets."

Equipment: 25 h. p. gas hoist; 500 cu. ft. compressor, 100 h. p. F. M. gas engine, 60 h. p. gas engine and hoist, store and buildings.

The properties of this company do not come up to the very rosily-painted descriptions given out by the brokers who held an option for 51% of the stock, the balance being owned by the company's manager.

Property closed down early in 1919 with no immediate prospects of re-opening.

MINERAL HILL CONSOLIDATED COPPER CO. ARIZONA

Office: 1014 Frick Bldg., Pittsburgh, Pa. **Mine office:** Tucson, Pima county, Arizona.

Officers: Robt. Law, Jr., pres.; E. B. Reeser, v. p.; Jas. A. Dunn, sec.-treas. and F. A. Minard, cons. engr.

Inc. March, 1904, in Arizona, as successor of Azurite Copper & Gold Mining Co. **Cap.,** $3,200,000; shares $1 par.

Property: the Azurite mine with 26 claims, 12 patented, 520 acres, in the San Xavier district, 18 miles S. W. of Tucson, said to have produced $550,000 worth of ore under former ownership. Company's lands also include the American group of 8 claims and the Mineral Hill group of 5 claims. The mine is claimed to have a large body of sulphide ore averaging about 3.5% copper. Recent developments on the 500 and 600′ levels is said to have disclosed a large body of 4% copper sulphide ore. Has shipped about 60,000 tons of carbonate ore in past.

Development: by 74 pits and open cuts, 8 tunnels, longest 250′ and 3 shafts, deepest 600′, mine having a total of about 2 miles of workings. Company is devoting all its energies to development work.

Equipment: includes gas engines, electric generators, air compressor, pumps, etc.

Company is favorably regarded.

MOLYBDENUM MINING CO. ARIZONA

Address: Orendorff Hotel, Tucson, Ariz.

Officers: F. J. Wharton, pres.-mgr.; J. M. McBride, sec.

Inc. 1909, in Ariz. **Cap.,** $1,000,000; $1 par.

Property: about 200 acres of land in the Baboquivari mountains, 50 miles S. W. of Tucson, with 4 shafts, deepest 80′. Claimed to have a ledge 300′ wide.

In 1917 the State Corporation charged that company was selling stock without a permit. A prospect.

MOLYBDENUM PRODUCTS CO. **ARIZONA**

Address: Arthur Geeson, Box R, Tucson, Ariz.

Officers: F. H. Hereford, pres.; Harold Steinfeld, v. p.; Alan Kissock sec.-treas. and mgr., with Hiram Corbett, R. K. Shelton, K. G. Smith and Maxwell Miltors, directors.

Inc. June, 1916, in Arizona. Cap., $100,000; $1 par; 30,000 issued.

Company owns no mines yet, but operated an electric smelter, buying wulfenite ores, mainly from Arizona Rare Metals Co. Was said to be one of the largest producers of molybdenum in the United States in 1917.

NARRAGANSETT COPPER CO. **ARIZONA**

Address: care W. R. Ramsdell, 30 So. Stone Ave., Tucson, Ariz.

Officers: W. R. Ramsdell, pres.; R. J. Williams, v. p.; James S. Kelso, sec.-treas.

Inc. 1917 in Arizona. **Cap.,** $3,000,000; shares $1 par; $1,250,000 shares outstanding.

Gross earnings in 1918 were $265,665.

Property: 21 claims, at Rosemont, Helvetia district, Santa Rita mountains, Pima county, Ariz. Mine is 20 miles S. of Vail on the S. P. R. R.

Geology: the ore occurs in a replacement deposit between limestone and quartzite, which dips 30° E., and has a N.-E. pitch. Shoot has been opened for 1,000′ along the strike. Both oxide and sulphide ores occur, and contain both copper and silver. Average of 7.01% copper, 1.15 oz. silver reported from 13,248 tons shipped during 1918. During 1915-16-17-18, reports shipping 34,331 tons with a net smelter return of $835,860.

Development: by tunnel; workings, total 3,000′ to depth of 450′, said to have exposed 80,000 tons containing from 2½ to 4% copper, including ore in dumps.

Production: in 1917 was 1,611,429 lb. copper. Over 1,200 tons monthly were shipped, 1918.

In August, 1919, Albert Steinfeld & Co. of Tucson, brought suit against company to recover $300,000 loaned on notes. Judgment was awarded plaintiff, plus interest, a total of $330,000. The mine and equipment were then to be sold at sheriff's sale.

NATIONAL CONSOLIDATED MINING CO. **ARIZONA**

Presumably idle. Described in Vol. XI, Copper Handbook.

NATIONAL TUNGSTEN CO. **ARIZONA**

Acquired by International Tungsten Corp., which see.

NEW CORNELIA COPPER CO. **ARIZONA**

Subsidiary of the Calumet & Arizona Mining Co. Gordon R. Campbell, sec., Calumet, Mich. **Operating office:** Ajo and Warren, Ariz. Same directorate as the Calumet & Arizona Mng. Co., with Dr. L. D. Ricketts, James Phillips, Jr. and Geo. H. Augustine. J. C. Greenway, gen. mgr.; M. Curley, supt.

Inc. Sept. 28, 1909, in Delaware, as a reconstruction of the Cornelia Copper Co. Cap., $9,000,000, shares $5 par; non-assessable; all issued and outstanding. Listed on Boston Stock Exchange. Calumet & Arizona owns 1,229,741 New Cornelia shares.

Company authorized an issue of $4,000,000 6% 12-year sinking fund gold bonds, dated Sept. 1, 1915, maturing Sept. 1, 1927, convertible into stock at $10 per share, to finance the purchase of necessary equipment and construction work. All subscribed at par. To Dec. 31, 1918, all bonds had been converted excepting $1,500.

Financial statement, years ending Dec. 31:

ASSETS

Year	Property	Construction	Investments	Current	Total
1918.....	$25,577,837	$5,205,956	$436,574	$3,789,637	$35,010,000
1917.....	26,000,000	5,895,408	111,000	2,186,004	34,192,412
1916.....	10,187,932	4,972,790	.....	628,780	15,789,503

LIABILITIES

	Capital	Bonds	Notes Payable	Reserves	Current	Surplus	Total
1918.	$9,000,000	.....	$649,564	$766,810	$643,148	$23,950,477	$35,010,000
1917.	7,024,500	$3,951,000	3,330,559	720,248	263,658	18,902,446	34,192,412
1916.	6,012,000	3,976,000	710,000	241,964	14,625	4,834,914	15,789,503

INCOME AND EXPENDITURE

	Metal Sales, Etc.	Operating Charges	Deprec., Depletion, Interest	Dividends	Net Balance
1918...	$11,073,680	$6,282,500	$2,263,374	$450,000	$2,077,806
1917...	3,810,123	2,136,483	911,229	.....	762,411

Dividends: initial of 25c per share, $450,000 was paid in Nov., 1918, none since on account of the copper market.

History: company's early history and its experiments with new processes are fully described in Vols. VI, VIII, and X, Copper Handbook. In 1910, the General Development Co. bought 20,000 shares for $20,000, spending the money under an option for a stock control, putting down 5 diamond-drill holes, deepest 188′, which showed the ground to be oxidized to a depth of about 30′, followed by sulphides, estimated by the company to average 2 to 2.75% copper. The option was forfeited 1910, and property was leased to H. C. Chamberlain, who shipped concentrates from 800 tons of 4% ore to the Copper Queen smelter.

In 1911 the Calumet & Arizona Mining Co. took an option on 76% of New Cornelia stock, and under the direction of John C. Greenway, general manager, and L. D. Ricketts, cons. engr., proved the existence of a large body of commercial copper ore. Laboratory tests showed that the carbonate ore could be treated by leaching with dilute sulphuric acid and the sulphide ore by flotation.

Experimental leaching plants of one ton and later of 40 tons per day capacity were erected at Ajo and tests made for over a year. Results of 310 charges showed: average heads, 1.31% copper; average tails, 0.271% copper; extraction, 79.36%, and 0.88 lb. per k. w. hr.

Meanwhile wells were drilled to locate a water supply, and a shaft sunk on a hole 7 miles from the property found a satisfactory water stratum. In the summer of 1915 the Tucson, Cornelia & Gila Bend Railroad from Gila to Ajo, a distance of 43 miles, was started, and completed in Feb., 1916. Work was immediately started on a 5,000-ton leaching and electrolytic precipitation plant, which started operation in May, 1917. During 1918, production of this plant averaged 85,382 lb. of cathode copper daily.

In July, 1917, the New Cornelia Copper Co. acquired the property of the adjoining Ajo Consolidated Copper Co. property, in which a substantial tonnage of similar ore has been developed by diamond drilling and underground work.

Property: 55 patented and 38 unpatented claims, and one patented and 14 unpatented mill-sites at Ajo, 44 miles south of Gila Bend, Ariz. Property comprises about 1,704 acres, 55 of which constitute the New Cornelia orebody.

Property of the Ajo Consolidated, 7 patented and 52 unpatented claims, totaling 1,150 acres, adjoins the New Cornelia on the south, the orebody as undeveloped, a continuation of the New Cornelia, covers about 21 acres.

Geology: claims cover an area of rhyolite, lava, breccia and tuff beds, intruded by a huge mass of monzonite porphyry, which cuts and uplifts the rhyolite. There were subsequent intrusions of diorite and diabase porphyry, probably con-

nected with the great mass of Tertiary basalt and andesite lava flows which cover the surrounding country. Mineralization has formed a low-grade disseminated deposit with high-grade veins in monzonite and narrow rich veins in the adjoining rhyolite. The disseminated orebody, covering about 55 acres, has a pear-shaped outline. The depth of the ore varies from less than 50′ on the outskirts to more than 600′ in the center of the orebody.

In the Ajo Consolidated property the disseminated mineralization often extends beyond the monzonite into thoroughly brecciated rhyolite, but in general the ore followed the contact of the two rocks, dipping steeply S. W. and more flatly and irregularly to the S. E. For about 300′ along the contact there is a lens of ore of much higher grade than the average.

The original mineralization was chalcopyrite and bornite with comparatively little pyrite. Surface alteration has converted the primary sulphide minerals to malachite to a depth of about 20′ below the deepest arroyos and 150′ below the highest hills. The plane of demarcation between carbonates and sulphides is almost horizontal, agreeing with the present ground water level. Chalcocite is rare in the New Cornelia orebody, but locally of much importance in the Ajo Consolidated ground, particularly in the ore in rhyolite below the water level.

In March, 1919, a body of sulphide ore was opened on the 361′ level of the Ajo Consolidated ground. This ore runs from 4% to 77.7% copper, and is opened for 360′ width and 400′ long. Shipments of 300 tons daily of smelting ore were being made Dec., 1919, and the lower grade ore will go to the flotation plant.

Development: diamond drill holes and underground development work have proven the existence of 10,100,984 tons of carbonate ore carrying 1.568% copper and 41,219,437 tons of sulphide ore carrying 1.587% copper, or a total of 51,320,421 tons carrying 1.579% copper.

The extent of the orebody to the south and east has not been determined. Several drill holes on both properties stopped in ore at from 400′ to 600′.

Underground development consists of a 250′ shaft and 2,227′ of levels. On the 250′ level the orebody is approximately 400′ long by 265′ wide and varies from 4% to 9% copper.

Ore reserves: total estimated tonnage, based on a 1% minimum basis, is 56,000,000 tons, carrying 1.58% copper. Gold and silver values in the carbonate ore are negligibly small, but the sulphide ore carries between 30 and 50c. per ton in precious metals.

All the carbonate ore and about 22,500,000 tons of the sulphide ore are available for steam-shovel mining. The occurrence of ore at the surface obviates stripping and loss of ore or vitiation of grade through admixture of ore with capping. Grade of ore already mined has averaged 0.12% above estimates.

Equipment: plant is about one mile from the orebody, with which it is connected by a double-tracked standard gauge railroad. Ore is loaded into cars by three 100-ton steam-shovels, the cars dumping directly into the large crusher. Five thousand tons are now being treated daily.

Ore is crushed to 10″ size in a large gyratory crusher; 4 smaller gyratory crushers reduce it to 3″ cubes before it goes by belt conveyors to the storage bins. From the 10,000-ton storage bins the ore is carried by 4 pan conveyors to 15 Symons disc-crushers, reducing it to ¼″ in size. The ore is very hard and contains many large boulders.

Crushing practice at Ajo was described by W. L. Dumoulin, in Bull. 152, August, 1919, of the A. I. M. E. The product sent to the leaching tanks is as follows:

Mesh	%	Mesh	%
+3	26.7	+10	7.0
+4	17.3	+14	4.9
+6	12.7	+20	4.1
+8	9.0	−20	18.3

From the crushing plant the ore is carried by an overhead conveyor 100′ long to 11 leaching tanks, each 88′ square and 15′ deep, built of reinforced cement

lined with lead. The conveyor advances across the tanks at 12′ an hour. Each tank holds 5,000 tons of ore, and each charge remains in the tank 8 days, the tailings are removed by Hulett excavators and hauled to the dump in a train of twelve 50-ton cars. The acid solution is handled by two 3,500 gal. a minute horizontal centrifugal pumps.

The pregnant solution from the tanks is treated in 4 sulphur dioxide gas towers, 20′ in diam. and 40′ high, to change ferrous to ferric iron, and then pumped into the 152 electrolytic tanks, holding 77 cathodes. The anodes are of lead, and the starting cathode sheet is 3′ square, weighs 16 lb., but accumulates copper by the electric current until it weighs 165 lb., when it is withdrawn. The discarded solution goes over scrap iron. The sulphur dioxide gas is made by burning pyrite in 4 Wedge furnaces, and purified by the Cottrell process.

Results during the first year of leaching operations at Ajo are given in great detail by Tobelman and Potter in Bull. 146, Feb., 1919, of the A. I. M. E.

The $1,000,000 power plant has 5 oil-fed 825 h. p. boilers, 2 steam turbines of 7,500 k. w. capacity, 4 rotary converters.

A 500-ton experimental flotation plant was built in 1919, to study the best method for treating the sulphide ores. It is believed that the company will be handling 10,000 tons of this ore daily by 1922. A smelter and refinery are under consideration.

Company contemplates building its own railway to a port on the Mexican coast.

Production: until Jan. 1, 1919, when production was greatly curtailed, was 1,775,000 tons of oxidized ore averaging 1.465% copper, treated in the leaching plant and 81,417 tons of sulphide ore, averaging 3.39% copper, shipped to Douglas, as against a total of 840,424 tons in 1917. Copper produced in 1917 was 19,482,191 lb.; in 1918, 46,950,139 lb.; in 1919, 36,000,000 lb.

New Cornelia is a big mine in good hands, is in a strong position, and will pay regular dividends for a long time if conditions are normal.

OLD HICKORY COPPER CO. **ARIZONA**

Address: 17½ Howe St., Passaic, N. J.

Officers: Jas. V. Parber, Prof. of Music, Passaic, N. J., pres.; J. G. Wigg, v. p.; John Post, v. p.; P. Wannemacher, sec.-treas. John Parber, supt.

Inc. in Arizona. **Cap.,** $5,000,000; $1 par; fully paid; non-assessable; issued 1,650,000 shares.

Property: 41 claims, 600 acres, 35 miles S. of Tucson, and 8 miles from the S. P. R. R.

Development: 3,000′ of tunnels, shafts and open cuts. The main shaft, the Jackson, was 190′ deep in Nov., 1918. Prospectus states the vein widened from 1″ at the 110′ level to nearly 1′ at 160′ depth. On 150′ level claimed to have 2′ of copper sulphide in east drift and 1′ in west drift. One shipment, 31 tons, netted $1,362.

Equipment: includes an air-compressor, drills, sinking pump, hoist and a Mack truck.

While the mine is still a prospect awaiting development to prove its value, the management seems to be sincere in its beliefs and aspirations for making a mine.

OLD PUEBLO MINING & MILLING CO. **ARIZONA**

See Tucson Consolidated Copper Co.

OLD YUMA MINE **ARIZONA**

Col. Epes Randolph, owner, Tucson, Ariz.

Property: 40 unpatented claims about 14 miles W. of Tucson, Pima county, Ariz., shows a fissure vein 40′ wide in andesite, carrying gold, molybdenite and specularite. Ore occurs in 4 shoots, each about 300′ long, and is said to average $3 gold and 1¼% molybdenum. Developed by vertical shaft to depth of 320′.

Equipment: includes 15 h. p. hoist, pump, 400′ tramway and 400-ton concentrating mill. Concentrates said to average 21% MoO_3.

Mine was closed down in August, 1916.

PAYMASTER SILVER-LEAD CO. **ARIZONA**

Address: Charles Blemman, pres., Tucson, Ariz.

Property: at Olive Camp, 25 miles S. of Tucson. Ore has been sent to El Paso, and a mill was planned August, 1919, to treat low-grade ore.

PIMA MNG. & SMELTING CO. **ARIZONA**

Address: G. P. Meyers, sec., Tucson, Ariz.

Inc. 1918, in Arizona. **Cap.,** $1,000,000. Company was organized to move the Socorro, N. Mexico smelter to Tucson and enlarge the output from 250 to 500 tons daily. At last accounts construction work had not been started.

PIONEER MINING & SMELTING CO. **ARIZONA**

Offices: 1178 Broadway, N. Y.

Officers: Garret B. Kip, pres.; Tarrytown, N. Y.; W. C. Moore, sec.-treas., with G. H. Corwin and Edward Benedict, directors.

Inc. Aug. 19, 1913, in Arizona, as a reorganization of the Pioneer Smelting Co., which went into bankruptcy in 1913. **Cap.,** $1,000,000; shares $1 par; $690,647 issued; non-assessable.

Property: formerly held by the Pioneer Smelting Co., 14 unpatented claims, 260 acres, included the Plumed Knight mine, sold to Mr. Barnsdall of Pittsburgh in 1917, and the Gould mine, also sold, 1917. Mines fully described in Vol. XII.

Company owned a 150-ton custom smelter, 1½ miles west of Sahuarita, and 20 miles south of Tucson, on the Twin Buttes railroad. The plant has a 106x42″ blast-furnace, built by the Colorado Iron Works Co. The smelter was in blast for a short time in 1912, but has since been idle, as property could not pay expenses. Smelter reported sold, 1919.

PLUMED KNIGHT MINE **ARIZONA**

Sold in 1917 to Mr. Barnsdall of Pittsburgh, Pa.

Mine, formerly owned by Pioneer Mng. & Smelting Co., is 18 miles from Tucson, Pima county, Ariz., in the San Xavier district.

Development: by shafts to about 350′ depth shows ore rich in iron, lime and silica at and above 100′ level, succeeded by bornite at depth. Ore said to average 4% copper with small gold-silver values.

We have no information as to results obtained by the new manager.

REINIGER FREEMAN MINING CO. **ARIZONA**

Address: 57 N Church St., Tucson, Ariz.

Officers: Chas. P. Reiniger, pres.-gen. mgr..; Chas. W. Freeman, v.-p. L. E. Jettinghoff, sec.-treas., with Chas. E. Walker and J. E. Jones, directors. A. B. Richmond, mgr.

Inc. Jan., 1918, in Arizona. **Cap.,** $5,000,000; $5 par. Listed on New York Curb.

The General Balance Sheet, Dec., 1918, shows total assets of $5,169,400, which includes mining properties and options, $3,894,572; cash, $76,450; bills receivable, $100,126; development expenditures, $71,892; machinery and equipment, $20,846; warehouses and supplies, $5,515; treasury stock, $1,000,000. Liabilities show: capital stock, $5,000,000; balance due on purchase price of properties, $16,000 on Oct. 9, 1919; $22,000 on Oct. 9, 1920; $131,400 on Oct. 9, 1921. Statements of receipts and disbursements show receipts of $174,703 from sale of stock, deduct disbursements, $98,253; cash on hand, $76,450.

Property: the Wakefield group at Mineral Hill, also option on the Copper Prince Group near Twin Buttes and Virginia Group west of Silverbell.

The Wakefield or Belmer group of 21 claims, 347.97 acres adjoins the San Xavier Mineral Hill and other well known mines at Mineral Hill P. O., San Xavier mining district, 20 miles south of Tucson.

This tract covers a limestone-diabase contact in an area of sedimentary rocks, surrounded by granite and altered by contact metamorphism. Mineralization occurs in contact deposits and in veins. Ore in the neighboring properties is base, consisting of lead, zinc and copper sulphides and carrying variable value in silver.

Development: work in 1918, embraced sinking the Belmer shaft to a depth of 330′ and the San Carlos shaft, 80′, a few hundred feet south of it. The Belmer shaft is reported to have cut the San Carlos veins. The "Contact" which in the adjacent Empire Zinc Company's tract is said to carry a body of sulphide ore 40′ wide, should have been reached by crosscutting 350′ from the

Belmer shaft, had its dip been constant; but at last reports no ore had been cut. Management claims that "for over a year we have been exploring the property by shaft and laterals," with greatest depth of working at 330'.

The extravagant claims as to the possibilities of this Wakefield group appear to be based on statements made by others concerning the results of mine development on adjacent properties. Inasmuch as the Empire Zinc tract has been shutdown for some time, and the Reiniger Freeman is practically idle, the very optimistic and very general statements issued by the company should be considered as an opinion of what is hoped for rather than a statement of facts and conditions.

The property is well equipped, has ample houses, offices, buildings, etc., and it is evident considerable money has been spent on this tract, but development appears to have been suspended before ore was found.

Company holds options on the Virginia group of claims, 20 miles W. of Silverbell; Belmer group of 5 claims, 20 miles S. of Tucson; Copper Prince group of claims 1 mile N. of Twin Buttes. Virginia group is said to show contact veins, between granite and sedimentaries, that produced some copper ore from shaft 50' deep in 1917. Copper Prince is said to have contact veins between limestone and granite with development shafts, 40' and 70' deep in 1917, showing copper ore.

The amount of work done on the property does not warrant the character of the advertising matter put out by the company.

ROSEMONT COPPER CO. **ARIZONA**

Office: 61 Broadway, New York. Is controlled by Adolph Lewisohn and Lewisohn Bros.

Property: 6 claims at Rosemont, Pima Co., Ariz.

In 1919 a part of the property was under lease to the Daylight Mining Co., a Tucson company. Shipments were being made regularly until the copper market became unsettled.

Geology: numerous orebodies in limestone, occurring under geological conditions surficially similar to those at Bisbee. Company also owns claims at Helvetia, and others adjoining the Tiptop mine, near Helvetia, but the bulk of its holdings are on the east side of the Santa Rita Mountains, west of the Rosemont post office. Company has a small smelter, long idle. Property regarded as promising.

SAHUARO COPPER CO. **ARIZONA**

Address: Mineral Hill, via Tucson, Ariz. F. Buckout, pres.; T. R. Shacklett, v. p.; W. D. Uphaw, sec.-treas.

Property: 4 claims adjoining the Vulcan copper mine in the Mineral Hill-San Xavier district.

SANTA RITA COPPER MINING & SMELTING CO. **ARIZONA**

Office: care C. F. Elliott, P. O. Box 592, El Paso, Tex. **Mine office:** Arivaca, Pima county, Ariz.

Inc. June, 1901, in Arizona. **Cap.,** $3,000,000; shares $1 par; issued, $2,750,000.

Property: 12 claims, unpatented, 220 acres, in the Tyndall district of the Santa Rita mountains, 13 miles from Arivaca, shows granite, porphyry and diorite, carrying several veins of sulphide ore, usually at the contact of the diorite and granite. Veins range from 4 to 12' in width.

Development: 2 shafts and several tunnels, with a total of about 2,000' of workings, mostly in low-grade ore. A new tunnel, planned to give a back of 110', was 200' long, at last accounts. The mine is without power equipment. Company is a promotion of A. A. Post. No recent returns.

SAN XAVIER EXTENSION COPPER CO. **ARIZONA**

Address: Tucson, Ariz.

Officers: E. G. Bush, pres.-gen. mgr., with Nathan Kendall and R. K. Shelton, directors.

Cap., $750,000; 50c par.

Property: 6 claims, 100 acres, in San Xavier mining district, developed by 200' vertical shaft, has lead-silver, copper, zinc ore.

Reported to have shipped, to September, 1919, 900 tons of ore assaying 20 oz. silver, and 4% copper. Idle temporarily, but company plans sinking to 500′ level.

SESAME COPPER CO. **ARIZONA**

Address: Box 907, Tucson, Ariz.

Officers: C. M. Taylor, pres.; J. E. White, v. p.; S. A. Elrod, sec.-treas.; Gerald Jones, counsel.

Inc. in Arizona. **Cap.,** $1,000,000; shares $1 par. On April 16, 1917, Arizona Corporation Commission allowed sale of 75,000 shares at 10c each.

Property: in Empire district, Pima county, Ariz., 11 miles S. E. of Vail on the S. P., and El Paso and S. W. lines.

Development: several hundred feet by shafts, opening copper ore in 12 places. Prospectus said that "A number of theoretical and practical mining men expressed the opinion that a large body of paying ore should be encountered at a probable depth of 200′," which is interesting, if true. Idle for a year.

SILVER VIRGIN MINING CO. **ARIZONA**

Address: J. J. Adair, supt., Ajo, Ariz.

Officers: A. B. Murchison, pres.; J. F. Deitrich, v. p.; S. W. White, sec.; F. E. Caldwell, treas., with J. E. Shaw and H. D. Maynard, directors.

Inc. 1919, in Arizona. **Cap.,** $150,000.

Property: in the Quijotoa mountains, 85 miles N. W. of Tucson, reached by good road through the Papago Indian Reservation.

Development: by shaft. Reserves are reported as 10,000 tons of $56 silver ore.

SOUTHERN ARIZONA SMELTING CO. **ARIZONA**

Bankrupt. Property, the Sasco smelter, bought in by preferred creditors at public auction, March, 1915, and reported leased, 1916, to the American Sm. and Ref. Co. Sasco smelter fully described in Vol. XI, Copper Handbook.

STRATTON CONS. COPPER CO. **ARIZONA**

(Successor to Stratton Copper Co., and Old Hat Copper Co.)

Address: Tucson, Ariz.

Officers: C. N. Wilson, pres.; S. H. Keeney, v. p.; J. R. Dunseath, sec.-treas.; above are directors.

Inc. April, 1919. **Cap.,** $1,500,000; $1 par; issued 200,000; non-assessable.

Property: 12 claims, in Catalina Mts., 54 miles N. E. of Tucson, said to show a contact deposit of copper ore in limestone with assays from 2 to 8% copper.

Development: shallow shafts and tunnels, with a total of 1,800′ of workings.

Management says operations shall be started September, 1919.

STRATTON COPPER CO. **ARIZONA**

Succeeded by Stratton Cons. Copper Co., which see.

TEXAS-ARIZONA COPPER CO. **ARIZONA**

Address: First Nat'l Bank Bldg., Houston, Texas. M. M. Carpenter, supt., Tucson, Ariz.

Officers: T. H. Base, pres.; J. H. Kirby, v. p.; J. M. Baird, sec.-treas.; with J. G. Bass and M. M. Carpenter, directors.

Inc. 1917, in Arizona. **Cap.,** $1,000,000; shares $1 par

Property: 38 claims, 700 acres, 10 miles N. E. of Tucson, said to show copper-silver ore in schist and gneiss.

Management states that $25,000 was spent in 1918 in diamond and churn-drilling; that a 2-compartment shaft will be sunk and a mill built.

Production: 1,000 tons in 1907, and 3518 tons in 1917.

TIP TOP COPPER CO. **ARIZONA**

Office: Commonwealth Bldg., Philadelphia, Pa. **Mine office:** Helvetia, Pima county, Ariz.

Officers: Geo. A. Aman, pres.; S. Charles Pratt, v. p. and gen. mgr., at last accounts.

Inc. 1902, in Arizona. **Cap.,** $1,150,000; shares $1 par.

Property: 24 claims, 400 acres, also known as the Little Helvetia mine, including the Tip Top and Copper Duke claims, also a 100-acre mill site, about 2 miles from Helvetia, shows 3 veins, averaging 14′ width. These veins have

extensive bodies of soft black sulphide ore in altered clayey limestone and porphyry, reported to give average assays of 5% copper and 1 oz. silver per ton, with a trace of gold.

Development: mainly by tunnel with about 4,000′ of workings; also the usual prospect shafts and tunnels.

Equipment: includes gasoline power. Was bonded 1907, to Guggenheim interests, for $250,000, with cash payment of $75,000, but both parties to bargain were dissatisfied, and property reverted to owners.

Idle for years.

TUCSON ARIZONA COPPER CO. **ARIZONA**

Office: 331 Ness Bldg., Salt Lake City, Utah. **Mine office:** J. A. Cowan, supt., Tucson, Ariz.

Officers: John F. Cowan, pres.; E. A. Culbertson, v. p.; B. G. Hite, sec.-treas., with S. H. Douglas, W. H. King and L. A. Cummings, directors.

Inc. Nov. 28, 1916, in Arizona. **Cap.,** $1,000,000; shares $1 par; non-assessable; 724,493 issued.

Property: 23 claims, 6 miles from Tucson, Ariz., show contacts and fissures in limestone and andesite. Orebody is said to be from 4 to 30′ wide, dips 45 to 75°, and has an E.-W. course. Shoot is 400′ long, 6 to 10′ thick, and reported to contain 6% copper, 3 oz. silver and $1 gold per ton.

Development: started in Dec., 1916, by 100′ shaft and 500′ of workings.

Equipment: 25 h. p. gasoline hoist and 250 cu. ft. compressor. Mine in 1917 was a prospect in good hands. No recent information.

TUCSON CONSOLIDATED COPPER CO. **ARIZONA**

Letters returned unanswered in May, 1917, from 511 Chamber of Commerce, Milwaukee, Wis. **Mine office:** Tucson, Pima county, Ariz. Property is evidently idle. Reported June, 1918, that the Black Dyke group of claims would be sold at Sheriff's sale.

Officers: at last accounts, J. H. Wussow, pres.; Dr. M. A. Brandt, v. p.; F. J. Rodee, sec., Tucson; C. W. Schneider, treas.; Hon. Fred W. Fickett, gen. mgr.; preceding officers, J. G. Albright, C. F. Freeman, P. P. Donohue, A. Ballantine, R. L. Bennett and S. W. Purcell, directors.

Inc. April 15, 1907, in Arizona. **Cap.,** $3,000,000; shares $1 par: non-assessable; in one-half full paid paid and one-half common stock; issued $1,500,000. Annual meeting, third Monday in March.

Property: 81 claims, unpatented, in 4 groups, 1,620 acres, in the Pagago district. The property of the Old Pueblo Mining & Milling Co., 9 claims, is held by this company under an option for 51% of stock on completion of $50,000 worth of work. Presumably includes Purcell Grand Cons. Mng. Co. property.

The 4 groups are 8 miles W. of Twin Buttes and 35 miles W. of Tucson. Claims show granite-porphyry and limestone, with fissure veins and contact deposits, 5 being under development. The largest deposit is described as a chimney in limestone, about 55x150′ in size. The groups as a whole have 3,800′ of workings, mostly tunnels, longest 800′, but including 10 shafts, deepest 525′. Ore is said to give assays of 6 to 30% copper, 12 to 80% lead, 3 to 125 oz. silver and 80c to $30 gold per ton, from azurite, chalcocite, chalcopyrite and galena. The reserves were estimated at 500,000 tons ore blocked out for stoping, which estimate is regarded as excessive.

The **Purcell** group of 16 claims,, 3 fractional, 275 acres, shows 3 approximately parallel mineral zones, developed by a 96′ shaft and a 200′ tunnel, estimated by the company to give assays of 15% copper, 20 oz. silver and $1.50 gold per ton.

The **Bolello** group of 9 claims, 180 acres, 2 miles S. of the Purcell, has basic granite, with frequent quartz-porphyry intrusions, showing 3 copper veins, slightly developed, carrying ore that has given assays up to 24% copper, with gold and silver values.

The **Black Dyke** group of 48 claims, 960 acres, is W. of and about 3 miles N. from the Purcell group, constituting a parallelogram 3,600′ wide and 12,000′ long, showing strong iron outcrops, with favorable indications, having

a number of shallow shafts, showing copper ore of 4 to 25% copper tenor, and silver-lead ore assaying up to 69% lead and 139 oz. silver per ton. This group has little development, but appears promising.

Equipment: includes a 250 h. p. steam plant, burning petroleum, with 2 hoists, and there are 6 buildings, including 2 general stores.

The **Old Pueblo Mining & Milling Co.'s** property consists of 9 claims, 5 miles W. of Tucson, developed by the 517′ Quien Sabe shaft and a tunnel. A 70′ shaft cut, at depth of 30′, a 15-ton pocket of chalcocite, assaying 33% copper, 16 oz. silver and $2.50 gold per ton.

The reports by Wishon, 1908, and Attix, 1903, issued by the company are so old, one wonders why this "sure thing" mine has been so long idle, and what work, if any, has been done in the past 10 years.

TWIN BUTTES MINING & SMELTING CO. **ARIZONA**

Office: 77 Michigan St., Milwaukee, Wis. **Mine office:** Twin Buttes, Pima county, Ariz.

Officers: W. A. Barber, pres.; Julius Frank and J. H. Tweedy, v. p.'s; P. C. Branner, sec.; Stephen Hoff, treas., with Ralph M. Friend, G. P. Mayer, Fred Williams, M. J. Davis, R. E. Hackett and Henry Nunnemacher, directors.

Inc. Sept. 8, 1903, in Arizona. **Cap.,** $2,000,000; increased, 1905, from $1,000,000 to $1,250,000, and again increased, January, 1910, to $3,000,000; shares $1 par; 2,000,000 shares outstanding. Capital reduced to $1,880,000 in July, 1918. Controls the Twin Buttes Railroad Co. Wisconsin Trust Co., transfer agent and registrar. Annual meeting, third Monday in February.

Property: the Glance and Queen mines, being operated by the Glance Mining Co., and Midland Copper Co., respectively, under bond and lease, on royalty basis. The Morgan mine is idle. The Twin Butte Co. also owns many other claims, partly patented, in the Twin Buttes district, in the foothills of the Sierrita Mountains, 27 miles south of Tucson. Lands carry fissure veins in limestone and contact deposits having a limestone foot and granite-porphyry hanging wall.

The Twin Buttes Railway, 10 miles in length, running from Twin Buttes to the S. P. (Nogales line), has 1 locomotive and 3 flat cars.

Production: See Glance Mining Co. and Midland Copper Co.

VALLEY GROUP **ARIZONA**

A group of claims 4 miles N. W. of Ajo, owned by Sam Clark. Reported that considerable development work has shown a large tonnage of low-grade copper carbonate ore similar to that at Ajo, and that the owner will build a small leaching plant.

VERDE QUEEN MINING CO. **ARIZONA**

Address: Pantano, Pima Co., Ariz. P. M. Hilton, supt.

Property: in central part of Empire mining district, about 12 miles from Pantano, and 15 miles W. of Benson. Shows silver-lead and copper ores, developed by a 280′ two-compartment shaft, from which a little lead ore was shipped to the El Paso smelter.

Equipment: includes gasoline hoist. Idle for several years.

VULCAN CONSOLIDATED MINING CO. **ARIZONA**

Address: W. R. Ramsdell, 30 S. Stone Ave., Tucson, Ariz.

Officers: W. R. Ramsdell, pres.; C. E. Walker, v. p.; J. S. Kelso, sec.-treas.

Inc. March 16, 1916, in Arizona. **Cap.,** $100,000; shares $1 par; non-assessable.

Gross earnings from ore sales in 1916 were $128,753, and operating expenses $78,078. Earnings were equal to 50c per share.

Property: 9 claims, 4 patented, 20 miles S. of Tucson, Pima county, Ariz. Examined by F. R. Weeks.

Development: 175′ vertical shaft and 560′ incline shaft. Flow of water was struck and mine shut down early in 1918 on account of caving of lower part of incline shaft. Company plans on sinking new shaft, pumping out mine and mining the 6 to 7% ore, large bodies of which are said to have been undergoing development when water was struck.

Equipment: 15 and 25 h. p. Fairbanks-Morse hoists, and 50 h. p. Chicago Pneumatic compressor.

Production:

	Lb. Copper	Oz. Silver	Net Smelter Returns	% Copper	Oz. Silver
1917	474,690	4,718	$84,238	7.52	1.55
1916	716,458	6,614	128,753	6.43	1.17

WAYNE DEVELOPMENT CO. ARIZONA

Property: near Quijotoa, via Weldon, Pima county, includes 49 claims, partly patented, 980 acres and three mill sites, total 1,020 acres, in the Quijotoa district, 40 miles from the Red Rock-Silver Bell railroad. Claims show mineralized zones between granite and andesite carrying several orebodies, one of which is said to be 200′ wide and characterized by gold ores. The other orebodies show copper ores containing malachite near surface, succeeded by chalcopyrite, mixed with lead and zinc sulphides beneath the oxidized zone. The ore is reported to average 10 to 30% copper and 5 to 70% lead.

Development: by 1,800′ crosscut tunnel, long abandoned, 7 shafts of 60 to 330′ depth and about 10 tunnels, longest 430′ with total workings of about 4,500′.

Equipment: includes steam and gasoline engines, aggregating 500 h. p. at the mine and mill, two 45 h. p. hoists, good for 700′ depth, Fairbanks-Morse and Leyner air compressors, with 17 buildings. The 100-ton stamp mill and concentrator has 30 gravity stamps and a 250 h. p. engine, 4 Blake and Samson crushers, one 50-ton Elspass centrifugal crusher and 3 Standard tables.

Long inactive and probably defunct.

WHITCOMB MINING & MILLING CO. ARIZONA

Office: 154 W. Randolph St., Chicago, Ill. **Mine office:** Tucson, Ariz.

Officers: H. Whitcomb, pres.-gen. mgr.; J. F. Johantgen, v. p.; T. A. Snow, treas.; A. McCallum, sec., with J. C. Freeman, directors.

Inc. March, 1914, in Arizona. **Cap.,** $100,000; recently increased to $200,000; shares $1 par; non-assessable; all issued. No bonded indebtedness.

Property: 3 unpatented claims in the Pima district, 20 miles from Tucson. The increase of capitalization was for the purpose of acquiring 6 additional claims known as the Prosperity group.

Development: by inclined shaft about 500′ deep and stopes on 3 levels. Ore is a silver-lead-bearing quartz of milling grade.

Equipment: includes a concentrating mill, shut down in 1915 for lack of water, but again operated in 1916. Company claimed $500,000 worth of ore developed on the two properties, but we cannot ascertain whether any has been shipped lately.

WHITE-VICTOR COPPER MINING CO. ARIZONA

Mail returned, 1918, from former address, Twin Buttes, Pima county, Ariz., marked "out of business."

Inc. Nov., 1916, in Arizona. **Cap.,** $500,000; shares $1 par.

Property: 6 claims, near the San Xavier mine, Mineral Hill district, Ariz. In March, 1917, 2-10% copper ore was said to have been opened near the surface and shaft sinking was started.

Prospectus said little about the property, but described the wonderful returns of other mining companies.

YUMA MINE ARIZONA

Idle.

Property: 14 miles N. W. of Tucson, is controlled by Col. Epes Randolph, Tucson, Ariz., and associates. Shipping ore containing molybdenum, with about $3 gold per ton in 1917.

Mine is described in Bull. 111, U. S. Bureau of Mines, 1916. The molybdenum occurs as wulfenite in an acid eruptive rock so highly altered that it is difficult to classify. The wulfenite is associated with cerussite, or well-crystallized vanadinite, or both. The average mine ore would be about 2 or 3% wulfenite. Ore concentrates well.

PINAL COUNTY

ALIZONE SILVER QUEEN MINING CO. **ARIZONA**

Officers: D. H. Munoz, pres.; E. W. van de Ford, sec.-treas., with A. E. Troxel, Ed. Ferguson, directors.

Cap. $1,000,000; par $1; 100,000 shares offered for sale, 1918, at 15c to provide funds for development.

Property: 11 claims, Mineral Hill district. An undeveloped prospect. Mail returned from Ray, Ariz., April, 1919.

ALTA MINING & SMELTING CO. **ARIZONA**

Idle. Mail returned, 1916, from former offices at Superior, and Florence, Pinal county, Ariz.

Officers: L. H. Sherman, pres.; Col. G. W. Griffey, v. p. and agent; H. A. Austin, second v. p.; J. C. Ferrall, sec.-treas.; preceding officers and G. R. Charters, directors.

Inc. Sept. 8. 1905, in Arizona. **Cap.,** $5,000,000; shares $1 par. Annual meeting, first Tuesday in September.

Property: 25 claims, area 470 acres, and a 200-acre patented ranch, including a water right on the Gila river, in the Mineral Creek district, at Superior P. O., near the Lake Superior & Arizona mine. Lands have veins in schist and contact deposits between schist and porphyry, ranging 5 to 50′ in width, opened by shafts of 96′, 127′ and 150′, with upwards of 3,000′ of workings, showing ore giving assays of 2 to 57% copper, with gold and silver value, also a lead vein giving assays of 2 to 57% lead, 4 to 15 oz. silver and 80c to $14 gold per ton.

Equipment: at the Black Copper shaft includes boiler house and power house, with steam hoist good for 1,000′, 4-drill Leyner air-compressor and 14,000-gal. oil tanks. There are 9 mine buildings.

A suit against H. W. Augustine, H. F. Clough and I. A. Wood, promoters, for money claimed to be illegally appropriated for their own use, was decided in favor of the present management, compromised by the surrender of 1,190,000 shares of stock to the company.

Property reported sold, 1917. No later information.

ANTELOPE MINING CO. **ARIZONA**

Property: near Kelvin, Pinal county, owned by W. E. Hanney and associates of Kansas City, Mo. Examined 1919 by Alfred Roos of Tucson.

ARIZONA CORONADO COPPER CO. **ARIZONA**

Office: E. M. Fisher, pres., Superior, Ariz.

Property: 24 claims, 9 miles south of Superior, Pinal county. Developed by 260′ shaft. Ore, copper with gold. At depth of 138′ ledge said to be 13′ wide of commercial ore, widening with depth. Shipments reported, 1917, to Wickenburg smelter. Considered of doubtful merit.

ARIZONA-HANCOCK COPPER CO. **ARIZONA**

Idle many years. **Office:** Hancock, Mich. **Mine office:** Florence, Pinal county, Ariz.

Officers: John D. Cuddihy, pres.; Alfred C. Sieboth, v. p.; Henry L. Baer, sec.-treas., with C. D. Hanchette, F. C. Mayworm and Philip Carroll, directors.

Inc. in Arizona, as successor to Arizona-Hancock Consolidated Mining Company.

Property: 4 claims, patented, 2 miles S. of Superior, showing a vein traversing 2 claims, parallel to the vein of the Lake Superior & Arizona, with diabase footwall and limestone hanging, opened by a short tunnel and a winze of 55′, with drifts on 2 levels, showing lead above and copper below.

ARIZONA HERCULES COPPER CO. **ARIZONA**

Stock control passed to Ray Hercules Mining Co., which see.

ARIZONA SILVER QUEEN MINING CO. **ARIZONA**

L. E. Troxel, mgr. and owner, Ray, Ariz.

Property: undeveloped claims in Mineral Hill, Pinal county. Reported to have a vein 4′ wide containing some gold. Regarded as a prospect of doubtful merit.

ARIZONA SUPERIOR MINING CO. **ARIZONA**

Office: 403 Fleming Bldg., Phoenix, Ariz.

Officers: A. A. Fairchild, pres.; V. E. Messenger, v. p.; James E. Nelson, sec.-treas., with Dr. Meade Clyne, directors.

Inc. Dec. 11, 1916, in Arizona. **Cap.,** $1,500,000; $1 par; issued for property 722,804 shares. Annual meeting, first Tuesday in February.

Property: 17 claims and 2 millsites, about 5 miles N. W. of the Ray Consolidated, midway between Ray and Superior, Pinal county.

Prospectus shows a contact of quartzite and limestone with 2 parallel veins dipping 43° E. and several fissures or cross fractures. Veins are 2′ wide on surface, widening to 12′ at shallow depth, showing traces of gold, silver, copper and lead. Developed by 100′ tunnel.

A prospect. Closed during the war, but to be re-opened October, 1919.

ARMOUR MINING CO. **ARIZONA**

Owners: J. A. Armour and E. A. Williams, 311 N. First St., Phoenix, Arizona.

Property: 900 acres located 16 miles east of Florence and 5½ miles from Price, Pinal county.

Reported prospecting with churn-drills. Twelve men employed.

ATLAS DEVELOPMENT CO. **ARIZONA**

Had an option on the Lake Shore mine, near Casa Grande. Ceased operations and has gone out of business. Described in Vol. XIII.

BALL COPPER CO. **ARIZONA**

Office: 1005 Title Ins. Bldg., Los Angeles, Cal. **Mine office:** Winkelman, Pinal county, Ariz.

Officers: Chas. E. Finney, pres.; F. B. Pugh, v. p.; Robt. J. Simpson, sec.-treas., with S. F. Parrish and D. Carl Kurtz, directors.

Inc. Feb. 1, 1908, in Arizona. **Cap.,** $3,000,000; $10 par; $1,250,000 issued. Bonds, $9,000 outstanding at 6%. Annual meeting, third Tuesday in January. Company owns 40,000 shares of the London Arizona Consolidated Copper Co., and has transferred its mineral claims to that company; they are described under that title.

The Copper Exploration Co., promoted by Cameron-Michel Co., New York, has acquired a controlling interest in this company.

BLUE BIRD SILVER MINING CO. **ARIZONA**

Office: Thos. N. Wills, Winkelman, Ariz. **Mine office:** Copper Creek, Arizona.

Officers: Thos. N. Wills, pres.; Geo. C. Young, v. p.; Miles Miller Carpenter, treas. and cons. eng.; Judge S. W. Purcell, sec.; I. B. Winsor, mgr., together with Chas. E. Walker, Tucson, Ariz., directors.

Inc. 1918, in Arizona. **Cap.,** $1,500,000; shares $1 par; 750,000 shares were issued to the owners and were to have been placed in trust until one year after commencement of dividends.

Property: 10 claims, Copper Creek district, Pinal county, reports by both Young and Carpenter state that previous shipments are estimated at 1,000 tons of ore worth $150,000, in silver, besides further values in lead, copper and gold. Mr. Young stated he shipped 32 tons, which returned $4,200 net. Stock offered by Boston broker at 35c, 40c and 50c in 1918, accompanied by intensive advertising campaign of alluring claims. Reported idle, and in December, 1918, machinery being removed.

BOSTON & ARIZONA MINES CO. **ARIZONA**

Mail returned unclaimed, September, 1918, from former address, Tucson, Arizona.

Officers: Geo. P. Gregory, pres.; Henry C. Young, Jr., v. p. and gen. mgr.; Gerald S. Howland, treas.

Inc. 1915. **Cap.,** $100,000; shares $1 par. Stock listed on Boston curb. Federal Trust Co., Boston, transfer agents; Exchange Trust Co., registrars.

Property: 5 claims in the Old Hat mining district, 25 miles north of Tucson, Pinal county, Ariz., said to show an orebody 25′ wide and 100′ long, with

copper, silver and gold. Ore occurs between grano-diorite foot and quartz lime hanging-wall. Developed by 247′ tunnel. A prospect.

Was not favorably regarded.

BROWNELL-ARIZONA MINING & SMELTING CO. **ARIZONA**

Mail returned unclaimed, March, 1919, from former address, Casa Grande, Pinal county, Ariz.

Property: formerly held by Producer Mining & Smelting Co., is supposed to include the Jack Rabbit mine, 80 acres, in Pinal county, together with the Producer and Century-Chief group of 320 acres, and Index group of 220 acres, in Pima county, all in the Quijotoa Mountains. Company sold stock, 1910, on the strength of a clever brochure, written by Alfred Henry Lewis, the talented writer, whose statements were not hampered by a knowledge of copper mining. Company not favorably regarded. Presumably idle.

BROWN WHITLOW GROUP **ARIZONA**

Mine address: Superior, Pinal Co., Ariz. Owned by J. C. Brown and J. W. Whitlow.

Property: 5 claims, in Pioneer district, near Superior; adjoins the old Silver King mine, once the richest silver property of Arizona.

Development: by tunnel, which cuts a 7′ contact vein of ore low in copper and silver. Believed to be idle.

BUNKER HILL COPPER CO. **ARIZONA**

Address: F. M. Pool, Winkelman, Ariz.

Officers: F. M. Pool, pres.; H. S. Bailey, sec.-treas; with B. H. Norton and Thos. Quarrelli, directors. G. G. Wald, supt.

Inc. in Arizona. **Cap.,** 1,500,000 shares, $1 par; 600,000 issued; non-assessable. Annual meeting in March.

Property: 39 claims, 780 acres, in Bunker Hill district, Pinal county, 35 miles from Winkelman. Vein is in diorite, and sulphide ore carries gold, silver, copper, and lead. Shoots are 4′ wide.

Development: by 150-ft. vertical shaft and 300-ft. tunnel; total workings, 600′. Shaft is to be sunk to 600′ point soon.

Equipment: 15 h. p. hoist and Sullivan 2-drill compressor.

Production: 33 tons sent to El Paso, Texas, in March, 1919, was settled for at $81.84 per ton gross and $68.15 net. More high-grade ore was opened in August, 1919. In June the owners had 60 tons of high and 300 tons of $20 ore on dumps.

CAMELBACK GOLD & SILVER MINING CO. **ARIZONA**

Address: Superior, Pinal county, Ariz.

Reported about to drive a 100′ tunnel to cut a rich gold-silver ledge.

COPPER VAULT MINING CO. **ARIZONA**

Owner: J. J. Sherwin, Bellevue, Ariz. Not incorporated.

Property: 28 unpatented claims, 8 miles N. E. of Ray Cons. Copper Co.; a 4′ vein is said to contain 6 to 34% copper, 10 oz. silver, $3 gold per ton. Fissure vein in diabase and schist with N. E.-S. W. strike and dip of 55°.

Development: by tunnels and shaft to depth of 150′ and 500′ underground workings.

No shipments by present owners, but was worked for silver in early days.

CORONADO COPPER & SILVER MINING CO. **ARIZONA**

Office: 503-4 K. of P. Bldg., Indianapolis, Ind.; and E. W. Fisher, 35 E. Adams St., Phoenix, Ariz.

Officers: E. W. Fisher, pres.; J. W. Pringle, v. p.; C. A. Chambers, sec.-treas., with C. O. Patton and H. H. Dils, directors.

Inc. June 5, 1918, in Arizona. **Cap.,** 3,500,000 shares; 1c par; 1,500,000 issued.

Property: 24 claims, 250 acres, in Pioneer district, Pinal county. Ore occurs in a fissure in schist and porphyry, and carries gold, silver, copper and lead. The outcrop is 1,500′ long. Examined by W. M. Owens of Phoenix, Ariz.

Development: by 400′ incline shaft and 1,000′ of workings. Three shafts are to be sunk after Aug. 1, 1919.

Equipment: 65 h. p. hoist, compressor, pump, etc.

Production: one carload of 20% copper ore has been shipped.

CURRY MINING CO. **ARIZONA**

Wm. Curry, mgr., Superior, Ariz.; John T. Rurey, Phoenix, sec.; J. D. Cox, Hornell, N. Y. and Fred. H. Schulz, directors.

Inc. 1917, in Arizona. **Cap.**, $1,000,000; authorized to sell 200,000 shares.

Property: 7 claims, the Curry group, 3 miles north of Magma, near Silver King, shows a vein of silver-lead ore.

Development: mostly by open cuts and pits, which show copper and lead ore.

DOUGLAS COPPER CO. **ARIZONA**

Office and secretary: Fred L. Mason, P. O. Box 421, Globe, Ariz. T. C. Hendricks, pres.; H. M. Foster, v. p.; Chas. Davis, supt.

Inc. Aug., 1910, in Arizona. **Cap.**, $1,125,000.

Property: 35 claims, about 30 miles from Globe on the wagon-road, and midway between the towns of Ray and Superior, Pinal county, Ariz. Lands are traversed by several N. W.-S. E. fissure veins in limestone and quartzite, carrying gold, silver and copper in oxidized ores or as bornite and chalcopyrite.

Development: by 2 tunnels, a shallow shaft and a number of open cuts, all on one large vein. Management expects to sink shaft to 500′ in depth. Property lies west of the limestone uplift in which the Newman group is located. From personal inspection, the claims are regarded as of highly speculative value, but the great amount of activity in this belt, all part of the Superior district, makes the tract far more valuable than it was a few years ago.

Nothing is known of operations since 1917.

DRIPPING SPRING COPPER CO. **ARIZONA**

Operating a lease on the Pearl group, expiring in 1921.

Address: M. G. Tarr, Mammouth, Ariz. Joe Bandhauer in charge.

Property: 9 unpatented claims in Old Flat mining district, Pinal county. Fissure vein in monzonite carrying lead, copper and silver.

Development: a 4 by 6′ incline shaft, 165′ deep to be sunk further, and a 500′ tunnel.

Equipment: Sullivan compressor, hoist, and a dry concentrator, which proved to be a failure.

Production: in 1917, shipped 80 tons returning 15% lead, 11½% copcoper, 83 oz. silver; none since.

Work was to be resumed in August, 1919.

EAGLE MOUNTAIN COPPER CO. **ARIZONA**

Probably dead. Col. P. T. McGrath, gen. mgr., but his whereabouts unknown at Kelvin, Pinal county, Ariz.

Property: 27 claims, known as the Copper Queen group, in the Riverside district, is slightly developed. Idle several years and lands of doubtful value.

FORTUNA CONSOLIDATED MINING CO. **ARIZONA**

Office: Superior, Pinal county, Ariz.

Officers: H. K. Welch, pres.; E. D. Farley, v. p.; Calvert Coates, cons. eng. D. M. Stevenson, Patrick Miller, Sanford Makeever, directors.

Inc. in Arizona. **Cap.**, $1,000,000; $1 par; outstanding 750,000. Property is said to be free of debts and titles cleared.

Property: 16 claims, 300 acres, 5 miles north of Superior, is a consolidation of various properties, including the mines of the Fortuna Mining Co. Ore occurs as tetrahedrite, with argentite, ruby silver, galena and chalcopyrite in fissure veins, which show faulting. An 18″ sample is said to assay 7.1% copper and 151.1 oz. silver. Diamond drill cores reported to show 20′ of fair copper-silver ore.

Development: 430′ shaft, a 620′ tunnels on E. W. vein and 1050′ tunnel along N.-S. vein.

FORTUNA MINING CO. **ARIZONA**

Now property of the Fortuna Consolidated Mining Co., which see.

GALIURO MOLYBDENUM CO. **ARIZONA**

Address: W. R. Ramsdell, Tucson, and Mammoth, Ariz.

Property: 7 claims, known as the E. W. Childs mine on Copper Creek,

14 miles N. E. of Mammoth, developed by tunnels, raises, etc., totalling 850′. Ore is said to carry gold with about 2% molybdenite.

GILA DEVELOPMENT CO. **ARIZONA**

Address: Kelvin, Pinal county, Ariz.

Property shows 6 to 36″ vein containing free-milling gold ore, opened by 200′ shaft with drifts on the 100′ and 200′ levels.

GOLDEN BELL MINING CO. **ARIZONA**

Office: care E. W. St. Charles, pres. and mgr., Kelvin, Ariz.

Officers: above with E. F. Goodwin, treas.; W. R. Blackman, sec., Hibernian Bldg., Los Angeles, Calif.

Inc. 1910. **Cap.**, $1,000,000; outstanding 550,000 shares.

Property: 56 claims, near the Southern Pacific railway, 5 miles west of Kelvin, shows gold-silver-copper ore in 2′ vein in altered diorite.

Developed: by 100′ tunnel, 200′ shaft and crosscuts. Equipped with 25 h. p. hoist and air compressor.

GRAND PACIFIC COPPER CO. OF ARIZONA **ARIZONA**

Company address: Franklin, Pa. **Mine address:** L. I. Rehfus, mgr., Superior, Ariz.

Officers: J. French Miller, v. p.; with J. C. Denton, Chas. Lamb, Dr. T. A. Irwin, J. J. Van Dresser, and H. W. Breckenridge, directors. W. E. Barrow, sec.-treas.

Inc. August 17, 1916, in Arizona. Amended, May 14, 1919. **Cap.**, $2,000,000; $1 par; 1,242,000 outstanding. Listed on New York Curb. Security Transfer & Registrar Co., New York, transfer agent. Income in 1919 was $35,728 and expenditures, $74,000. The company has no debts; has spent $200,000 to date. Annual meeting on April 1.

Financial statement on June 1, 1919, showed current assets of $9,548 and liabilities of $5,000. Buildings, mine equipment, roads, development, were valued at $174,000. Income account showed $265,358 from sale of shares and loans, and $38,738 from ore shipments.

Property: 35 unpatented claims, 2 miles S. of the Magma mine, Pioneer district, Superior, Ariz.

Geology: there are 5 principal and 2 lesser mineralized fault-fissures crossing the uptilted limestone and quartzite beds at right angles. The Sandal fissure lode cuts obliquely through limestone with course N. 60° E., dip 60° N. and is similar in geological occurrence to the nearby Magma mine. The Sandal vein varies from 20′ to 50′ wide, is developed for a total length of 600′, showing two main ore shoots. The ore usually occurs in the hanging-wall limestone above a clay gouge seam, the rest of the vein is oxidized and leached.

Ore occurs in both bedded veins and fault fissures as shoots with 30° dip and E. W. course. Oxide ore shipped averaged 17% copper, with some precious metals. A bedding plane lode and a silver lode also occur on the claims.

Development: mainly on the Sandal vein by 3 tunnels; the lowest one, with branch, 1,405′ long, Dec. 1919, should cut the ore-shoot if continued. A 530′ shaft has been sunk from No. 3 tunnel, water being found at that depth. Shaft sunk in hanging of vein which appears to straighten and pitch in the opposite direction, similar to an occurrence in the Magma mine. At 450′ in shaft, a station was cut and a crosscut driven several hundred feet, cutting a fault which has shifted the vein. Workings total 3,620′.

Equipment: includes Fairbanks-Morse hoist and Sullivan compressor, and accommodation for 25 to 50 men.

Production: 990 tons of 17% ore in 1918.

Regarded favorably as an excellent mining speculation. Geologic conditions are favorable and sulphide ore should be found at water-level.

Company is controlled by Franklin, Pa., stockholders, though J. C. Denton is largest individual shareholder. These men are bending every energy to develop a mine, and not to sell stock.

GREATER MIAMI COPPER CO. **ARIZONA**

Address: Box 14, Miami, Ariz.

Officers: A. Dumontier, pres.; F. Kiernan, v. p.; J. W. Murphy, sec.; T. M. Jackson, treas.; with C. Stewart and E. Graham, directors.

Inc. Feb., 1916, in Arizona. **Cap.**, $1,500,000; $1 par; 8,000 outstanding.

Property: 32 unpatented claims, Pinal county, 9 miles N. of Ray Cons. Copper Co. and 16 miles S. W. of Globe and Miami, reported to have 100,000 tons of copper carbonate ore blocked out, also some sulphide ore.

Present earnings are from sale of shares. Installing hoist at last accounts.

Reported July, 1918, under bond and lease to Major A. E. Pickerel and associates, of Jerome.

KELVIN-SULTANA COPPER CO. **ARIZONA**

Inc. April 19, 1910, in Arizona. **Cap.**, $3,000,000, increased Dec., 1914, to $5,000,000; shares $1 par; non-assessable; issued 3,842,752 shares. Authorized bond issue to November 1, 1919, $200,000, $198,700 outstanding. Company was a reconstruction of the Sultana-Arizona Copper Co., financed by the Baldwin Syndicate of Chicago and the entire floating indebtedness eliminated.

Property was sold by Receivers in January, 1919, to bondholders, who then reorganized under the name of Ray Boston Copper Co., which see.

KEYSTONE DEVELOPMENT CO. **ARIZONA**

Operating the Isabella mine, 20 miles from Casa Grande, Pinal county, Ariz., at last accounts. Reported to have some 7% copper ore. No recent returns; believed to be idle.

KORNCOB MINING & DEVELOPMENT CO. **ARIZONA**

Care E. W. Walker, v. p. of Arizona Consol. National Bank, Tucson, Ariz.

Is a dormant corporation. Bond and lease on the Apache & Del Monte group of claims an eastern base of Catalina Mountains, 75 miles by road from Tucson, has expired.

Claims show garnet containing copper pyrite, as a contact metamorphic product, along a granite limestone contact.

Geological report on property made by A. F. Tolman, Jr., of Leland Stanford University, May 24, 1912.

LAKE SHORE MINE **ARIZONA**

Address: Frank M. Leonard, owner and mgr., 3543 Third St., San Diego, Cal. **Mine address:** Casa Grande, Ariz.

Property: 35 claims, 3 patented, 50 miles W. of Tucson and 35 miles S. of Casa Grande, carries a contact deposit in granite and andesite. The ore zone runs N.-S. and dips 45°. Over one million tons of oxidized copper ore, averaging 3% copper, has been developed above water level.

Development: by 285′ vertical shaft; bottomed in sulphide ore of payable tenor.

Mine produced and shipped about 3,000 tons of 5 to 6% ore in 1917. Is regarded as a good mine, needing further capital for equipment and development.

LAKE SUPERIOR & ARIZONA MNG. & SMG. CO. **ARIZONA**

Reported sold its properties to the Superior Arizona Copper Co., in 1916.

MAGMA CHIEF COPPER CO. **ARIZONA**

Address: Mesa, Ariz.

Officers: C. L. Knight, pres.; K. Pomeroy, v. p.; F. T. Pomeroy, sec.-treas., with D. D. Moffat and W. T. MacDonald, directors; C. A. Kumke, gen. supt.

Inc. Oct. 4, 1913, in Arizona. **Cap.**, $2,000,000; $1 par; 1,259,916 issued.

Property: 17 unpatented claims in Pioneer district, Pinal county. Examined by W. H. Hollis, F. M. Gordon, C. A. Kumke. The work on this property by tunnels and drill-holes gave disappointing results.

Company is now actively developing Sombrero Butte Copper Co.'s holdings, in the Copper Creek district, consisting of 14 claims, near Mammoth, Pinal county, which were acquired in December, 1918. In August, 1919, new shaft was down 240′ in 18% ore. At 120′ a tunnel was driven to connect with the surface, made possible by the steep hillside. At 40′ from shaft, this tunnel cut good carbonate ore. The tunnel was also connected with old workings, opening good ore. Shipments of one or more cars of 16 to 22% copper and 3 to 4 oz. silver ore were sent to smelter at Hayden.

The Superior property was energetically and well prospected, but is now closed down, probably for good. The Sombrero Butte mine appears to have the earmarks of a good producing property.

MAGMA COPPER CO. **ARIZONA**

Office: 14 Wall St., New York. **Mine office:** Superior, Pinal Co., Ariz.

Officers: Chas. F. Ayer, pres.; Theo. Schulze and Wilber Judson, v. p.'s; H. E. Dodge, sec.-treas.; preceding, with John F. Alvord and C. A. Corliss, directors; W. C. Browning, gen. mgr.; E. H. Lundquist, mine supt. J. A. Garrott, mill supt.

Inc. May, 1910, in Maine. **Cap.**, $1,500,000; shares $5 par; issued $1,200,000. Transfer agent, Guaranty Trust Co., New York. Registrar, Bankers' Trust Co., New York. Listed on New York Curb. Controls the Patagonia-Superior Copper Co., which see.

Balance Sheet:

Assets—

	Property & Plant	Investments	Cash & Copper	Other Current	Supplies	Total
1918.....	$1,125,360	$242,037	$911,742	$669,187	$184,731	$3,133,057
1917.....	1,060,129	242,037	1,073,743	381,080	165,821	2,922,810

Liabilities—

	Capital Stock	Current	Surplus	Total
1918.....	$1,200,000	$306,591	$1,626,466	$3,133,057
1917.....	1,200,000	135,695	1,587,115	2,922,810

Income Account:

	Metal Sales	Total Income	Total Expenses	Net Income	Dividends	Surplus
1918.....	$2,897,823	$2,916,689	$2,397,339	$519,350	$480,000	$39,350
1917.....	3,235,070	3,246,206	2,178,220	1,067,986	504,000	563,987

Quarterly dividends of 50c per share began September 30, 1915, were continued quarterly during 1917 and 1918 with an extra 10c Red Cross dividend during 1917.

Property: in the Pioneer district, Pinal county, Ariz., 531 acres formerly known as the Silver Queen mine. Company owns a compact group of claims of 1,019 acres, of which 163 acres are patented, also 141 acres of mill sites. Owns other interests and has options on 175 acres of adjoining ground. In October, 1919, an option was taken on the Three R mine, at Patagonia. Diamond drill holes from the main crosscut on the 1,500′ level encountered the vein at depths corresponding to 1,750′ and 2,250′, indicating commercial ore containing chalcopyrite. On the east end the vein is wide and leached, and is not considered to be of commercial grade.

Geology: The known orebodies of the mine occur in a strong fault fissure filled with porphyry and cutting diabase, quartzite and limestone. The ore, with some bornite, is mainly chalcocite. Chalcopyrite appears on the 1,400′ level and in the diamond-drill holes.

Development: has been partly prospected and developed to the 1,800′ level by the old 800′ shaft and a new 2,200′ three-compartment shaft. Development work in 1918 totaled 11,122′, of which 1,243′ was sinking. Total underground workings January 1, 1919, 46,328′. The vein has been developed on the 500′, 650′, 725′, 800′, 1,000′, 1,200′, 1,300′, 1,400′, 1,500′ and 1,600′ levels. Openings on each of the three bottom levels have exposed the main ore shoot, indicating a length of 800′. An 1,800′ tunnel is being driven to connect with the workings at depth of 500′. It is 12 by 12′ in cross section, is being concreted and will serve as a main haulage level. Completion is expected by January, 1920. On the 1,800′ level there is a partly developed ore-body 500′ long, 9.7′ wide, assaying 5.35% copper, 3.6 oz. silver, and 20c gold per ton. Minerals are principally bornite and chalcopyrite. In September, 1919, a drill-hole was down 400′ below the 1,800′ level, the last 47′ assaying 5% copper and 4 oz. silver per ton.

Ore reserves: estimated Jan. 1, 1919, as 235,000 tons copper sulphide ore assaying 5.7% copper, 4.2 oz. silver and .02 oz. gold per ton; 20,000 tons of lead-zinc ore, assaying 13.5% zinc, 2% lead and 12 oz. silver per ton.

Equipment: is electrical throughout, but includes a 160 h. p. steam hoist, now driven by compressed air, at No. 3 shaft a Nordberg-Westinghouse hoist, good for 3,000′ depth, 2 air compressors, one of 1,500, the other of 900 cu. ft. capacity, driven by a 225 h. p. motor and 3 vertical Aldrich pumps, each driven by a 75 h. p. motor.

In August, 1914, the company completed a concentration and flotation mill, having a monthly capacity of 6,000 tons. Mine and mill are connected by a 2,600′ aerial tram. The Callow flotation process is used in the mill and treats the tailing from the finishing tables. Recovery was 95.33%. Ore and concentrates are shipped to the plant of the A. S. & R. Co. at Hayden, Ariz. Alleging infringement of its flotation patents, Minerals Separation started suit against Magma early in 1919.

The company owns substantially all the shares of the Magma Arizona Railroad Co., completed in 1915, a 30.4-mile narrow gauge road from Superior to Magma Junction, a station on the Arizona Eastern R. R. This line was profitably operated in 1918.

A 15-mile electric power line, with steel towers, connects with the line from Roosevelt Dam at Miami. The company has a contract for several years with the U. S. Reclamation Service for electric power, at an approximate cost of $49 per year and has constructed a 32-mile power line, connecting at Goldfield.

Production: in 1918 was 10,968,556 lbs. of copper, 463,503 oz. silver, 5,699 oz. gold. The average selling price for 60% of the copper produced was 25.05c per lb and cost 16.425c, the remainder, 40% is carried at 15c per lb.; 1919 production is between 9 and 10 million pounds copper and close to 500,000 oz. silver.

Crude ore shipped, 15,888 tons, assayed 16.675% copper, 13.186 oz. silver, and $2.10 gold per ton. Mill ore, 74,441 tons, averaged 4.496% copper and 3.803 oz. silver. Tailing contained .3482% copper and .43 oz. silver per ton.

Magma is regarded very favorably, for while the amount of ore actually blocked out is not very large, its drill holes indicate large reserves of copper ore. Development work now in progress will insure an output of 15,000,000 lbs. copper annually, with at least 750,000 oz. silver. It is one of the lowest cost copper producers of this country.

MAGMA EXTENSION COPPER MINING CO. **ARIZONA**

Address: 110 N. First Ave., Phoenix, Ariz. **Mine office:** Superior, Ariz.

Officers: John Cowan, pres.-treas.; Geo. A. Mauk, v. p.; H. F. W. Lampker, sec, with J. W. Spray, directors.

Inc. 1917, in Arizona. **Cap.,** $1,500,000; shares $1 par; non-assessable.

Property: 135 acres in Pioneer district, Pinal county; said to be between and near the Magma Copper, Magma Chief and Silver King mines. Geological conditions are reported to be similar to the Silver King and the Magma Copper Co., but this is doubted. A mineralized prophyry dike 700′ wide is said to be intrusive in diorite.

MAGMA QUEEN COPPER CO. **ARIZONA**

J. C. Callaghan, C. R. Bone and G. A. MacDonald of Phoenix, incorporators.

Inc. Dec. 2, 1916, in Arizona. **Cap.,** $1,500,000; shares $1 par.

Property: 10 full and 2 fractional claims, 208 acres, known as the Black Diamond and Magma King groups, at the northern end of the Pioneer or Superior mining district, Pinal county, Arizona.

Geology: the Black Diamond ore deposit is a gently dipping bed of garnetized limestone, 12′ to 20′ thick, containing scattered grains and clusters of oxidized copper ore. This occurs at the contact between the limestone series of the region and the Silver King stock or body of monzonitic, i. e., granitic rock. The ore is flecked and spotted with stellate masses of micaceous hematite. Selected material for shipment shows 15% copper, 34.5% insoluble and 25% iron, but the average copper content of the deposit, so far as opened, is less than 2%. The Black Diamond orebody is 225′ long.

Other claims show geological conditions which warrant prospecting work.

Development: work is limited to an incline, 48′ long and various open-cuts. The 450′ Black Diamond tunnel, 100′ below the ore bed, had not reached ore at last accounts.

Regarded as worthy of limited prospecting, but not at points thus far attacked. Presumably idle.

MAGMA RAY COPPER CO. **ARIZONA**

Address: A. H. Woollacott, 261 I. W. Hellman Bldg., Los Angeles, Cal.

Property: 420 acres, known as the McSherry group, near Ray Junction, Pinal county, Ariz. Probably idle.

MAGMA-SUPERIOR COPPER CO. **ARIZONA**

Address: care of Samuel Newhouse, Salt Lake City, Utah.

Property: situated south and adjoining what was originally known as the Lake Superior & Arizona claims, now owned by Magma Copper at Superior, Pinal county, Ariz. Geological conditions said to be favorable. Development proceeding, 1917, but no news since.

MAGMA SURPRISE MINING CO. **ARIZONA**

Address: Superior, Ariz.

Officers: G. J. Stone, pres.; V. B. Andreas, v. p.; J. L. Boyce, sec.-treas., with R. Krakauer and P. Howle, directors.

Idle.

Cap., $1,000,000; shares $1 par.

Property: 21 claims, 1½ miles S. W. of Superior, Pinal county, Ariz.

MAGMATIC COPPER CO. **ARIZONA**

Address: 514 Mill Ave., Tempe, Ariz. Mine at Superior, Ariz.

Officers: J. C. Goodwin, pres.; T. J. Goodwin, v. p.; G. A. Goodman, sec.-treas.

Inc. 1917, in Arizona. **Cap.,** $100,000; shares 10c par; non-assessable. Recently sold 70,000 shares stock at 10c per share.

Property: 21 claims, 440 acres, 1½ miles S. of the Magma Copper Co. mine, Superior, Pinal county, Ariz.

Present work, resumed in October, 1919, consists in driving a tunnel.

Geological conditions are similar to the other parts of the district. Shaft 140′ deep, is said to have passed through 20′ of rock carrying 18% of manganese, 34% of iron, with small gold, silver and copper. This shaft was being deepened in August, 1919.

MAJESTIC COPPER CO. **ARIZONA**

Office: First National Bank Bldg., Kansas City, Mo. **Mine office:** Oracle, Pinal county, Ariz.

Officers: E. A. Hosier, pres.; W. A. Neiswanger, v. p.; E. T. Wilder, sec.-treas.

Inc. as Inspiration Mining Co., but sold its property, in the Globe district, to the Inspiration Copper Co., and changed its name, March, 1909, to present title, to avoid misunderstanding. **Cap.,** $3,000,000; shares $1 par; $2,707,000 oustanding; bonds authorized, $25,000; $14,350 outstanding.

Former property: 6 claims near Oracle, on which assessment work was done for several years, has been abandoned and company is now inactive. Company received from the sale of the Inspiration mine about $1,500,000. Idle since 1917.

MAMMOTH COLLINS MINE **ARIZONA**

Care of Young Bros., Shultz, Ariz. See Great Western Copper Co.

MAMMOTH DEVELOPMENT CO. **ARIZONA**

Now St. Anthony Mining & Developing Co., which see.

MANIFEST COPPER & SILVER CO. **ARIZONA**

Address: Box 494, Globe, Ariz.

Officers: W. Kitzmiller, pres.; W. R. Henry, v. p.; W. W. Crawford, sec.-treas., with J. W. Morrell and (Mrs.) C. Kitzmiller, directors.

Inc. in Arizona. **Cap.,** $3,000,000; shares $1 par; non-assessable; 35,000 outstanding.

Property: 43 unpatented claims in Pioneer district, Pinal county, Ariz., 20 miles from Globe and 12 miles from Hayden. Was a silver producer in the 80's. Under bond for 3 years, from 1917, to W. J. Porter and W. Kitzmiller.

Development: to 85′ depth, totaling 2,000 feet.

Geology: sulphide ore occurs in a contact fissure in quartzite. It is reported to carry 10 to 30 oz. silver, $1.50 gold, 10 to 35% lead, and 1½ to 6% copper.

MANITOU HILL COPPER CO. **ARIZONA**

Idle and probably dead. Mail returned unclaimed, 1919.

Office: care W. H. Brown, sec., 110 S. Third St., St. Joseph, Mo. **Mine office:** Globe, Gila Co., Ariz. A. T. Hammons, pres. and mgr.

Inc. 1911. **Cap.,** $1,250,000; shares $1 par. Company is a reorganization of the Pinto Creek Mining & Smelting Co., and by consolidation later acquired the property of the Five Points Copper Mining Co.

Property: 70 claims, at the head of Pinto Creek, about 10 miles S. W. of Miami, Pinal county, shows pre-Cambrian schists cut by granite and granite porphyry. Ore is low-grade.

Equipment: includes small steam plant and hoist at the Five Points mine, 6 h. p. gasoline hoist, 6-drill air-compressor, and 250-ton concentrator at the Pinto Creek mine. Assessment work done, 1914. Company, in 1917, endeavored to raise $25,000 for sinking shaft to prove ore in commercial quantities.

MAVERICK COPPER CO. **ARIZONA**

Address: Florence, Pinal county, Ariz. Geo. Lobb and Eugene Woodbury, managers.

Property: 35 claims, known as the Iron Spring mine, shows a strong outcrop, carrying finely disseminated chalcocite, estimated to average 3% copper.

Development: by a shallow shaft and a number of prospect pits and shafts. Annual assessment work only has been done since 1910, when the Copper Queen Co. relinquished its $100,000 bond on the group.

Reported sold to the Pillsbury interests, who intend to test by churn-drilling. Wm. Gordon, mgr.

Presumably idle, June, 1919, as mail not answered.

MT. TURNBULL COPPER CO. **ARIZONA**

C. B. Barnhard, mgr., Phoenix, Ariz.

Adjoins Inspiration Central. Is a prospect that is under development.

NEWBURY MNG. CO. **ARIZONA**

Property near Cochran, on Ariz. Eastern R. R., east of Florence. To save property from sale, Makeever Bros. of Boston put up $10,000, but after their engineers had examined it, the firm abandoned the property.

NORTH PINAL MINING CO. **ARIZONA**

Address: C. W. Cisneey, pres., 228 E. Jefferson St., Phoenix, Ariz.

Property: formerly held by La Coronado Development Co., is in the Mineral Hill district, 10 miles from Price, Pinal county, Ariz.

Development: by a 300′ shaft, shows a lens of copper ore at depth of 260′ in the shaft, said to carry up to 70% copper. Ore is mainly bornite.

Equipment: included a 25 h. p. gasoline hoist and an air-compressor. No recent information.

OHIO ARIZONA COPPER CO. **ARIZONA**

Address: Silver Hill mine, via Sasco, Pinal Co., Ariz.

Property: in the Silver Bell range, 15 miles from railroad at Sasco, has been worked intermittently for years. A 400′ shaft was to be sunk in 1919.

OWL HEAD COPPER CO. **ARIZONA**

Office: Cameron Michel & Co., 8 West 40th St., New York. Mine near Red Rock, Pinal county, Ariz.

Officers: Wm. P. Michel, pres.; Jas. P. Harvey, v. p.; E. I. Chapman, treas.; J. B. Wright, sec., with Ralph Cameron, directors.

Inc. 1910, in Arizona. **Cap.,** $10,000,000; shares $1 par; 3,160,000 issued. Registrar & Transfer Co., transfer agent.

Property: 24 claims, the Apache Princess group, in the Tortillita mountains, Owl Head mining district, 16 miles N. E. of Red Rock. Lands said to show a zone, 150′ wide, of Pinal schist with porphyry dikes, the conditions being said to resemble those of the "porphyry" or disseminated deposits at Miami and Ray. The workings show copper impregnations in the schist and to some extent

in the adjoining granite, said to give assays of 0.5% to 3% copper and 1 to 3 oz. silver per ton.

Development: by shaft, 150′ deep in May, 1916. Management states that shaft will be sunk to 500′ level and that arrangements have been made to underwrite 100,000 shares of treasury stock at $2.50 per share to provide funds for this and other development purposes. The Owl Head Co. is controlled by the Cameron, Michel & Co., 100,000 shares being owned by the Copper Exploration Company.

OXIDE COPPER CO. **ARIZONA**

Office: A. C. Burrage, owner, 85 Ames Bldg., Boston, Mass. Mine at Silver Bell, near Red Rock, Pinal county, Ariz. Albert C. Burrage, pres.; Chas. D. Burrage, sec.-treas. Company believed to be defunct.

Property: 46 claims, patented, known as the Copper Prince group, in the Silver Bell district, 7 miles south of the Imperial mine, shows contact metamorphic deposits carrying argentiferous copper sulphides in limestone gangue.

Development: by a 500′ shaft and a 350′ tunnel, with about one-half mile of workings.

Equipment: includes gasoline power and an air compressor. Churn-drilling was done in 1910, to locate disseminated ores, but apparently results were not especially encouraging. Production was 49,676 lb. copper and 103 oz. silver in 1908, and less than $3,750 worth of ore in 1910; none reported since.

PINAL DEVELOPMENT CO. **ARIZONA**

Address: 1401 No. 3rd St., Phoenix, Ariz.

Officers: J. C. Devine, pres.-treas. and mgr.; E. A. Tovrea, v. p.; C. T. Carpenter, sec.; E. M. Blake, J. H. Robinson, E. P. Palmer and Arthur Luhrs, directors.

Inc. Dec., 1915, in Arizona. **Cap.,** $1,500,000; $1 par; non-assessable; 700,000 shares issued.

Property: 47 claims, 940 acres, known as the Renfro group, near Hayden, Ariz., adjoins the Troy-Manhattan at Troy, nearly due E. of Ray, Pinal county, Ariz.

Geology: ore occurs on contact between limestone and shale, as irregular replacements on bedding plane. Ore horizon is 15′ thick, and ore carries oxidized copper minerals, no sulphides being found; also carries low gold-silver value and 10 to 20% copper.

Development: by several tunnels, main one 1,600′ long, with about 2,500′ of workings to depth of 600′. In June, 1917, a 3′ streak of high-grade copper ore was struck, and a raise and winze were driven on it. Production started September, 1917.

Property is under excellent management, and was regarded as a legitimate mining venture in 1917. No recent returns available.

POMEROY-PRUDENTIAL COPPER CO **ARIZONA**

Offices: Hornell, N. Y., and Superior, Ariz.

Officers: K. Pomeroy, pres.; J. T. Rurey, v. p.; E. Pomeroy, sec.; I. N. Brill, treas.

Inc. 1917, in Arizona. **Cap.,** $1,500,000; 750,000 in treasury; 50,000 shares sold at 25c each; 50,000 more offered the public at 50c a share, March, 1917.

Property: 9 claims, Pioneer district, 3 miles W. of Silver King, and known as the Silver Bell and Sulphide group, in the Pioneer district, 3½ miles N. W. of the Magma mine.

Development: by 130′ tunnel said to show some copper glance ore with silver values.

Is a prospect. No returns since 1917, probably idle.

POTTS CANYON MINING CO. **ARIZONA**

From our files it appears that an attempt to sell some of the worthless shares of this concern resulted in F. D. Ryan of 1482 Broadway, New York, and two others, being indicted by the Grand Jury at Baltimore, Md. Supposed to have owned a property in Pinal county.

QUEEN COPPER MINING CO. **ARIZONA**

Property sold to Magma Copper Co., and company liquidating.

QUEEN CREEK COPPER CO. **ARIZONA**

Address: Phoenix, Ariz.

Officers: A. Mackay, pres.; W. C. Foster and F. S. Stephens, v. p.'s; Arthur J. Smith, sec.-treas, with J. C. Devine, J. W. Crenshaw and C. M. Shannon, directors; C. H. Smith, supt., Superior, Ariz.

Inc. May 3, 1916, in Arizona. **Cap.,** $1,000,000; shares $1 par; 564,965 shares outstanding. Listed on New York Curb as a prospect. Equitable Trust Co., New York, transfer agents; U. S. Corporation, registrars. Annual meeting, first Monday in May.

Property: 17 claims on Queen Creek, 1 mile from Superior, Pinal county, said to have a contact fissure carrying gold-silver-copper values.

Development: 800′ shaft, with 1,200′ of drifting on contact vein at various levels. On 600′ level a vein is now being developed that is said to show bunches of $32 galena ore. Company may sink shaft to 1,200′ level.

RED CHIEF MINING CO. **ARIZONA**

Address: Casa Grande. T. P. Copening, mgr.

Last report from this company, June, 1918, stated that a 50-ton Elsol type dry concentrator plant for milling silver-lead ore had been completed.

SADDLE MOUNTAIN MINING CO. **ARIZONA**

Office: 902 Chapel St., New Haven, Conn.

Officers: Frank M. Travis, pres.; C. M. Robinson, sec.-treas.

Inc. 1902, in Arizona. **Cap.,** $2,500,000, increased from $1,000,000; shares $1 par; outstanding, 1,306,585 shares. Bonds: none.

Property: consists only of $300,000 par value of the capital stock of the Gila C. Sulphide Co., which acquired in October, 1909, the property of the Saddle Mountain Mining Co., subject to the latter's authorized outstanding first mortgage bond issue of $1,000,000, all of which was exchanged for an equal issue, $1,000,000 first mortgage 6% bonds of the Gila Copper Sulphide Co., due April 1, 1918, convertible at par into stock of the Gila Copper Sulphide Co., at the option of the bondholder. Interest payable April 1 and October 1. Of this issue, prior to December 1, 1917, $248,600 par value were retired out of earnings, leaving outstanding, December 1, 1917, $751,400, due, principal and interest, April 1, 1918.

For description of the property, see Gila Copper Sulphide Co.

SAINT ANTHONY MNG. & DEV. CO. **ARIZONA**

Address: 1023 Investment Bldg., Los Angeles, Cal. **Mine office:** Schultz, Pinal county, Ariz.

Officers: R. C. Gillis, pres.; A. H. Fleming, v. p.; Epes Randolph, treas.; C. L. Bundy, sec. Horace Pomeroy, gen. mgr.

Cap., $1,000,000; $1 par; 300,000 issued.

Property: the Mammoth and Collins group at Schultz, near Mammoth, and south of Ray, developed by 833′ shaft. A strong vein shows gold, lead and wulfenite ore. An 1,800′ drift on the 700′ level connects both groups.

Equipment: 200-ton concentrator and flotation plant. Shipping gold and molybdenum products at last accounts.

SASCO SMELTER **ARIZONA**

Sasco, Ariz. Operated by A. S. & R. Co.

SILVER KING OF ARIZONA MINING CO. **ARIZONA**

Office: 1 Broadway, New York. **Mine office:** Superior, Ariz.

Officers: A. W. Hillebrand, pres.; John Fowle, v. p.-mgr.; W. F. Ainsworth, sec.-treas., with E. J. Stern, E. S. Booth, G. D. Christy and W. W. Lawhon, directors.

Inc. May, 1916, in Arizona. **Cap.,** $2,000,000; $1 par; 1,999,290 issued; non-assessable. Security Transfer & Registrar Co., New York, transfer office. Annual meeting, second Tuesday in January. Listed on New York Curb.

Financial statement, December 31, 1918, shows: Total assets, $2,271,835, which includes mining property, $2,000,000; equipment and development, $214,017; current assets, $57,818. Liabilities: Capital stock, $1,999,290; accounts and notes payable, $56,784; surplus earned, $18,551; surplus property, $197,210.

Operating account for 6 months ending December 31, 1918, shows: Income, $54,938; operating costs, less ore and concentrates in process, $36,387; net, $18,551.

Property: the Silver King mine, 11 lode claims, over 170 acres, 3 miles from Superior, on the Stoneman grade. It is an old silver mine, popularly credited with a production of $10,000,000, and known to have paid $1,950,000 in dividends up to July, 1887. Opened to a depth of 1,000′, the mine was originally worked for gold and silver, copper ore in the form of tetrahedrite coming in at a depth of about 310′ and continuing to depth of 510′.

Geology: the conditions are described in Bull. 540, U. S. Geol. Survey. Though currently spoken of as a vein, the ore-body is a stockwork, in which the extraordinary rich ores, carrying various silver arsenical and antimonial sulphides of silver, with argentite and stromeyerite, apparently gave out at the bottom levels. Below this level, lower grade but payable concentrating ore, amenable to flotation may be expected and lateral development is also expected to develop more ore. Old records show that copper ore was mined on the 800′ level.

Development: in August, 1917, the mine was reopened, and by July 1, 1918, the 980′ shaft was unwatered to 417′, and production commenced.

Company is sinking a 3-compartment 1,000′ shaft and upon its completion plans erecting a 500-ton mill. The shaft was down 245′ at end of August, 1919, and small veins of ore were being cut.

Equipment: includes Fairbanks-Morse gasoline hoist, Ingersoll-Rand compressor, Cameron pump, 5-ton auto-truck and a 25-ton plant using a Marcy mill and flotation apparatus. The mill started operating in November, 1918, and is said to be recovering 95% of the 20 oz. ore.

SILVER REEF MINE **ARIZONA**

Owned by Frank M. Leonard and associates, 3543 Third St., San Diego, Calif. Former company, the Silver Reef Mining & Smelting Co., dead.

Property: 12 claims, surveyed for patent, including the Silver Reef mines, at Vekol, 12 miles S. of Casa Grande, in Pinal county, Ariz., originally worked for silver ore. Vein 35′ wide, between granite and rhyolite carries 12 to 20 oz. silver ore, also some lead and copper.

Development: by a 375′ shaft and 425′ tunnel.

Equipment: includes a gasoline hoist, air-compressor, and 20-stamp all-slime cyanide plant.

SOUTHWEST INSPIRATION COPPER CO. **ARIZONA**

Mail returned, 1919, from former office, 8 W. Adams St., Phoenix, Ariz. **Mine office:** Copper Creek, Pinal county, Ariz.

Officers: H. H. Temple, pres.; J. J. Sweeney, v. p.-treas.; J. W. Crenshaw, sec.,; C. J. Price, gen. mgr.; also directors, with Louis Huber.

Inc. 1917, in Arizona. **Cap.,** $5,000,000; shares $1 par; non-assessable; 2,500,000 issued.

Property: 69 claims, 1,200 acres, adjoining Calumet & Arizona and Copper State companies' holdings on E., in Bunker Hill district, 12 miles E. of Mammoth, Pinal county, Ariz. Examined by C. J. Price, N. R. Logue and Louis Huber.

Claims are said to show 5 chimney deposits in diorite, also disseminated porphyry. Ore carries copper, gold, and silver.

Development: commenced in May, 1917; tunnel 1,500′ and shaft 400′. Proposed to drive 1,115′ crosscut tunnel, sink 2 shafts and churn-drill at three points. No recent returns.

SUNSET COPPER MINING CO. **ARIZONA**

Address: Hayden, Ariz.

Officers: Geo. H. Parsons, pres.; J. E. Steele, v. p.; Chester Bertolette, v. p.; F. W. McQuiston, sec.; T. A. Ball, treas., with F. M. Pool and E. C. Hight, directors.

Inc. in Delaware. **Cap.,** $3,000,000; shares $1 par; issued 1,570,000 shares.

Property: 14 unpatented claims, in Bunker Hill district, 14 miles E. of Mammoth and 34 miles from Hayden, Ariz. Company also has 12 claims in Riverside mining district said to have gold-silver-copper ore, developed by two shafts, 140′ and 190′ deep, and tunnels, 75′ and 290′ long.

Geology: ore-bearing rock is a quartz diorite that cuts the sedimentaries and volcanic breccias. Ore shoots are found as chimneys, or pipes, from 25′ to several hundred feet in diameter. Ore usually occurs as a filling between fragments of breccia.

Development: by 175′ shaft and 590′ tunnel, said to show a body of 3½% to 5% copper carbonate ore.

Resumed work in May, 1919, and shipping ore in August.

SUPERIOR ARIZONA COPPER CO. **ARIZONA**

Office: 14 Wall St., New York City. **Mine address:** Superior, Ariz.

Officers: Wilber Judson, pres.; D. E. Thomas, v. p.; F. V. Munster, sec.-treas.; above, with F. W. Holmes and A. E. Peterman, directors; W. C. Browning, mgr.

Inc. March 22, 1916, in Maine. **Cap.,** $250,000; $1 par; non-assessable; 180,010 issued. Annual meeting, fourth Monday in May.

Company purchased the property of the Lake Superior & Arizona Mining & Smelting Co., together with some claims formerly owned by the Magma Copper Co., at Superior, Pinal county, Ariz., adjoining the latter company's mines.

Property: 15 patented, 11 unpatented, claims, 323 acres at Superior, in the Pioneer district. Claims show thickly bedded, steeply upturned limestone, resting on quartzite, underlaid by diabase. Several vertical cross fissures cutting both sediments and diabase occur. Ore occurs along contacts of Upper and Lower Carboniferous limestones and at contact of limestone and quartzite especially near cross fissure. Ore which is oxidized to greatest depth reached by development occurs in a gangue composed largely of iron and manganese oxides in which occur bunches of oxidized ore with occasional sulphides. Hope is felt that good grade sulphides may be found in depth.

Development: the principal working is the Charlton tunnel, which for 2,000′ follows the mineralized fracturing along the bedding plane between Devonian limestone and quartzite. This tunnel is 130′ vertically below the Holt tunnel, is connected with the latter by a 165′ winze on the dip of the vein and is 3,000′ long, showing ore assaying up to 30% copper. At the northern end of this long tunnel, there is an incline shaft sunk along the bedding plane at 26° inclination for 1,800′ with short levels at various intervals.

Some development was done during 1917 and 1918.

Production: in 1917 and 1918, 768,673 lbs. copper from 4,130 tons of 10.08% ore, mainly by lessees; 90 tons of 43.78% manganese ore was shipped. Ore extraction still continues on small scale.

SUPERIOR-BONANZA MINING CO. **ARIZONA**

Mail returned, 1918, from former address, J. T. Muller, Superior, Ariz.; reported several months later that property would be reopened.

Officers: J. T. Muller, pres.; Chas. Brittonham, v. p.; H. D. McPhail, sec.-treas., with G. J. Camsler and Geo. Dogan, directors.

Inc. in Arizona. **Cap.,** $500,000; shares 50c par; non-assessable; 485,000 issued.

Property: 6 claims, 110 acres, ½ mile N. of the Magma Copper Co., Pioneer district, Pinal county, Ariz., said to show a fissure vein in diabase, dipping 72° N., with E. W. course. Ore contains gold, silver and lead. Shoot said to be 300′ long.

Development: by shaft to 52′. Only assessment work done in 1916. Shaft sinking to 700′ proposed.

A prospect of no particular merit.

SUPERIOR RAY COPPER CO. **ARIZONA**

Mail returned, 1918, from former address, A. L. Emberson Co., 112 N. Central Ave., Phoenix, Ariz.

Inc. in Arizona. **Cap.,** $1,500,000; shares $1 par; non-assessable; 700,000 issued.

Property: 11 claims in Pioneer district, 30 miles from Florence, and 1 mile from Superior, Ariz. Examined by John Armstrong, in Dec., 1916, who considers that the ground is well within the famous east and west faulting system upon which the great mines of this section have been opened.

Apparently no work of consequence has been done and claims are a pure gamble.

SUPERIOR SAFFORD COPPER CO. **ARIZONA**

Mail returned, 1918, from former address, Miami, Ariz. Mine near Superior, Arizona.

Inc. in Dec., 1916, by A. M. Bernstein, W. D. Wiley and B. W. Fauble, all of Maimi. **Cap.**, $2,000,000; shares $1 par.

Property: in Pioneer district, Pinal county, Ariz., near Magma Extension property. Shaft sinking said to have revealed 8 to 12% copper ore.

Company also had 23 claims, 9 miles W. of Safford, Graham county.

SUPERSTITION CONSOLIDATED MINING CO. **ARIZONA**

General office: mail returned, 1919, from former office, Phoenix, Ariz.

Officers: J. P. Bickell, pres.; Louis Ford, v. p.; A. W. Scott, sec.-treas.-gen. mgr.

Inc. Jan. 7, 1915, in Arizona. **Cap.**, $2,000,000; shares $1 par; outstanding, $500,000. Security Transfer & Registrar Co., New York, transfer office and registrar. Listed on New York Curb as a prospect. Liabilities in Feb., 1915, a 2-year 6% note of $10,000, dated Jan. 20, 1915.

Property: 7 claims, Arizona King group and 2 adjoining claims in the Pioneer mining district, Pinal county, 60 miles E. of Phoenix and 7 miles from a railroad. Said to show schist and intrusive porphyry with a vein outcropping for 3,000′, from 5 to 40′ in width; strike N. W., dip 65° E. The ore is gold claimed to assay from $3 to $48 per ton, with very little copper present.

Development: a 400′ shaft with several hundred feet of workings. Ore reserves not given. A 50-ton flotation mill was built in 1915.

Is considered a meritorious prospect. Evidently idle.

TABLE MOUNTAIN COPPER CO. **ARIZONA**

Near Mammoth, Ariz. Was controlled by Arimex Consolidated Copper Co., now defunct; a Thos. W. Lawson promotion. Fully described, Vol. XI., Copper Handbook.

TORTILLITA COPPER CO. **ARIZONA**

Office: 8 W. 40th St., New York. **Western office:** care Hon. J. B. Wright, 32 N. Stone Ave., Tucson, Ariz.

Officers: Wm. P. Michel, chairman; Robinson V. Thompson, pres.; Thos. Rowland, v. p.; Leon N. Salmon, sec.; J. W. Edward Michel, treas., with Geo. P. Jeffrey, directors.

Inc. March, 1912, in Arizona. **Cap.**, $1,000,000; $1 par; 600,000 issued Annual meeting in January, at the Tucson office.

Company claims to have sufficient funds on hand for continuation of systematic development work. Management said to be in hands of the Eastern Stockholders Committee, a group of 10 stockholders, business men, who, according to their own statements, form "A Committee of Progress and Development—not Grievance." Is controlled by Cameron Michel Co. of New York, who report in May, 1919, "that the property will be put in operation about Oct. 1, 1919, with important changes in the personnel."

Property: 37 claims, 750 acres, about 15 miles N. E. of Redrock, Pinal county, Ariz., includes the Cloudburst and Yankee Girl mines, purchased under foreclosure in May, 1912. Property is an old-time silver producer.

Development: the "Yankee Girl" double-compartment vertical shaft. 12′ wide and 500′ deep, said to show some quartz carrying copper glance and native copper at the bottom; also a large flow of water. A large hoist and compressor have been installed. A N. crosscut was cut 600′ from No. 5 station, with the main ore channel not far distant, where "large volumes of heavily enriched ore" should be encountered.

Equipment: includes an oil-driven air compressor, drills and a gasoline hoist.

Whether the property has a large ore deposit or not has not yet been proven, but reports by various engineers are favorable.

TROY ARIZONA COPPER CO. **ARIZONA**

Address: A. K. Sloan, sec.-treas., 15 Maiden Lane, New York City.

Mine office: Kelvin county, Ariz.

Officers: John F. Galvin, pres.; Calvin Page, v. p.; Brackley Shaw and Henry Rudolph, directors. John C. Devine, mgr.

Cap., $3,000,000; shares $10 par. Company is a reconstruction of the old Troy Copper Co., succeeded by Troy-Manhattan C. Co., which in turn was succeeded by the Troy Consolidated Mining Co., fully described in Vol. IX, Copper Handbook. Operations of all these "Troy" companies proved disappointing.

Property: 85 claims, 1,600 acres, 3½ miles N. E. of Erman, on the Arizona Eastern R. R., known as Troy, Climax and Manhattan groups. The Troy group said to have 12 and Manhattan group 6 veins.

Development: reported to aggregate over 5 miles, including several shafts, deepest 500′, and tunnels; the Pratt tunnel has been re-opened, 1919. Company's engineer stated that while a large tonnage of ore is not blocked out, yet with a moderate amount of work several hundred thousand tons could readily be made available. Examined and reported on by Leon Von Rosenberg, but inspection proves the work very superficial and conclusions, in our opinion, unwarranted.

A 500′ shaft has recently been sunk on the Climax claim, to explore the sulphide zone. Mine is producing and shipping. Teaming costs are high, which makes it necessary to sort ore carefully.

Present management considered good and property promising.

UNITED MAGMA MINES CO. **ARIZONA**

Out of existence, and Harry Lefkovits (name changed in Sept., 1918, to Lefko), with his first aide, R. V. Stuart, were finally convicted in Dec., 1919, of using the mails to defraud the public. A swindle from beginning to end. See Vol. XIII.

WHITE METALS MINING CO. **ARIZONA**

Address: J. C. Devine, mgr., Pioneer, via Globe and Kelvin, Ariz. T. A. Crowe, largest shareholder.

Property: an old silver mine on the south side of the Pinal range, south of Globe. Dumps are said to contain 100,000 tons of $20 ore. Development is under way, and a Doak gas engine and compressor have been installed.

RAY DISTRICT, PINAL COUNTY

ARIZONA & BUTTE COPPER MNG. CO. **ARIZONA**

Address: care Edw. W. McKay, 701 Union Bank Bldg., Pittsburgh, Pa.
Mine office: Ray, Ariz.

Office: G. H. Harn, pres.-mgr. Eva G. Titus, sec.

Inc. in Arizona, 1916. **Cap.,** $1,000,000; par $5; 155,000 shares issued; 45,000 shares in treasury. Shares offered, 1917, at $3; 5,000 offered at $10 in Feb., 1919. Pittsburgh Trust Co., transfer agent and registrar.

Property: 32 clams, 560 acres in one group, on west side of Ray district, Ariz., adjoining Ray Cons. ground. Ore, chalcopyrite and tetrahedrite occurs as cementing material in granite breccia and as boulders and streaks of sulphide in quartz and clay matrix filling crush zone or fault vein in altered Pinal schist cut by wide diabase dikes and intruded by offshoots of the Ray granite mass. Surface indications are regarded as favorable at granite contact, on Overlook claim in S. W. part of group.

Development: by 670′ Overlook shaft with 800′ of workings on 200′, 450′ and 550′ levels. On upper level oxidation has leached the ore; on 450′ level a crosscut 28′ long across the deposit and still in it shows 3.66 oz. silver per ton, 1.46% copper and 50c gold, across a 10′ face. Ore occurs as a cementing material between fragments of granite, as film plates and specks in crushed schist and being primary values should not play out downward. On 550′ level a 150′ drift shows 50′ of milling ore carrying boulders and bunches and streaks of high-grade chalcopyrite ore and tetrahedrite.

The Overlook shaft encountered ore at 412′ that extended down for 30′, assays running as light as 17% copper and 80 ounces silver. Stringers of high grade ore were also cut at 620′ extending down to 670′, where water level was cut.

Tunnel work and several shallow shafts on other claims show values, but conditions are less promising than at Overlook.

Company expects to install new hoist, compressor, drills and pumps and resume sinking and crosscut work in 1920.

Equipment: 15-h. p. gasoline hoist, buildings, etc.

Property regarded as an attractive prospect that has a chance to develop a commercial orebody near the igneous contacts.

BROKEN HILLS MINE **ARIZONA**

Address: L. D. Huntoon, mgr., via Ray, Pinal county, Ariz. Company is developing a lead-silver deposit in the Ray district.

GREAT RAY COPPER CO. **ARIZONA**

Address: C. A. McDonald, Citizens Bank & Trust Co., Bisbee, Ariz.

Property: 44 claims on both sides of Sulphide canyon, about 1 mile W. of the town of Ray, Pinal county, Ariz., adjoining holdings of Ray Consolidated Copper Co. and the western group of the Ray Hercules Co.

Geology: Great Ray is outside the area of secondary enrichment—unlike the developed deposits of the district—but shows abundant copper stains and some copper sulphide in both the granite and schist rocks exposed in the walls of Sulphide canyon. The area of most intense primary mineralization is at least 1,500′ broad and 3,000′ long. This ground warrants drilling to determine the copper content. Recent reports state this is being done.

Considered a speculative mining venture to see if the ground contains a primary deposit with 1% or better copper in it.

LITTLE BOBBIE MINING CO. **ARIZONA**

Office: I. J. Lipsohn, sec.-treas., Phoenix, Ariz. Scott Lintner, mgr., Ray, Ariz.

Officers: W. J. Graham, pres.; J. Pollard, v. p.; S. J. Ross, sec.-treas., above with Geo. Hershman and J. A. Ganz, directors.

Inc. 1917, in Arizona. **Cap.,** $450,000; shares $1 par; 312,500 issued.

Property: 9 unpatented claims, known as the Bisbee group, 175 acres, 1½ miles S. E. of Ray, Pinal county, Ariz., adjoining the Ray-Broken Hill and Ray-Silver-Lead mines.

Ore: silver-lead in limestone, with some gold and copper.

Development: by 300′ tunnel.

Reported June, 1919, that control of company was bought by Ray-Broken Hill Mining Co.

NEW ARIZONA RAY COPPER CO. **ARIZONA**

Address: 115 N. First Ave., Phoenix, Ariz.

Officers: W. A. Stuart, pres.; F. M. Dorsey, v. p.; J. L. Milligan, sec., with Fred. E. Young, L. L. Wallace and W. Laurence Barnard, directors.

Inc. in Arizona. **Cap.,** $1,000,000; shares 10c par; 5,000,000 shares paid promoters for the claims.

Property: 12 claims, adjoining the Ray Consolidated, at Ray, Pinal county, considered to be outside the ore-zone and valueless.

Former company was exposed and denounced by the California Corporation Commission, by the "Mining & Scientific Press," and by the "New York Tribune." The exposé drove the promoting firm out of California and to Phoenix, Ariz., where its business is said to have been bought out by the Arizona Securities & Trust Co.

Arizona Ray was considered a fraud of the worst type.

Nothing new is known of operations, if any, since name of company was changed.

RAY-ARIZONA COPPER CO. **ARIZONA**

Address: 828 Chestnut St., Milwaukee, Wis.

Officers: Fritz Bock, pres.; M. A. McCabe, sec.; Fritz Bock, Jr., mgr., Kelvin, Ariz.

Property: 42 claims, on the south side of the Gila river, opposite Kelvin, shows monzonite porphyry in mineralized granite with impregnations and veins carrying copper ore.

Development: by tunnel shaft and churn-drilling. F. L. Underwood is reported to have financed the company under an option on 51% of the stock for $250,000.

Equipped with Leschen tramway. Lessees shipped several cars of copper ore in 1916 to Hayden smelter. No recent information, probably idle.

RAY BOSTON COPPER CO. ARIZONA

A reorganization of the Kelvin-Sultana Copper Co.

Address: 732 Monadnock Bldg., Chicago, Ill. C. E. Hart, mgr., Box 995, Miami, Ariz.

Officers: A. H. Westfall, pres.; O. M. Gale, v p; G. O. Swarts, sec.; G. P. Baldwin, treas.; C. E. Hart, gen. mgr.; E. P. Worthington, supt.

Cap., $5,000,000.

Property: 21 claims and 3 fractions, 530 acres; all patented but 2 claims and fraction, in Ray-Kelvin district, Pinal county, Ariz., formerly owned by Kelvin-Sultana Copper Co. Company also owns 30 acres of gold and silver lands in Ures district of Mexico.

The Arizona mines were formerly known as the Riverside and Bryan groups, and are across the Gila river from 1½ miles S. E. of Kelvin. Management reports 21 contact deposits, between granite and diorite, of which 5 veins have been developed; reported as 18″ to 6′ wide, and estimated to average 5′ in width, with a generally N. W. trend. The property also was said, formerly, to show a 6′ vein carrying chalcopyrite in the lower workings, from which shipments to the Humboldt smelter returned 8.7 to 10.6% copper. Average tenor of ore in all veins is estimated by the company as 6% copper and 3 to 4 oz. silver per ton. From published reports the deposits appear to be gash veins, pinching out at shallow depth.

Development: by 6 shafts, deepest 590′, and the Hunter and Agnes tunnels, with about 10,000′ of underground work.

Crosscuts on the 540′ level, driven 2,000′ and 1,267′ in Feb., 1916, are reported to have intersected 3 veins.

Equipment: includes a 575 h. p. oil-burning electric plant, a 1-mile aerial tram across the Gila river, to the railway station of Kelvin and a concentrator of 200 to 300 tons daily capacity.

Production: of old company, to end of 1909, was 422 tons of ore, yielding $12,450. Production in 1907 was 45,838 lb. fine copper and 653 oz. silver. Daily shipments of 20 tons to the Hayden smelter were made in summer of 1913. The mill has been closed down until sufficiently large reserves have been blocked out to insure profitable operation. Lessees were working on the surface and have made shipments said to average 8-14% copper.

The new owners are to do several thousand feet of diamond-drilling. Old workings are described in Vol. XIII of this book.

RAY BROKEN HILL MINING CO. ARIZONA

Address: Ray, Ariz.

Officers: Frank Schilling, pres.; H. H. McDonald, sec.-treas., with E. T. Ferguson, W. F. Gordon and Dr. Crawford, directors. Scott Lintner, mgr.

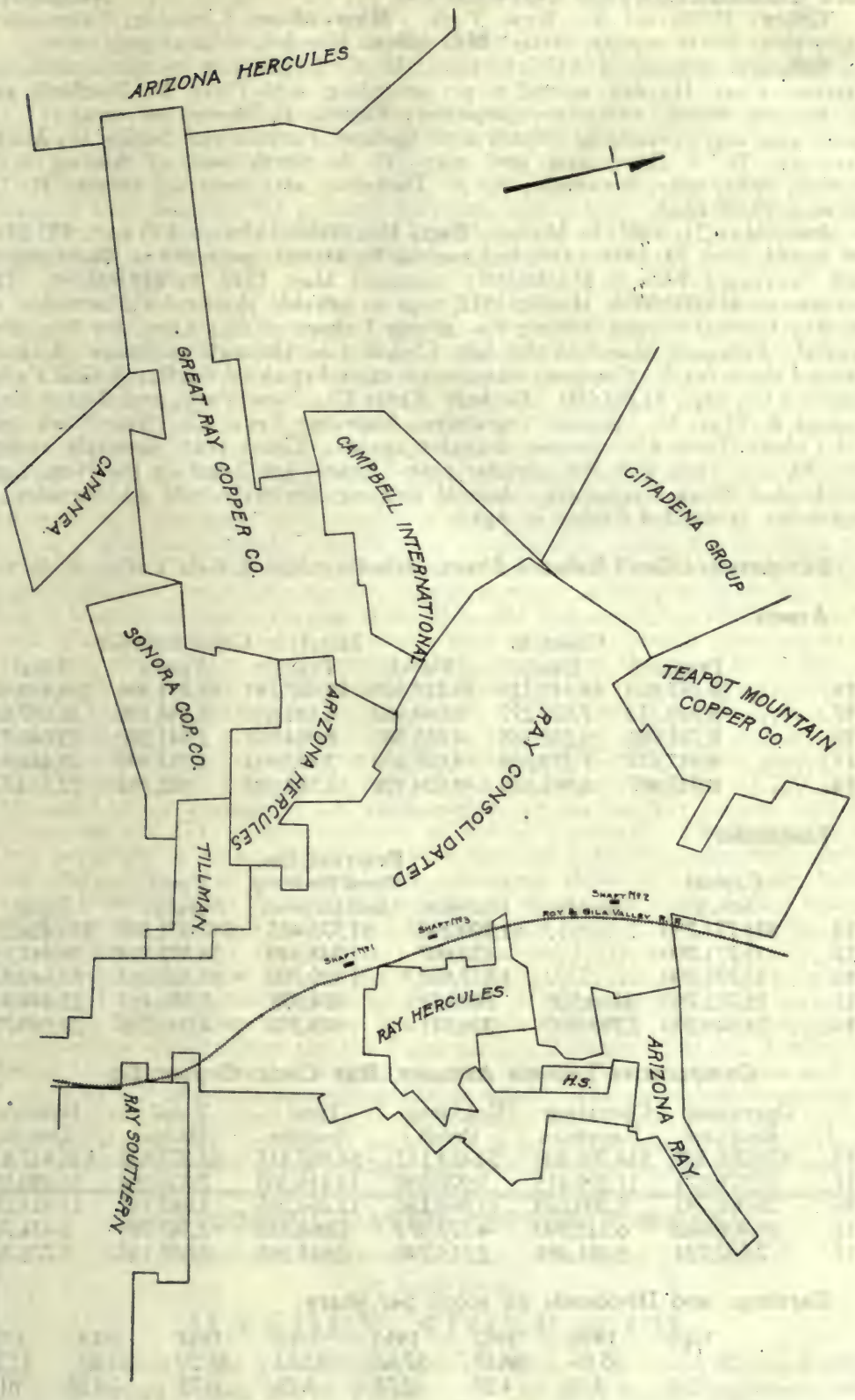
Property: 8 claims, unpatented, adjoins Ray Cons. on the east. In June, 1919, acquired control of adjoining 9 claims of the Little Bobby Mining Co., also 10 claims in the Alma group. The ore is gold and copper.

Development: by a 1,200′ tunnel, June, 1919, said to have cut an orebody 100′ in width.

Reported, Oct., 1919, that work had been suspended on original holdings after an unfavorable report by C. P. Berkey, and L. D. Huntoon.

RAY CENTRAL COPPER MINING CO. ARIZONA

Company conveyed by direct deed all assets to Ray Consolidated Copper Co. in June, 1912.



PROPERTY MAP OF THE RAY DISTRICT, ARIZONA

RAY CONSOLIDATED COPPER CO. ARIZONA

Office: 25 Broad St., New York. **Mine office:** Louis S. Cates, gen. mgr., Ray, Pinal county, Ariz. **Mill office:** Hayden, Gila county, Ariz.

Officers: Sherwood Aldrich, pres.; D. C. Jackling, v. p. and managing director; Chas. Hayden, second v. p.; preceding, with Chas. M. MacNeill and W. Hinckle Smith, executive committee; Eugene P. Shove, sec.-treas.; L. S. Cates, gen. mgr., preceding officers with Spencer Penrose and Seeley W. Mudd, directors. W. S. Boyd, asst. gen. mgr.; C. A. Smith, supt of mines; D. D. Moffatt, cons, engr. for mills; E. A. Thornton, asst. supt. of mines; R. W. Thomas, chief engr.

Inc., May 11, 1907, in Maine. **Cap.,** $16,000,000; shares $10 par; $15,711,790 issued, Dec. 31, 1918. Original capital, $6,000,000, increased to $8,000,000 in 1908; increased 1909 to $10,000,000; increased May, 1910, to $14,000,000. The increase to $16,000,0000, March, 1912, was to provide shares for absorption of the Ray Central Copper Mining Co., giving 1 share of Ray Cons. for 8 of Ray Central. Company absorbed the Gila Copper Co., through exchange of stock, giving 1 share for 3. Company owns entire capital stock of the Ray & Gila Valley Railroad Co. cap., $1,767,100. Bankers' Trust Co., New York, and Boston Safe Deposit & Trust Co., Boston, registrars; Guaranty Trust Co., New York, and Old Colony Trust Co., Boston, transfer agents. Fiscal year, formerly ending June 30, now ends with the calendar year. Shares are listed on the New York and Boston Stock Exchanges. Annual meeting, formerly held 4th Tuesday in September, is the 3rd Friday in April.

Comparative Gen'l Balance Sheet, including Ray & Gila Valley R. R. Co.

Assets:

	Property	Const. & Equip.	Devel.	Metals in Transit	Other Current Assets	Total
1918.....	$8,657,620	$8,141,719	$6,218,529	$4,067,781	$8,791,496	$36,426,070
1917.....	8,719,313	7,927,277	6,044,968	6,101,606	6,944,158	36,047,652
1916.....	8,715,888	9,252,188	4,655,381	8,084,998	2,941,300	33,649,755
1915.....	8,917,573	7,373,768	4,076,250	3,823,834	1,253,492	25,444,917
1914..... ..	8,917,407	6,961,660	4,024,120	1,753,695	912,892	22,569,774

Liabilities:

	Capital Stock	Bonds	Current	Reserves, Ins. Bond Redemp. and Deprec.	Total Surplus	Total
1918....	$15,771,790	.....	$1,109,298	$1,573,483	$17,971,500	$36,426,070
1917....	15,771,790	.....	833,007	1,045,540	18,397,315	36,047,652
1916....	15,771,790	.....	1,037,962	1,519,700	15,320,303	33,649,755
1915....	15,712,790	$160,500	709,132	974,078	7,888,417	25,444,917
1914....	14,549,290	2,708,000	316,911	905,217	4,090,356	22,569,774

Comparative Income Account, Ray Cons. Copper Co.

	Operating Revenue	Operating Expenses	Net Optg. Profit	Total Income	Total Deduct	Balance Dec. 31
1918...	$19,209,311	$14,795,200	$4,414,112	$4,803,455	$5,275,832	$16,417,819
1917...	21,278,071	11,299,415	9,978,656	10,416,303	7,339,284	16,890,195
1916...	20,060,783	8,200,633	11,860,150	12,264,265	4,885,792	13,813,177
1915...	10,498,962	6,125,590	4,373,371	5,004,133	2,345,798	6,434,704
1914...	7,597,724	5,281,484	2,316,240	2,655,163	2,655,163	3,776,368

Earnings and Dividends on stock per share:

	1919	1918	1917	1916	1915.	1914	1913	1912
Earned .....$.....		$3.05	$6.15	$7.66	$2.73	$1.29	$1.49	$1.33
Paid	2.00	3.25	4.20	2.75	1.25	0.75	1.125	nil

The total to Dec. 31, 1919, was $23,825,441.

Present rate, $2 per share per annum, payable quarterly, March 31, etc., at Guaranty Trust Co., New York.

A sinking fund of 10c. per ton of dry ore treated was in effect from 1914 to 1916, increased to 12½c. a ton after 1916. It seems improbable it will ever be needed.

For the first 9 months of 1919 the operating profit was $724,346, plus $616,535 from miscellaneous income. Dividends amounted to $2,365,769, so the net deficit was $1,269,555, including the deficit for the first quarter.

Property: 126 patented claims, 2,143 acres of mining claims, at Ray, 130 acres at Ray Junction for railroad purposes, and a tract of 4,164 acres in Gila and Pinal counties, at Hayden and 21 miles from the mines, for milling and power-plant and tailing disposal; 536.5 acres of this are leased to the A. S. & R. Co. for its smelter.

About 580 acres of the Ray property have been proven to be mineralized, and about 183 acres have been developed, with a certainty that more or less of the additional mineral ground will be found to carry workable deposits.

Geology: The ore deposit is almost identical with that of Miami, and genetically similar to those at Bingham, Ely, and Morenci. It is a flat orebody 150 to 500′ thick, 1,000 to 3,000′ wide and about 9,000′ long, through the property. This zone consists essentially of a highly metamorphosed iron-stained schist, intruded by a granite mass, whose borders and tongues are also mineralized and cut by diabase dikes. A fault east of the orebody brings the orebody against quartzite and limestone, while unaltered schist is found to the west. The silicified and whitened rock is leached to a considerable depth, the oxidized zone being succeeded by impregnations and seams of chalcocite and pyrite. Oxidized copper ores are found near surface, though in much of the ground the top of the belt is leached to depths varying from 30 to 400′ and averaging 225′, this leached zone being succeeded by ore carrying copper sulphides, greatly enriched by the secondary redeposition of chalcocite, latter constituting the main ore value. At the bottom of the orebody the transition from the ore to rock mineralized with primary sulphides takes place in a few feet. This primary mineralization averages about one-half of 1% copper, whereas an average sample of ore on the 50′ level gave 2.4% copper, 3.4% iron, 2.6% sulphur and 90.3% insoluble matter.

The many drill-holes bored have shown an average capping of 240′ depth, succeeded by an average of 118′ thickness of ore, on the Ray proper, with 315′ of capping and 171′ thickness of ore on the Gila ground. The Ray mine has been developed by both underground workings and extensive churn-drill borings. Six churn-drills have been employed, averaging about 50′ each daily, boring several hundred holes to an average depth of nearly 400′ each, with a total of 140,000′ of drilling, holes being bored checkerboard fashion, in 200′ squares.

Development: by shafts Nos. 1 and 2 about 4,000′ apart, and No. 3, the Ray Central shaft, near No. 1. No. 4 Man shaft, 547′ deep, sunk in the western portion of the mine and capable of handling 37 men per trip, went into commission in 1918. There are many less important workings. The ore supply now comes almost equally from the No. 1 and the No. 2 mines. The No. 3 mine furnishes a smaller tonnage of high-grade ore. No. 1 shaft is 400′ deep and has 4 levels at 171′ and each succeeding 100′ in depth. The shafts are connected by a drift, on the second level, which is run for more than 1 mile, practically through commercial ore. By the side of each shaft is an incline shaft, with a series of stairs used by the men and a haulage way used for the hauling of material, the

RAY CONSOLIDATED COPPER COMPANY

Our Statistical Department will furnish complete information on application.

HAYDEN, STONE & CO.

Members New York, Boston and Philadelphia Stock Exchanges.

25 Broad Street, NEW YORK **87 Milk Street, BOSTON**

main shafts being used solely for ore extraction. The greatest depth from which ore is to be hoisted will be about 300′ for years to come, and the greater part of the tonnage will be taken from the 170′ level and above for some years.

The Ray mine, of which the Ray Central or Globe-Isabella mine is now an integral part, has been developed for a maximum width of 3,500′ and length of 8,000′. Total underground workings Jan. 1, 1919, amounted to 134 miles, of which mining operations have destroyed about 69 miles. In 1918 new work totaled 61,711′, compared with 84,915′ in 1917, and 66,863′ in 1916.

Ore Reserves: Dec. 31, 1918, total ore reserves to date were 86,383,642 tons, averaging 2.061% copper and underlying an area of 205.2 acres. The higher grade orebody developed by No. 3 shaft, contained Jan. 1, 1914, approximately 540,000 tons of ore averaging slightly over 5% copper. This tonnage ensures a life of about 24 years on basis of present production, averaging 10,000 tons per day. There is a large area tributary to No. 2 shaft where there are good reasons to expect additional tonnages.

The mine is operated electrically throughout, taking current over a transmission line from Hayden to Ray. There is a crushing plant at the mine, reducing ores to about 1″ size before shipping to the mill.

The company owns and operates its own railway, known as the Ray & Gila Valley, from Ray to Kelvin, the trains continuing over the tracks of the Arizona railway (S. P. R. R.) to Hayden Junction and thence over a branch line, belonging to the Ray & Gila Valley to the Hayden concentrator. This line between Ray and Kelvin is standard gauge and is operated as a common carrier. It has 80-lb. rails, Mogul locomotives and 60-ton steel ore cars. The company has a very favorable freight contract with the Phoenix & Eastern for the transportation of ores partly over that line.

Concentrator: occupies a 4,000-acre site at Hayden, about 16 miles from the mine. In its essential features it is a duplicate of the Garfield mill of the Utah Copper Co.

The mill, of 10,000 tons daily capacity, has eight units, and is so designed that it may be enlarged, on the unit plan. The crushing department has 16 sets of 42x16″ rolls, and 24 six-foot Garfield Chilean mills. Sizing is done by 48 impact screens, and Janney classifiers, and concentration is effected by Garfield roughing tables, Harz single compartment jigs, Wilfley tables, and Isbell vanners. Water, derived from the Gila river and the adjacent hills, is sent to a 4,000,000-gal. reservoir at the mill site through a 30″ pine, by pumps having a capacity of 7,500 gals. per minute.

The mill started in March, 1911, treating an average of 850 tons of ore daily. The concentrates are well adapted to smelting, as regards sulphur and iron contents, only a small amount of limestone being required for fluxing. Concentrates are treated in the Hayden smelter, owned by the American Smelting & Refining Co.

The power-plant at the mill-site, of 10,000 h. p. capacity, supplies electric current for the operation of the entire property. The plant has water-tube boilers, and running four 2,500 h. p. Allis-Chalmers triple-expansion engines, direct-connected to four 1,750 k. w. electric generators. Oil and coal were formerly used for fuel, but a sure and steady supply of fuel oil for the future being uncertain, the company jointly with the Chino Copper Co. and the A. S. & R. Co., took over July 1, 1917, the coal fields formerly owned by the Victor-American Fuel Co., in the Gallup district, N. Mexico. The Gallup-American Coal Co., with capital of $4,000,000, was organized to handle this property.

Production:

	Tons Treated	Cost per Ton: Mine Cts.	Mill Cts.	Total	% Cu.	% Rec.	% Cu. in Cncts.	Lbs. Cu. Rec. per T. Ore	Net Prod. Lbs. Cu.	Cost Cts. per Lb.	Sell. Price Cts.
1919*..	1,224,500	174.50	127.00	.....	1.810	78.00	.....	.....	35,810,399	15.20	.....
1918...	3,411,000	176.00	101.00	.....	1.612	74.92	18.198	24.17	83,599,160	17.695	22.941
1917...	3,560,900	109.00	82.86	.....	1.635	74.53	18.935	24.37	88,582,649	12.649	23.986
1916...	3,332,340	80.078	55.35	$2.46	1.607	72.20	19.91	22.56	74,983,540	10.134	26.724
1915...	2,848,969	62.68	50.86	2.115	1.673	64.11	19.29	21.45	60,388,936	9.497	17.352
1914...	2,427,700	62.42	49.88	2.174	1.760	67.88	19.25	23.89	57,004,281	8.839	13.267
1913...	2,365,296	73.23	51.93	2.284	1.719	66.09	18.55	22.72	52,341,029	9,874	15,201
1912...	1,565,875	77.55	46.88	2.334	1.677	68.28	18.94	22.9	35,861,496	9.828	15.762
1911...	681,519	81.60	59.45	2.65	1.83	63.01	22.04	22.0	14,935,047	10.765	13.08

* 9 months. For 12 months the total was 47,000,000 lb.

Mine cost includes coarse crushing and loading on cars at mine, 6.5c. per ton in 1918. Total cost calculated from income statement includes all operating charges. Cost per pound does not include credits for gold and silver, nor for miscel. income, equal to 0.5c. per lb. in 1918. Low recovery in 1915 due to construction work in mill improvements at a time when the price of copper made it more profitable to overload such sections as were not undergoing repairs.

In 1918 production of silver was 8,395 oz., sold at 97.24c. per oz., and 1.145 oz. gold at $20 per oz.

With the signing of the Armistice, Nov., 1918, the demand for copper ceased abruptly, and to avoid a large surplus of unsold metal, production and operations were reduced approximately 50%, beginning the year 1919. Operating costs have decreased slightly. Production during the last two years has surpassed that of Chino and Nevada Cons., both older mines. The company has more constructive possibilities than any of the four porphyries. Equipment in every department is now practically complete and construction expenditures hereafter will be relatively small.

The tonnage already developed places the Ray Consolidated among the great copper mines of the world, standing sixth in point of ore reserves, with a certainty that the present enormous ore tonnage will be increased, and a possibility that it may be doubled. The management is practically the same as that of the Utah Copper Co., the pioneer among the so-called porphyry mines of the world, and is thoroughly experienced, strong and capable.

RAY HERCULES COPPER CO. **ARIZONA**

Office: 25 Broad St., New York. Mine at Ray, Ariz.

Officers: Frank C. Armstrong, pres.; J. G. Hopkins, v. p.; R. C. Greene, treas.; Wm. P. Maloney, sec. Directors: Frank C. Armstrong, J. G. Hopkins, E. P. Earle, Geo. A. Huhn, W. F. Bartholomew, August Heckscher, Jos. B. McCall. A. A. Wren, gen. mgr.; J. T. Shimmin, mill supt.

Inc. August, 1915, in Maine. **Cap.,** 1,500,000 shares $5 par; 1,263,000 outstanding. Company owns over 99% of the issued Arizona Hercules Copper Co. stock. No bonded debt, no preferred stock. As the 500,000 shares sold at $3.75 yielded $1,875,000, and $1,000,000 was put in the treasury, the difference must represent part of the purchase price.

Property: 207 acres, in the heart of the Ray district, at Ray, Ariz., surrounded by the holdings of the Ray Consolidated Co. Tract shows Pinal schist, in part capped by dacite, conglomerate and wash and invaded by diabase. Ore developed is an extension and part of the Ray Consolidated orebody. It is crossed by a fault with 350′ drop to the east, which fact long retarded development.

Development: in Sept., 1915, Henry Krumb made an examination after drilling 27 drill holes; 17 drill holes showed ore averaging 73.6′ thick over 13½ acres with a 257′ capping. The total ore developed by these holes was 3,428,774 tons assaying 2.36% copper. Ore reserves: recent estimates place reserves at 10,000,000 tons of 2% ore, and a total of 25,000,000 tons is expected.

Company has sunk one 862′ and one 543′ shaft at N. W. corner of property and will mine orebody by methods formerly used by C. E. Addams at De Beers diamond mine in Africa. 125-volt locomotives are used for underground haulage. At first and second levels of No. 1 shaft there are reinforced concrete ore pockets, capacity each pocket, 400 tons.

Equipment: at the mine includes a double-drum, electrically-driven Nordberg hoist, capacity 300 tons per hour; an Ingersoll-Rand class P. R. E. 2, electrically-driven compressor. The coarse crushing plant has one No. 8 Gates gyratory crusher and one set of Traylor rolls, product from here goes to the sampling mill and main ore bin, capacity 5,000 tons. The crushing plant can handle 1,200 tons in 8 hours. The ore is transported 5½ miles to the mill, 3¼ miles over Ray & Gila Valley R. R. to Hercules Junction and from there over tracks of the Ray Hercules Co., 2½ miles to Belgravia, and dumped into a 2,000-ton bin.

The power plant, installed by the McIntosh & Seymour Corporation, has 3 of that company's 1,045 h. p., 164 r. p. m., 6-cylinder, 4-cycle Diesel engines. These engines are direct connected to G. E. Co. 720 k. w., 0.8 power factor, 2,200-

volt, 3-phase, 60-cycle generators. Power is transmitted to mill at 2,200 volts. Water for power plant and mill is obtained from shallow wells along S. bank of Gila river.

Mill: 3 units with rated daily capacity of 400 tons each. First section went into commission August 12, 1918; the third about the middle of September. Equipment includes 3 Marcy mills, 3 Hardinge mills, 15 Deister-Overstrom tables, 42 Callow flotation cells, 9 Dorr classifiers, 3 Oliver filters and 2 Connersville blowers for the flotation machines. The mill was designed for an 80% recovery of total copper content. At present the plant is treating almost 1,000 tons daily. The output has been somewhat hampered because of lack of power, caused by the experimenting necessary with such a large type Diesel engine.

Production: in June, 1919, there was milled daily 854 tons of 1.84% copper ore with a recovery of 75%. In July, 25,487 tons were treated, of which 72% was saved. The year ended August 31, 1919, yielded a total of 4,994,355 lb. of copper. Costs are around 17c. per lb. In September, the output was 800,000 lb.

Since starting milling a year ago, many factors have interfered with regular operations, one being a suit by the Minerals Separation Co. for infringement of patents.

The company started production August, 1918, too late to enjoy the war prosperity of the copper producers. It has therefore had to contend with the listless copper market of 1919. It can easily produce 800,000 lb. of copper a month, or 1,000,000 if crowded, and in a reviving market can soon pay off its debts due to construction costs, increased by war conditions. It is managed by experienced copper men, and has good prospects.

RAY-KELVIN MINING CO. **ARIZONA**

Address: 418 National Bank of Arizona Bldg., Phoenix, Ariz.

Inc., March, 1918, in Arizona, by Wm. E. Cogdell, A. L. Kelly and John L. Pascale, for the purpose of operating a lead-silver property of 24 unpatented claims, 6 miles N. of Kelvin. In Nov., 1918, H. E. Easterday asked that a receiver be appointed for the company. No later information.

RAY SILVER LEAD MINING CO. **ARIZONA**

Address: 215 Noll Bldg., Phoenix, Ariz.

Officers: William McDermott, pres.; J. E. Rowlands, v. p.; J. H. Page, treas.; H. H. Smith, sec.-asst. treas., with A. W. Lautz, directors.

Inc. Dec., 1916, in Arizona. **Cap.,** $1,500,000; $1 par; 723,805 shares outstanding; $94,950 8% convertible mortgage bonds outstanding.

Property: 48 claims, 960 acres, 2 miles E. of Ray, Pinal county, on top of high limestone mountains. Shows replacement deposits of high-grade lead carbonate ore in fissures and along porphyry dikes intrusive in limestone, the ore occurring just above quartzite series.

There are three or four mines on the property, all showing ore.

Production: began in June, 1917, and totaled 2,005 tons shipped to Jan. 31, 1919, contained 4,145,327 lbs. lead, 544 oz. gold, and 20,422 oz. silver with gross value of $270,784. Shipments, June 1 to Dec. 31, 1918, averaged 27.5% lead; shipments in Jan., 1919, averaged 33% lead.

Property leased to Chas. E. Addams, formerly gen. mgr. of Ray Hercules Mng. Co., to May 31, 1920, for half net earnings. First 8 months' operation under lease resulted in earnings of $65,251.

Employs 35 men. Uses over 100 burros for packing ore into Ray. Shipments made to El Paso smelter.

RAY VERDE COPPER CO. **ARIZONA**

Office: 52 Vanderbilt Ave., New York. **Mine office:** Kelvin, Ariz.

Officers: W. B. Duvall, pres.; L. H. Bradshaw, sec.; F. W. Nye, treas.

Inc. Oct., 1919, in Arizona. **Cap.,** $500,000; par $1.

Property: 140 acres, 12 miles S. of Ray, said to show disseminated chalcopyrite in a large porphyry dike, the whole being low-grade copper ore. Management states, Nov., 1919, "Operations are expected to begin shortly."

SOUTH RAY COPPER MINING CO. **ARIZONA**

Office: 52 Vanderbilt Ave., New York. **Mine office:** Kelvin, Ariz.

Officers: A. N. Rice, pres.; F. W. Nye, v. p.; S. H. Bradshaw, sec.-treas.

Inc. 1917, in Maine. **Cap.**, $3,000,000; par $10. Also $300,000 of 3-year 7% notes.

Property: 600 acres, 9 miles S. of Ray, worked 20 years ago under name of "Old Ripsey" and subsequently as the "Norman." Ore is copper, gold, silver. Has a 500′ shaft. Management states, Nov., 1919, "the shafts of the mine were unwatered in June, 1919, and operations are expected to be resumed shortly."

SULTANA-ARIZONA COPPER CO. **ARIZONA**

See Kelvin-Sultana Copper Co., and Ray Boston Copper Co.

UNITED STATES VANADIUM DEVELOPMENT CO. **ARIZONA**

Address: 306 Goodrich Bldg., Phoenix, Ariz. B. S. Wilson, supt., Kelvin, Ariz.

Officers: E. P. Palmer, pres.; O. E. Plath, v. p.; Wm. Turner, sec.-treas., with H. B. Holloway, and W. J. Horspool, directors.

Inc. Dec. 31, 1915, in Arizona. **Cap.**, $1,500,000; $1 par; issued 1,350,000 shares; non-assessable.

Property: 40 claims, 800 acres, 3 miles E. of Kelvin, Ariz. Development by 250′ and 400′ tunnels is said to have opened considerable ore, and early in 1918, a 50-ton mill was completed. The Bryan dry sizing and concentrating process was used; the plant never proved successful.

In May, 1917, H. S. Bryan, of the Minerals Recovery Co. of Denver, reported that a low-grade sample of ore showed 3.68% vanadium, an equal content of "molybdate," gold and silver worth $76.27 per ton and about 48% "metallic" lead. A process had been evolved to treat this ore at Tucson.

Reported in July, 1918, that the Allied Metals Co. of Denver, had taken a 10-year lease on the mine. Property is said to have reverted to the owners after the lease had run for one year.

Late in 1919 mine was to be re-opened, and ore was to be treated by a new process.

SANTA CRUZ COUNTY

AMERICAN BOY MINE **ARIZONA**

Owned by Geo. Clarke, J. Petersen and J. B. David, Patagonia, Santa Cruz county, Ariz., but bonded to A. F. Gross of Duluth, Minn. Harry Armstrong, supt.

Property: 6 claims near Patagonia, shows several veins from 6″ to 18″ wide. Ore contains gold, silver, copper and lead, and is said to average $5 gold, 12 oz. silver and 10% copper.

Development: by an 80° incline shaft, 120. deep and a 370′ tunnel that cuts the bottom of shaft. On the 40′ level 200′ of drifting has been done, on the tunnel level 250′. The small shipments made have consisted of ore extracted by development work. New machinery was being installed in August, 1919.

ARIZONA EUROPEAN MINING CO. **ARIZONA**

Office: Nogales, Ariz.

Officers: Manuel Escalada, pres.; W. M. Schuckman, sec., with Geo. Januel, directors. Jas. Ritchie, supt.

Property: the Buena Vista group, 2 miles from Patagonia, at an elevation of 5,500′, said to show a 6′ ledge of high-grade copper-gold-silver ore.

Development: by shaft 115′ deep and 700′ of drifts. Average of 36′ of drift opened, reported as 2.58% copper. During 1918, shipments of about 50 tons of ore monthly are stated to have carried 12% copper, 40 oz. silver and $3 gold per ton.

Employs 16 to 20 men.

AUSTERLITZ GROUP OF MINES **ARIZONA**

Owned by A. H. Noon, Nogales, Ariz. Under lease and option to Camphius & Rives, of El Paso, Texas.

Property: 5 claims, about 100 acres, in Oro Blanco mining district, Santa Cruz county.

Development: by 150′ shaft and 2 tunnels, 600′ and 300′ long, said to show quartz fissure vein in porphyry assaying from $4 to $40 in copper, gold and silver. Steady work continued during 1918-10. Ore shipments, totaling over

$200,000, said to have been made to date. The property has been an intermittent producer.

BACHMAN-MERRITT METALS CO. **ARIZONA**

A close corporation owned by Dr. O. S. Bachman, Los Angeles; L. J. Merritt, Pasadena, Cal.; and Miss L. M. Kennedy, Nogales. Operates the old Tres de Mayo property, 10 claims, in Palmetto mining district, 14 miles N. E. of Nogales, said to contain vanadinite and silver ores. Main vein is a well-defined fissure in monzonite, with a width of 10 to 50′. Reserves are estimated at 8,000 tons of vanadinite. Shaft, down 129′ in August, 1919, is to be sunk to 600′ and a mill is to be erected.

BLACK EAGLE GROUP **ARIZONA**

Address: C. A. Pierce, Patagonia, Ariz.

Property: 6 claims, 84 acres, in Santa Cruz county, Arizona.

Geology: fissure vein in limestone, dipping 45° N. E., and pitching S. W. Ore occurs as shoots, and said to assay 36 oz. of silver and 1.2% copper. It also carries manganese.

Development: by 110 ft. incline shaft and 600 ft. of workings. Reserves estimated at 500 tons. Only equipment is a 10 h. p. Fairbanks-Morse hoist.

Production: $30,000 received from ore sales during 1918, of which $20,000 was expended.

BLAND MINING CO. **ARIZONA**

Address: Patagonia, Santa Cruz Co., Ariz. Company reported to be building a mill, August, 1919.

BLUE EAGLE MINE **ARIZONA**

Address: John Gleason, supt., Patagonia, Ariz. **Owner:** E. A. Shaw, New York.

A lead-silver property in the Santa Rita mountains, 8 miles N. W. of Patagonia, Santa Cruz county, reported sold to Mr. E. A. Shaw. Planned to commence operations, April, 1918.

BRADFORD MINE **ARIZONA**

See Sonoita Copper Co.

CASANEGA-DALY MINING & REDUCTION CO. **ARIZONA**

Amadoville, Santa Cruz county, Ariz. A. D. Daly, supt.

Property: 7 claims, 140 acres, in the Tyndall mining district, Santa Rita mountains, Santa Cruz county. Sulphide ore said to contain copper, gold, silver, lead and molybdenum, occurs in orebodies 3 to 8′ wide in monzonite.

Development: by 600′ tunnel, said to have blocked out 50,000 tons ore.

Equipment: includes a 50-ton concentrator, that started operating in Dec., 1915. Management planned driving a 1,000′ development tunnel and increasing mill equipment. Presumably idle, March, 1918.

CASTLE BUTTE MINE CO. **ARIZONA**

Address: Patagonia, Ariz.

Under lease and bond to J. C. Miller and H. S. Scheerer of Tucson, Ariz.

Property: 2½ miles S. W. of Patagonia, Santa Cruz county, Ariz. Shaft 65′ deep. Several cars of carbonate ore shipped during 1918. Indications said to be good.

CLINTON COPPER CO. **ARIZONA**

Idle and practically dead.

John F. Campbell, pres., 40 Court St., Boston, Mass.; A. F. Parker, treas.

Inc. in Arizona. **Cap.**, $5,000,000; par $5.

Property: the O'Connor mine, about 20 miles E. of Nogales and ½ mile N. of the Mexican border.

COMET MINE **ARIZONA**

Small producer of manganese near Mowry, Santa Cruz county, operated by John F. Campbell, during 1918. Is a prospect.

COMMONWEALTH DEVELOPMENT CO. **ARIZONA**

Office: Pearce, Ariz. **Mine office:** Patagonia, Ariz.

Officers: Andrew Y. Smith, pres. and gen. mgr.; F. L. Bryant, sec.-treas.

Property: the Commonwealth mine, near Pearce, Cochise county, reported to be shipping several cars of silicious silver-gold ore a week to the

Douglas smelters. Also operating the World's Fair mine (13 claims), near Harshaw, in the eastern end of the Salero mountains, Santa Cruz county. This mine has a 600′ main shaft, with about 2 miles of workings, developing a 8′ orebody, carrying silver-lead ore. The mine has been a shipper since about 1893, of high-grade silver ore, and is credited with past production of about $500,000 worth of ore. Concentrator was installed during 1918, and regular weekly shipments of ore amounting to 250 tons were being milled in Sept., 1919. (See Commonwealth M. M. Co.)

CONSOLIDATED ARIZONA COPPER CO. **ARIZONA**

W. J. Mitchell, supt., Mowry, Ariz.; J. A. Ritsler, pres., Kansas City, Mo.

Property: 12 claims, in Patagonia district, comprising the El Paso and Olive groups; has a 60′ shaft, said to show high-grade chalcopyrite and chalcocite ore. Stock underwritten by Mid-Continent Securities Co. of Chicago.

Equipment: includes 25 h. p. gasoline hoist.

DUQUESNE MINING & REDUCTION CO. **ARIZONA**

Main office: 53 State St., Boston, Mass. **Mine office:** Duquesne, Santa Cruz county, Ariz.

Officers: Geo. Westinghouse, Jr., pres.; H. H. Westingham, v. p.; W. Grosvenor Calkins, sec.-treas.; Murray G. Day, gen. mgr.

Property: the Duquesne or Westinghouse mines, comprise half a dozen mines, 84 claims, patented, 1,000 acres, near the Pride of the West and 5 miles south of the Mowry, in the Washington camp, Patagonia mining district, Ariz.

Mine shows a contact deposit between limestone and granite-porphyry, carrying argentiferous and auriferous chalcopyrite, sphalerite, galena and pyrite, opened by a shaft 650′ deep. The Pride of the West and the Washington mines have large bodies of complex ore which have been the subject of numerous experiments in wet, electrolytic, magnetic, dry and other systems of concentration for many years past.

Development: workings on the Bonanza mine are 650′ deep and the Duquesne shaft is 120′ deep.

Equipment: the Bonanza shaft is equipped with a 50 h. p. electric hoist and an Ingersoll compressor. The Duquesne shaft has a 12 h. p. gasoline hoist. A mill and oil-flotation was installed in 1917.

The mine, in 1917, was shipping to the Douglas, Arizona, smelter, shipments running about 16% copper and 5 oz. silver per ton. Operations in 1917 were very successful, the company's debts being paid off and a surplus acquired. The property and its history, geology, etc., is fully described in U. S. Geological Survey Bull. 582, pp. 321-334, 1915.

In 1919, Curry & Pannick had a lease on the mines, and in August were shipping 400 tons of ore monthly to Douglas. The Phelps Dodge Corporation recently examined the property, which is said to be on sale at $150,000.

ELEPHANT HEAD MINING & MILLING CO. **ARIZONA**

Address: Ben Daniels, pres., Nogales, Ariz. Copper-lead property near Mt. Hopkins, Santa Cruz county, Ariz.

Lands: about 40 miles from Tucson, and 6 miles from the Calabasas railroad, near Elephant Head Butte, in the Santa Rita mountains. A vein, said to have a 40′ outcrop, carries a complex of argentiferous lead, copper and zinc sulphides of low average grade, and there also is a 20′ vein of quartzite, said to give surface assays of $10 gold per ton.

No recent returns. Probably closed down. Mail returned unclaimed, March, 1919.

FLUX MINE **ARIZONA**

Address: F. B. Kollberg, mgr.; Thos. Safford, supt.; John McGregor, sec.-treas, Patagonia, Ariz.

A syndicate of Bisbee and Douglas men are reported to have a 5-year bond for $150,000 on the property from R. R. Richardson, the owner.

Mine was formerly owned by Hardshell-Flux Mng. & Dev. Co., dissolved in 1910. Worked by owner in 1917, and shipping 300 tons of lead-silver ore monthly.

Development: by 130′ shaft and 5,000′ of workings, including a 130′ winze. There is said to be 60,000 tons of carbonate ore assaying 5 oz. silver and 10% of lead, and 40,000 tons of sulphides blocked out.

Mr. Kollberg was building a 200-ton mill using tables and flotation at last accounts. A 100-ton smelter in contemplated for 1920.

HAPPY JACK MINING & REDUCTION CO. **ARIZONA**

Office: 530 Land Title Bld., Philadelphia, Pa.

Mine office: Patagonia, Santa Cruz county, Ariz.

Officers: Alfred W. Barnett, pres. and gen. mgr.; W. H. Barnett, v. p.; Henry W. Scattergood, sec.-treas,; preceding, with Martin Stotz and Theo. Myers, directors.

Inc. Oct., 1908, as successor of Happy Jack Mining Co., in Arizona. **Cap.,** $1,000,000; shares $1 par, fully paid and non-assessable; issued 304,-709 shares.

Property: 9 miles from Patagonia, shows several veins, carrying silver-lead ore with gold and copper.

Development: by 3 tunnels, longest 950′. Total development work, 4,000′.

Has shipped considerable ore averaging 42% lead, 2½% copper, 20 oz. silver and $2 gold. Several hundred tons of concentrating ore reported on dump.

Assessment work only done. Was considered promising in 1917, no news since.

HAVALINA MINING CO. **ARIZONA**

Sold its Santa Nino property, Patagonia mountains, S. W. of Duquesne, Santa Cruz county, Ariz., to J. Wells Smith, Feb., 1913. Property was being developed by 800′ crosscut tunnel to reach a rich copper shoot said to have been found in the mine. Claims said to show molybdenum ore. Litigation has stopped work.

HARDSHELL MINE **ARIZONA**

Address: H. K. Welch, mgr., Patagonia; Mr. Pierce, supt.

R. R. Richardson, owner. Mine formerly worked by the Hardshell-Flux Mng. & Dev. Co., dissolved in 1910. Bond and lease given in 1917.

Ore carries silver, with some lead, copper and gold, containing about 30% manganese. Jig concentrates average 40% manganese, 12% silica, 15 oz. silver, 10% lead. Sinking shaft at last accounts, Oct., 1919, when it was down 400′.

HENRY FORD MINE **ARIZONA**

Owner: J. A. O'Toole, Patagonia, Santa Cruz Co. Company in process of incorporation.

A silver-lead property near Patagonia, adjoining the World's Fair mine of the Commonwealth Development Co. Vein is 2′ wide.

HOSEY GROUP **ARIZONA**

Owned by W. B. Ramsdell and operated by Colin Timmons. J. McDonald, supt., Patagonia, Ariz. See Marguerita M. & S. Co., p. 331.

Property: 7 claims, including the Hosey and Augusta mines, 12 miles from Patagonia. The Augusta has 1,000′ of development showing 3 veins, 3-15′ wide, carrying copper, gold and silver. Assessment work in 1915 opened several rich payshoots and the management is sinking a new shaft about 300′ east of the old one. Equipment includes compressor and machine-drills.

HUACHUCA TUNGSTEN MINING & MILLING CO. **ARIZONA**

Mail addressed to Canille, Ariz., returned March, 1919.

Property located 8 miles from Canille, Santa Cruz county, in the Huachuca mountains, said to be producing some tungsten from a quartz vein 1-5′ wide containing scheelite.

IVANHOE MINE **ARIZONA**

Address: Patagonia, Santa Cruz county, Ariz. Formerly owned by Ivanhoe Mining Co., which has been dissolved. Property now owned by A. H. Ives, of Minneapolis, and J. E. Hurd, who, in 1915, did assessment work only.

Property: the Ivanhoe mine and various claims, 25 in all, unpatented, 500 acres, in the Wrightson district, 4 to 6 miles S. W. of Patagonia, the nearest rail point. The group shows rhyolite, andesite and diorite, with brecciation

zones carrying orebodies, of which 5 are estimated by owners to average 27′ in width, carrying silver chloride ore, gray copper and chalcocite, estimated by management to average 16% copper, 6% lead and 225 oz. silver per ton.

Development: by the 200′ Commercial shaft, with considerable crosscutting, developing, it is said, large bodies of milling ore. There are also several tunnels, with 2,700′ of workings, estimated to show 100,000 tons of ore.

Equipment: includes a 70 h. p. steam plant with a 50 h. p. hoist good for 1,000′ depth. There are 5 buildings, and water is supplied by a 6 h. p. gasoline pump.

Believed to be idle.

LAYMAN SYNDICATE **ARIZONA**

Address: Van Nuys Hotel, Los Angeles, Cal. B. B. Smith, mgr., Patagonia, Ariz. Not an incorporated company.

Property: owned by Jas. M. Layman, consists of 13 unpatented claims, 220 acres, in Harshaw mining district, Santa Cruz county, Ariz., known as the "Blue Nose," and also as the Abe Lincoln mine. The mine has been closed for about 30 years, it is said to have produced $250,000 in lead-silver ore. Developed to 160′ depth. See p. 278, Bull. 582, U. S. G. S.

Present management cleaned out the old shaft, added a new compressor, and by Nov., 1919, was shipping 4 cars of silver ore per week, yielding $1,000 net each. There were 30 men employed.

LOWER CALIFORNIA METALS CO. **ARIZONA**

Owned and controlled by the Sociedad Anonima de Metales, of Mexico City.

Address: F. M. Moore, asst. mgr., P. O. Box 365, Nogales, Ariz.

Property: 100-ton flotation plant, using K. & K. machines, located 3 miles N. of Nogales. Treats custom ores as well as ore from Del Pilar and Los Charcos mines in Sonora, owned by the Soc. Anonima de Metales. During the war was purchasing molybdenum ores. Idle about half the time.

MANSFIELD MINING & SMELTING CO. **ARIZONA**

Office: 317 Ridge Bldg., Kansas City, Mo. **Mine office:** Patagonia, Santa Cruz county, Ariz.

Officers: Frank D. Reasor, pres.; H. A. Sutermeister, v. p.; C. E. Sweet, sec.; Chas. L. Cookson, treas.; preceding with Harry J. Richards, A. W. Safford, and A. E. White, directors.

Inc. May 26, 1906, in Arizona. **Cap.**, $8,000,000; shares $1 par, nonassessable; issued $7,156,905. Bonds, $100,000 authorized, at 6%, all outstanding. Annual meeting second Monday in January. Company owns no mining property, but in the reorganization proceedings, 1914, acquired stock interests in the Ruby Copper Co. and Southern Arizona Mining Co. See Vols. VIII and XI, Copper Handbook, for early history.

MARGUERITA MINING & SMELTING CO. **ARIZONA**

Address: A. R. Grund, pres.-mgr., Patagonia, Ariz.

Property: the Hosey mine and the Trenton-Georgia mines, in the Baca-Float land grant, Santa Rita Mountains, 12 miles W. of Patagonia. These mines have produced some silver-copper and silver-lead ore.

Mine operated by Colin Timmins; see Hosey Group, p. 330.

MORNING GLORY MINE **ARIZONA**

Address: Chas. B. Wilson, owner and manager, Patagonia, Santa Cruz county, Ariz. The Southern Arizona Mining Co. is reported to be developing property. E. R. Shaw in charge.

Property: 12 claims, 240 acres, 12 miles from a railway, in the Harshaw district of the Patagonia mountains. Claim said to show 4 veins 6′ wide in limestone and porphyry, carrying sulphide ore, estimated by owner to average 3% copper, 3 oz. silver, 60c. gold, 35% iron and 35% sulphur per ton. A shoot of zinc-copper ore is reported to have been opened in 1916, from which shipments were made in 1918.

Development: 2 shafts of 80′ and 200′, with about 1,475′ of workings, are estimated by owner to give 50,000 tons of 3½% copper ore blocked out for stoping. Ore is hand-sorted. Crosscut tunnel is in over 700′ with good indications.

Equipment: includes a small hoist.

Production: over 10,000 tons to date. Mine has been worked for over 30 years. Two hundred and seventy-five feet of work done in summer of 1919.

MOWRY MINING CO. **ARIZONA**

Owner: A. J. Hazeltine, Warren, Pa.

Property: 21 patented claims, near Mowry, 12 miles from Patagonia, operated during the Civil War by Lieut. Mowry, who was accused of furnishing lead from this mine to the Confederates. The ores are lead-silver. The mine, closed down in 1907, after producing several million dollars, was re-opened in 1916. Average ore contains about 20% lead, and 20 oz. silver per ton. Reported to have crosscut a lens of ore 25′ wide on the 250′ level, containing carbonates and sulphides. In August, 1919, there were 35 men employed, and in November, the daily output was a carload of lead carbonate and galena daily.

MUMME MINING CO. **ARIZONA**

Office: 1502 S. Flores St., San Antonio, Tex. **Mine office:** Patagonia, Santa Cruz county, Ariz.

Officers: T. E. Mumme, pres. and gen. mgr.; E. J. Mockert, v. p.; H. P. Mockert, sec.; Geo. F. Wieland, supt.

Inc. Sept. 20, 1019, in Arizona. **Cap.,** $100,000; shares $1 par; issued 61,000 shares. Alsc has $10,000, debentures authorized, but unissued.

Property: 7 claims, patented, in the Harshaw district, 6 miles from Patagonia, shows 2 veins of about 7′ average width, carrying ore said to average 9% copper, 22 oz. silver and $4 gold per ton.

Development: 50′ shaft and 3 tunnels, longest 320′. Mine has no power equipment. No returns since 1913.

NEW STATE MINING & REDUCTION CO. **ARIZONA**

Office: 316 New England Bldg., Topeka, Kan.

Property: near Amadoville, Santa Cruz county, Ariz., 26 claims. showing veins said to carry lead-zinc-copper ores, with gold and silver values.

Development: by 150′ shaft with 950′ tunnel.

Equipment: includes gasoline hoist and Ingersoll compressor. Was planning to erect a 100-ton dry concentrator to treat low-grade ores in 1917.

ORO MINE **ARIZONA**

G. B. Williams, owner, 316 Meigs St., Rochester, N. Y. A. J. Fraser, supt.

Property: the Oro mine, 10 claims, unpatented, at Old Glory, in the Oro Blanco district, 30 miles west of Nogales, Santa Cruz county, Ariz. Mine shows 3 parallel fissure veins from 6 to 30′ wide. Vein on which most of the work has been done is 16′ wide, with a 5′ paystreak of silicious sulphide ore carrying copper, lead and gold.

Development: carried on since 1911, consists of a 350′ shaft with 2 levels and ground opened for stoping. In 1916, a drift on vein at 350′ said to have followed a paystreak assaying 3% copper, 5% lead and $20 gold.

Equipment: includes pumps, tramway, mill and dam. Mine has produced about $50,000 worth of ore to 1916.

Owner planned sinking winze and continuing drift on vein at 350′ level in 1916. No later returns.

PATAGONIA MINES & DEVELOPMENT CO. **ARIZONA**

Office: formerly at Patagonia, Santa Cruz county, Ariz.

No information since 1914; probably idle; described in Vol. XIII.

PATAGONIA-SUPERIOR COPPER CO. **ARIZONA**

Subsidiary of Magma Copper Co., 14 Wall Street, New York. Organized October, 1919, to exploit the Three R mine. W. C. Browning, mgr., Patagonia, Arizona.

Property: the Three R. mine formerly owned by R. R. Richardson and A. E. Crepin. From 1912 to 1914, inclusive, mine was worked under option and ore shipped by N. C. Amster of Boston. In August, examined and bonded by W. C. Browning and T. A. Etlinger for the Magma Copper Co. Shipments have ranged from 9 to 12% copper for many years past.

The property consists of 55 claims, about 1,000 acres, unpatented, on the westerly slope of the Patagonia mountains, 9 miles S. of Patagonia, Santa Cruz county, at an elevation of 5,000′.

Geology: Claims show alaskite with small, irregular areas of trachyte and rhyolite porphyries. Ore occurs mainly along several lodes in a N.-S. shear-zone as chalcocite in high-grade shoots and also disseminated low-grade values. The first orebody opened had stopes 70 to 80′ long and 40′ wide, extending from the 50′ to the 400′ level. a second parallel ore-shoot, 100′ from the first, was 23′ wide and carried 8% ore.

Development: the Colossus tunnel, Evening Star tunnel, and the 260′ Colossus shaft, with total underground workings of 10,000′. Practically all the high-grade ore has been mined.

Equipment: includes a 50 h. p. Fairbanks-Morse oil-type hoist at the Colossus shaft, 40 h. p. and 60 h. p. oil-type engines operating individual belt-driven Sullivan air-compressors, dwellings, etc.

RED MOUNTAIN COPPER MINING CO. **ARIZONA**

Property: 60 claims, 1,200 acres, includes the Four Metals mine at Mowry, Santa Cruz county, Ariz. Was worked unsuccessfully by Oscar A. Turner, 1914-15.

Development: by several tunnels, longest 1,300′, said to show pyrite and chalcopyrite ore, assaying from 1-3% copper for over 300′. No recent report.

Idle for years.

RUBY COPPER CO. **ARIZONA**

Office: 317 Ridge Bldg., Kansas City, Mo. **Mine office:** Patagonia, Santa Cruz county, Ariz.

Officers: F. D. Reasor, pres.; E. Theilman, v. p.; C. E. Sweet, sec.; C. L. Cookson, treas., with H. J. Richards, F. P. Greenwood, A. E. White and R. W. Pierce, directors. C. A. Pierce, gen. mgr.

Inc. 1912, in Arizona. **Cap.,** $2,000,000; shares $1 par; issued, 1,735,659; non-assessable. Debentures, $200,000 at 6%; issued, $119,760. Annual meeting, third Monday in January.

Property: the Lee group of 9 claims, 6 patented, about 13 miles N. W. of Patagonia, on Benson Branch of S. P. R. R.

Geology: claims show remnants of Tertiary lavas capping a series of limestones and other sedimentary rocks, altered by metamorphism and underlain by a dense black crystalline rock that carries ore. This rock, though seemingly devoid of crush zones or fissures, contains disseminated particles of chalcopyrite with occasional bunches and patches of high-grade ore assaying as high as 27% copper and 100 oz. silver per ton. This rock also holds kidneys, or globular masses of primary copper, glance and bornite. Ores are estimated to average 6% copper, 12 oz. silver and 11 cts. gold per ton.

Development: by 460′ shaft and a drift tunnel, with about 5,000′ of workings. The shaft is dry, unlike that of the Hosey mine to the N., and the Happy Jack to the S., both in higher ground.

Equipment: includes 30 h. p. gasoline hoist, Cameron pump, and Leyner compressor.

Company has recently prospected its disseminated deposits by a number of churn-drill holes and plans to sink a shaft upon the strength of drill results.

SOUTHERN ARIZONA MINING CO. **ARIZONA**

Officers: H. A. Sutermeister, pres.; F. D. Reasor, v. p.; C. E. Sweet, sec.; Chas. L. Cookson, treas., with A. E. White, Emil Thielman, H. J. Richards, E. P. Greenwood and R. W. Pierce, directors. C. A. Pierce, supt., Patagonia, Santa Cruz county, Ariz.

Inc. 1912 in Arizona. **Cap.,** $4,000,000; shares $1 par; non-assessable; 1,409,079 shares outstanding. Authorized bond issue, $400,000; $84,160 outstanding. Annual meeting third Tuesday in January.

Property: the Sweet group, 23 claims, 3 patented, in Wrightson mining district, 10 miles N. W. of Patagonia, shows gold-bearing copper ore, occurring as contact deposit between granite and monzonite. Mine has 365′ shaft equipped with steam hoist and air-compressor.

See Mansfield M. & S. Co.

STANDARD METALS CO **ARIZONA**

Address: Security Bond Co., 530 Title Insurance Bldg., Los Angeles, California.

Officers: O. B. Bachman, pres.; A. G. Kohnhorst, sec.; W. J. Mitchell, supt.

Inc. in Arizona. **Cap.,** $1,000,000; shares $1 par.

Property: over 1,000 acres, including the Denver, Standard, Tres de Mayo, Bob Lee, Mowry and North Mowry mines, in Santa Cruz county, Ariz. Ore carries silver and lead.

Development: workings said to aggregate 12,000′ to 15,000′. In the Denver, G. R. Hay estimates an output of $400,000 for 10 years. The Mowry has a large past production, and is said to have 100,000 tons on dumps worth $5 per ton net. E. W. Brooks considers the Bob Lee "one of the most promising undertakings of its kind."

It is to be hoped that those interested are not banking too much on past production of the mines. No recent information.

THREE R MINE **ARIZONA**

Acquired in Oct., 1919, by the Patagonia-Superior Copper Co., a new subsidiary of the Magma Copper Co.

TRENCH CONSOLIDATED MINES CO. **ARIZONA**

Address: care of Chas. W. Clark, Jerome, pres.; John Hoy, mgr.

Property: known as the Farrel mine, is near Patagonia and Harshaw, Santa Cruz county, Ariz. The mines were acquired in 1913 by Senator W. A. Clark at a price said to be $250,000. A double compartment shaft has been sunk 600′. Reported that good grade ore has been opened upon the 500′ level.

VICEROY MINING CO. **ARIZONA**

Office: Janesville, Wis. Mine near Patagonia, Santa Cruz county, Ariz.

Officers: Frank H. Baack, pres.; M. G. Jeffris, v. p.; M. O. Mouat, sec.-treas., Janesville, Wis.

Inc. Oct., 1912. **Cap.,** $1,000,000; shares $1 par; non-assessable; issued, $600,000.

Property: 8 claims, unpatented, 164 acres, in the Tyndall district, 20 miles N., N. W. of Patagonia, shows a number of fissure veins, traversing porphyry or following contacts between diorite and porphyry and dipping 45°. The vein is said to range from 6 to 75′ in width. Ores are principally silver-bearing, but show occasional bornite and a little lead ore above the water level, reported to carry from 16 to 199 oz. silver per ton.

Development: by shafts of 40′ and 100′ with about 400′ of tunnel workings in leached ore.

Idle for lack of funds, but company planned to resume operations in 1917, but whether it did we cannot say.

WANDERING JEW MINE **ARIZONA**

Comprises a group of four claims in the Tyndall district on the W. slope of Santa Rita mountains, near Alto, Santa Cruz county, Ariz., owned by M. & L. Lulley and R. R. Richardson. At last accounts G. W. Vanderwalker, supt., and operated under bond and lease by E. B. & W. E. Holt and M. L. Kaiser of Nogales. First shipments made February, 1916.

Development: to 100′ depth by 2 shafts, 300′ apart, drifts and crosscuts aggregating about 2,000′ of workings. Country rock is gray diorite. Vein varies from 6″ to 4′ in width and contains argentiferous galena. About half the deposit is said to be shipping ore, the rest, concentrating grade. Ore is galena from the surface down, but in places contains a little copper carbonate and chalcopyrite. Property has a 75-ton flotation mill.

WORLD'S FAIR MINE **ARIZONA**

Patagonia, Santa Cruz county, Ariz.

Operated by Commonwealth Dev. Co., which see.

YAVAPAI COUNTY

ALADDIN MINING CO. **ARIZONA**

W. A. Kent, mgr., Prescott, Ariz., writes: "I do not feel at liberty to fill out blank you send. All those entitled to receive the information asked for receive it direct." Company had a 5-year lease on Paymaster mine and 8 other claims, the property of the Oriental Mining Co., in Big Bug district, near Poland. Lottie mine of same group has 4,400′ tunnel and 20-stamp mill.

ALGONKIAN MINES CO. **ARIZONA**

Promoted by Cameron, Michel & Co., Inc.

Office: 8 W. 40th St., New York City. **Mine address:** Crown King, Yavapai county. A. J. Heath, mgr.

Officers: Geo. F. Shurtleff, pres.; John B. Frich, v. p.; John L. Schellenberg, sec.; J. Edward Michel, treas., with Ralph H. Cameron, directors.

Inc. 1910, in Arizona. **Cap.,** $1,000,000; $1 par; 402,645 outstanding. Registrar & Transfer Co., N. Y., transfer agent.

Property: 17 claims, 5 patented, 335 acres, in Bradshaw mountains, 4 miles east of Crown King, Yavapai county. Fourteen claims are said to be along a shear zone, paralleling a diabase monzonite contact. The schist is intruded by several porphyry dikes or sheets parallel to the schistosity. Mineralization is said to occur in the porphyry at the diabase contact.

Development: by tunnels and shaft totals 2,400′. The lower or Algonkian tunnel, 1,100′, runs along the dike contact, on the Anaconda claim. For 350′ it is reported to follow the apex of an ore shoot; a raise run from the tunnel to the surface at 322′, is said to be on the orebody. This air shaft continues as a 50′ winze below the tunnel and a drift N. from the bottom shows galena with occasional bunches of glance and chalcopyrite.

On the Sterling Silver claim a small cross vein, recently discovered by new work, said to show 8-10″ of high-grade silver ore, one sample carrying 180 oz. per ton. Property examined by Jas. P. Harvey.

Equipment: old equipment sold. Company officers report intention of building power line and installing electrical equipment.

AMULET MINE **ARIZONA**

C. M. Brown, supt., Walker, Ariz.

Property: in old abandoned silver mine. A new 200′ shaft is being sunk deeper and will enable owners to drift under the old workings.

ANDERSON & BIRCH **ARIZONA**

Property: 2 miles west of Humbolt, Yavapai county.

Reported having made shipments of high-grade lead-silver ore during 1917 and 1918. Milling ore treated by flotation, averaged about $15.00 per ton.

ANGLO SAXON SMELTING & REFINING CO. **ARIZONA**

Officers: J. E. Russell, managing director, Bank of Ariz. Bldg., Prescott, Ariz. Hugh Rose Croup, pres.; Robt. L. Service, sec., with G. G. Lemons, directors.

Inc. 1916, in Arizona. **Cap.,** $1,500,000. The company was to be financed in England.

The corporation had a lease on 200 acres of land from the City of Prescott for a smelter site and had also acquired several water rights. During the war, no active work was carried on. Reported June, 1919, that the company died during the war.

ARGENTA MINING COMPANY **ARIZONA**

E. J. Bessett, Prescott, Ariz.

Property: 13 claims in the Turkey Creek district, said to have a 3′ vein carrying gold and a 6″ streak with silver. Reported under option to E. J. Bessett, at last accounts.

ARGONNE COPPER CO. **ARIZONA**

Box 462, Prescott, Ariz. Mine near Cordez P. O., Ariz.

Inc. 1919, in Arizona. **Cap.,** $500,000; 50c par; 320,000 issued for property. Hall and Finlayson, incorporators. Personal promotion stock held by Arizona Corp. Comm. Company was granted permission to sell 300,000 shares at 50c. in 1919, less 15% selling commission.

Property: 27 claims including the Gil Ferguson group and 4 other claims near the Stoddard mine. Shows a blow-out 20 to 100′ across with 3′ of shipping ore in a 60′ shaft, and 4½′ of 20% glance ore in a new footwall shaft sunk in 1918-19. A promising prospect, bonded in 1919 by Argonne Copper Company, which see.

ARIZONA-BAGDAD COPPER CO. **ARIZONA**

Formerly Bagdad Copper Co.

Office: Suite 926, 111 Broadway, New York City. Mine at Bagdad, via Hillside, Yavapai county, Ariz.

Officers: E. B. Bronson, pres.-treas.-mgr.; L. H. Taylor, Jr., v. p.; Frederick C. Hart, sec.; H. A. Geisendorfer, supt., with Wm. L. Austin, Geo. W. Carpenter, E. A. Julian, H. B. Richardson, F. C. Hart, P. Chrystie, directors.

Inc. March, 1919, in Delaware. **Cap.,** $1,750,000;$1 par: outstanding, 785,000 shares. No bonds. Security Transfer & Registry Co., New York City, transfer office; The New York Trust Co., registrar. Annual meeting, first Tuesday in March.

In Oct., 1912, a 2-year bond on the property was given to the General Development Co. of New York (Lewisohn), and this company at once began drilling operations to develop more ore. Work with 3 churn drills was carried on up to April, 1913, when the bond was relinquished, but a new option on control of the company was taken in Oct., 1913, which has now expired. In order to secure funds to equip property, the Bagdad Copper Co., in 1918, with the consent and approval of its stockholders, sold all of its property to the Arizona Bagdad Copper Co.; 785,000 shares of the new stock were issued to the Bagdad Copper Co. for distribution to its stockholders after two years.

Property: 53 patented claims and 17 unpatented, over 1,000 acres, in the Copper Creek region, Eureka district, Yavapai county, 26 miles by wagon road from Hillside, on the Santa Fé line to Phoenix. The old company had spent over $600,000 on the property in purchase and development.

Development: by tunnels and churn-drilling. There were about 8,000′ of underground workings and 33,255′ of drilling Oct., 1915. In 1911 Allen H. Rogers estimated 4,324,500 tons of ore, averaging 1.93% copper. In 1912 F. H. Clark estimated 4,833,600 tons, averaging 1.934% copper. In 1914 H. A. Geisendorfer made detailed estimates of 6,031,000 tons of blocked ore, averaging 1.77% copper and 7,246,200 tons probable ore, averaging 1.60% copper, a total of 13,277,200 tons of ore, averaging 1.68% copper, underlying 67.88 acres. Average thickness of ore is estimated at 58.4′.

A reconnaissance survey for a branch railroad proves the project feasible, at a cost of about one and a half million dollars, or less, if a narrow gauge road be built. Work planned for 1919-1920 includes a branch railroad, water-power installation, mining equipment and erection of a 200-ton concentration plant, for an initial unit, using flotation equipment. Reported on by A. H. Rogers, W. H. Weed, J. Parke Channing, F. H. Clark, H. A. Geisendorfer and others.

ARIZONA BINGHAMTON COPPER CO. **ARIZONA**

Address: 405 Lexington Ave., New York. **Mine:** Stoddard, Yavapai county, Ariz. Company absorbed the Stoddard Mines Co. and Stoddard Milling Co., described, Vol. XII.

Officers: Wm. H. Reynolds, E. W. Wells, v. p.; Geo. W. Johnson, gen. mgr.; E. V. Davies, supt.

Inc. Feb., 1917, in Arizona. **Cap.,** $1,700,000; $5 par; changed late in 1918 to $2,000,000; $1 par; 1,713,250 shares issued; exchange basis 5 of new for 1 of old. Stock listed on New York Curb. Security Transfer and Registrar Co., New York, transfer agent.

Dividend: an initial dividend of 2c. a share was paid Jan. 20, 1919.

During year ended, May 31, 1919, there was an operating profit of $21,217, changed to a loss of $6,306 on deducting other charges, the result of non-settlement for 1,000,000 lb. of copper on hand.

Property: 10 claims, 6 patented, about 175 acres, in the Copper Mountain district, 5 miles from Humboldt. Mine was discovered in 1882 and re-opened by present company, 1916. The Binghamton mine shows a broad shear zone in green chlorite-sericitic schist. The ore carries chalcopyrite, with little pyrite, in

silicified schist, oxidized to the 600′ level. Main ore-shoot has been opened from the 100′ to 600′ levels, and yields 5% ore, though the mill feed averages but 2.2% copper. Reserves are reported as 100,000 tons 3% ore and 150,000 tons of a lower grade.

Development: by 1,000′ tunnel and 600′ shaft, with about 4,000′ of workings. The new 3-compartment shaft is to be sunk to 1,200′ and was down 900′ in Sept., 1919. At 750′ the orebody is 15′ wide and averages 5% copper. In 1918-19 $38,626 was spent on development.

Equipment: includes double-drum electric hoist, a 10-drill compressor, pumps, and 150-ton flotation mill, to be enlarged to 350 tons. New shaft equipment is to cost $40,000.

Production: during year ended May 31, 1919, the mill treated 36,605 tons of ore yielding 1,873,358 lb. of copper at a total cost of 19.84c. per lb. Concentrates contain about 25% copper; extraction is reported as 92.5%.

ARIZONA CALIFORNIA MINING CO. **ARIZONA**

Officers: Dr. E. A. Butler, pres.; G. W. Lavender, v. p.; H. G. Wilhelm, sec.-treas.; William S. Wilhelm, mgr.

Inc. April, 1915, in Arizona. **Cap.,** $250,000; $1 par; outstanding, $100,000.

Property: 6 claims, 122 acres, patented, in the Hassayampa mining district, 6 miles S. of Prescott, show a quartz vein containing gold, silver, zinc and lead ore.

Developed by the Shamrock and Ruth mines, latter having a 300′ vertical shaft.

Equipment: includes a 10 h. p. hoist and a 40-ton mill, with Huntington mill and Wilfley tables. Mill concentrates said to assay 36% zinc, 55% lead and 30 oz. silver. Driving a 1,200′ tunnel in June, 1918. An oil flotation plant was planned for 1918. Letters returned unclaimed from Prescott in 1919.

ARIZONA COPPER BELT MINING CO. **ARIZONA**

Office: 25 Broad St., New York, N. Y. **Mine office:** Constellation, Yavapai county, Ariz.

Officers: Wm. J. Dilthey, pres.; H. F. E. Gamm, v. p.; R. A. Camp, treas.; E. Rappold, sec.; Samuel Bloom, directors; C. R. Dilthey, supt.

Inc. Feb., 1906, in Arizona. **Cap.,** $1,000,000; $1 par; issued 719,242. No bonds.

Property: 17 claims, exclusive of water right and millsite, in two groups, known as the Texas and the Wren groups, in the Black Rock district, Yavapai county, about 15 miles N. E. of Wickenburg, the nearest railroad station on the Santa Fé Railroad.

The two groups are 2 miles apart and work is mainly on the Texas group, adjoining the Monte Cristo silver mines, some 2 miles nearer the railroad. The working shaft is about 320′ deep; a crosscut on the 300′ level is reported to have cut a mineral ledge more than 50′ wide. The ore carries copper, with gold and silver values, said to assay from $28-$40 per ton. The company has a well-established camp on grounds, 25 h. p. gasoline engine, air-compressor, machine shop and camp buildings.

ARIZONA COPPER-GOLD MINES CO. **ARIZONA**

Office: 1011 Pabst Bldg., Milwaukee, Wis. **Mine office:** Cherry, Yavapai county, Ariz. R. H. Burmeister, pres-gen. mgr. at last accounts.

Inc. Oct. 12, 1903, in Arizona, as Gold Lode Mines Co., and reorganized, April 10, 1906, under present title. **Cap.,** $1,500,000; $1 par. Company thrown into receivership and property acquired February, 1914, by bondholders, who planned reorganization and continuation of development work.

Lands: 17 claims, 340 acres, in the Cherry Creek district, 15 miles N. E. of Humboldt, including the Bugler group of 4 claims. Development: by several short tunnels, and the Leghorn shaft of 600′ depth, with about 3,500′ of workings, on a 2′ fissure vein. The ore apparently averages about 2% copper, with gold values.

Equipment: includes a 40 h. p. hoist, good for 1,000′ depth, and a 3-drill air compressor. A 40-ton mill, at the Leghorn shaft, has a 10′ Lane slow-speed Chilean mill. For early history, see Vol. XI, Copper Handbook.

ARIZONA COPPER MINES CORPORATION **ARIZONA**

Address: F. J. Hobson, mgr., Mayer, Ariz.

Property: the Pentland mine, 1 mile N. W. of Mayer, Yavapai county. Principal mineral is chalcopyrite. Conflicting reports are afloat regarding merit of concern.

Development: by shaft, down 700′ at mid-1919.

Equipment: includes hoist, air-compressor, steam and semi-Diesel engine power-plant. Flotation plant contemplated.

ARIZONA COPPER & MINING CORPORATION **ARIZONA**

Office: Prescott, Ariz.

Officers: A. W. Davis, pres.-mgr.; F. J. Hobson, cons. engr.

Property: 2½ miles N. E. of Mayer, Yavapai county. Reported to have opened up a 10′ vein of commercial copper-silver ore on the 500′ level. Ore averages about 2% to 40% copper, as chalcopyrite, country rock is schist. Shaft 30′ deep, March, 1919, is to be deepened 200′ more.

ARIZONA COPPER QUEEN MINING CO. **ARIZONA**

Address: 814 New York Life Bldg., Kansas City, Mo.

Officers: S. C. Douglass, pres.; E. S. Herider, sec.-treas., with E. J. White, W. D. Coldren, W. Burr Douglass, W. E. Trossell and S. C. Casey, directors.

Inc. July 24, 1907, in Arizona. **Cap.,** $5,000,000; $1 par; 2,641,000 shares outstanding. Annual meeting, first Tuesday in October.

Property: 8 claims, 160 acres, in Yavapai county, about 26 miles S. E. of Mayer, shows a number of narrow quartz veins in granite. The ore is quartz carrying copper sulphides and their oxidation products with fair gold-silver values.

Development: by 325′ shaft and some crosscutting. Shaft in ore nearly entire depth.

Equipment: includes 75 h. p. boiler, 2 hoists, one good for 1,500′, 8-drill compressor and steam power.

The company has been idle since September, 1918.

ARIZONA HILLSIDE DEVELOPMENT CO. **ARIZONA**

Address: 926 Kearns Bldg., Salt Lake City, and Hillside, Ariz.

Officers and directors: E. R. Pembroke, pres.; Philip Clark, v. p.; J. H. Winwood, sec.-treas.

Inc. Sept., 1917, in Arizona. **Cap.,** $1,500,000; $1 par; 934,000 issued. 750,000 syndicate shares under option to W. J. Davis of Salt Lake City. Annual meeting, first Monday in January, Prescott, Ariz.

Property: 730 acres (140 recently purchased) in Eureka district Yavapai county, 30 miles by new road to rail at Hillside; also has 186 acres under option. Examined in April, 1919, by J. W. Neill of Pasadena, California.

Deposit is a fissure vein in a crush or sheeted zone in schist, dipping 40° W. with N.-S. course. Orebody is up to 14′ thick. Ore carries zinc, silver, copper and lead, shipments returning 47% zinc, 5 oz. silver, 4 to 6% lead, and 1 to 2% copper.

Development: work has been concentrated on the Copper King claim, in center of the group, by 424′ incline shaft. Reserves are estimated by Mr. Neill to be 15,000 tons of shipping ore, worth 6.25c. per lb. for spelter, $71.07 per ton gross, also 10,000 tons of second-class ore. These ores carry 47.5 and 30% zinc, respectively. This tonnage is to a depth of 380′. The 400′ level does not show any sulphide ore. Whether the copper content will improve at depth remains to be seen. It is suggested that a winze be put down 200′ below the bottom level, at a point near the raise.

The Rudkins-Pinto claims, 3 miles S. E. of the Copper King, are considered a good prospect for copper; while the Pinafore group, 20 miles from the Copper King, carries zinc and copper.

Equipment: gasoline hoist, compressor, fan, shops, orebins, and living quarters. Power plant is insufficient for deeper exploration and company must be financed for new hoist, etc., if deeper development is to be done to prove the existence of the masses of copper ore indicated by geologic evidence.

ARIZONA MERGER GOLD & COPPER CO. **ARIZONA**

Idle. H. C. Hillwell, S. L. Herron, Henry Reefson, Alonzo Hall, Robert M. Bazel and Geo. D. Birch, directors, at last accounts.

Inc. 1909, in Arizona, as a reorganization of the **Lyon Copper Co.** **Cap.**, $5,000,000 $1 par.

Property: 64 claims, near Mayer, Yavapai county, shows fissure veins developed by a number of tunnels and crosscuts with 250′ shaft.

ARIZONA NATIONAL MINING CO. **ARIZONA**

Address: Humboldt, Ariz.

Inc. July, 1916. **Cap.**, $250,000; increased March, 1917, to $500,000 $1 par.

Operates the Anderson silver-lead mine, about 2 miles west of Humboldt. Has a small mill. Shipped some ore and concentrates in 1917-1918.

ARIZONA PORTLAND MINES, LTD. **ARIZONA**

Taken over by the International Syndicate of Mines & Smelters, which see.

ARIZONA SILVER MINE **ARIZONA**

Owners: F. M. Anderson and Sidney Birch, Humboldt, Ariz.

Property: near Humboldt, Yavapai county, reported to have shipped several cars of silver ore during 1918.

ARIZONA SMELTING CO. **ARIZONA**

Merged with Consolidated Arizona Smelting Co. in 1914.

ARIZONA VICTORY MINING CO. **ARIZONA**

Address: R. B. Cross, treas., Room 916, 30 Broad St., New York.

Company is connected with U. S. Continental Mines Co. (which see), as on Sept. 11, 1919, the latter advertised that there was to be a stock distribution of Arizona Victory shares totaling 25% of the outstanding capital of U. S. Continental on Oct. 1. 1919.

Property: that of Mark Bradley in the Walker district, opened by a 500′ of workings showing gold, silver and copper ore.

ARIZONA VIRGINIA COPPER CO. **ARIZONA**

Office and mine: Castle Hot Springs, Ariz. Selling agent, T. D. Hosmer, 306 Colorado Bldg., Colorado Springs, Colo.

Officers: G. W. Lewis, pres.; E. C. King, sec.-mgr., with George S. Elstrum and George Birdsell, directors.

Cap., $1,500,000; $1 par; outstanding 550,000 shares; including 250,000 shares paid to former owners for property; $20,000 cash still due.

Property: 14 claims in the Castle Creek district, Yavapai county, said to show two fissures, 40′ to 50′ wide, traceable for 3,500′, forming a junction at the N. W. end of the property, on which small prospect holes have been sunk. Now driving two tunnels at depths of 250′ and 350′. Shipments reported of 269 tons ore yielding 15% copper. Wagon haul 32 miles to railroad at Hot Springs Junction.

Reported on by Louis S. Noble.

AZTEC MINES CO. **ARIZONA**

Apparently dead,. If so, R. I. P., as it is ill form to criticise the defunct. See Vol. X of the Copper Handbook.

BAGDAD COPPER CO. **ARIZONA**

Name changed to Arizona Bagdad, which see.

BANNIE MINING CO. **ARIZONA**

R. M. Garrett, gen. mgr., Prescott. W. L. Comer, supt., Prescott, Ariz.

Property: in Walker district, about 20 miles S. W. of Prescott, company reported to have let contract to sink shaft from the 200′ to the 500′ level, and to be installing boiler and 5-drill compressor.

BEE HIVE GOLD CO. **ARIZONA**

Office: Hotel Zeiger, El Paso, Texas. Chas. Zeiger, pres.

Cap., $100,000; 25c par.

Property: 9 patented claims, adjoins the Octave mine, near Congress Junction, Weaver mining district, Yavapai county. **Ore** is quartz carrying gold values in quartz vein on contact between granite and schist.

Management claims to have spent $60,000 in development work, driving tunnels, 1,000′ and 2,000′ long respectively, and to have 10,000 tons of $8 ore on the dump besides 500,000 tons in sight and blocked out above tunnels and between two winzes sunk below the tunnel level.

Equipment: engine, compressor and drills.

Reported idle 1918-19.

BEEMER CONSOLIDATED GOLD & COPPER CO. **ARIZONA**

Owns the Stormcloud Mine at Mt. Union, 12 miles S. of Prescott, Yavapai county, Ariz. Idle.

BELCHER MINE **ARIZONA**

Formerly part of the Belcher Mining Co., but bought at tax sale by George Demain, Prescott, Ariz.

Property: 5 claims including the Belcher, Mammoth and the Eugene in the Big Bug district, 13 miles south of Prescott. Vein carries gold and silver, reported to average $5.90 per ton.

Said to be under option to John R. McEwen and E. C. Evans representing Phoenix parties, for $100,000.

BELCHER MINING CO. **ARIZONA**

Defunct and assets reported sold for taxes. Fully described, Vol. XII. See Belcher Mine and Red Rock Mine.

BIG BLUE MINING CO. **ARIZONA**

Mail returned unclaimed, March, 1919, from Constellation, Arizona.

Inc. 1911, in Arizona. **Cap.,** $1,000,000; $1 par. Col. E. F. Brown, owner; J. A. Caskey, supt.

Property: the Big Blue and Copper Prince mines on the Hassayampa river, 14 miles from Wickenburg, Yavapai county, showing fissure veins in schist, that yield high-grade silver-gold-copper ore.

Development: by 2 shafts, connected on 200′ level, drifts, crosscut and tunnels.

Equipment: includes crusher, pump, gasoline engine, hoisting plant and a concentration mill. Probably idle.

BIG BUG COPPER CO. **ARIZONA**

Office: Mayer, Ariz.

Officers: Frank Thornton pres. gen. mgr.; Carl Raab, v. p.; A. E. Rice, sec.-treas.; Uri Embody, asst. sec.-treas.; with Marshall Stoddard, directors.

Property: 6 claims, 5 miles east of Mayer, Yavapai county; 21 claims adjoining the Blue Bell, 2 near the smelter at Mayer, and 2 on Copper mountain.

Development: work on the Copper mountain property consists of shaft now 100′ deep, reported in ore assaying from 15 to 45% copper. Ore is a sericite schist containing lime spar shot through with chalcopyrite and black oxide of copper. A 30′ shaft, 1,000′ away, is stated to show the same ore with more glance and gray copper. Machinery was erected in Aug., 1919. Property attracting attention and is regarded by competent engineers as promising.

BIG BUTTE COPPER CO. **ARIZONA**

Address: H. E. Shumate, sec., Prescott, Ariz.

Officers: Geo. L. Reed, pres.; Ed. Shumate, v. p.; Geo. C. Ruffner, treas.

Inc. April, 1917, in Montana. **Cap.,** $1,500,000; $1 par.

Property: 43 claims in Copper Basin district, 12 miles from Prescott. developed by tunnel, shafts and open cuts, from which some copper and silver ore has been shipped. Reported driving tunnel to cut vein at point below rich outcrop.

BIG COPPER CHIEF CO. **ARIZONA**

Address: care Thomas Boyd, pres., Mound City, Ill.; S. E. Jordan, sec.-treas., Phoenix, Ariz.; R. E. Grace, v. p. **Mine address:** Canyon, via Bumblebee, Ariz.

Property: the Jasper N. Nellis groups, 1½ m. S. W. of Bumblebee. Yavapai county, shows schist mineralized by copper glance, etc., in a zone 300′ wide.

Developed by 50′ shaft, 250′ tunnel and many pits.

BIG DOME MINES **ARIZONA**

Owner: C. Benjamin Hayes, care Walker Stage, Prescott, Ariz.

Property: 4 patented claims, about five miles W. of Prescott, Walker district, Yavapai county. Reported showing an 8′ fissure vein in prophyry and schist, with gold, silver and lead values from $8 to $200 per ton in a 10-inch streak. Developed by vertical shaft 85′ deep, equipped with 3 h. p. gasoline hoist made by owner, small compressor and pump.

Expended $1,800 in 1918; plans to continue sinking during 1919.

BIG LEDGE COPPER CO. **ARIZONA**

Office: 512 Sellwood Bldg., Duluth, Minn., and 61 Broadway, New York. **Mines** at Big Bug (Huron P. O.), near Mayer and Humboldt, Yavapai county, Ariz.

Officers and directors: Milie Bunnell, pres.; M. G. Rodearmel, v. p.; mng. director; J. A. Percival, v. p.; A. L. Warner, sec.-treas.; with S. S. Titus, J. B. Cotton, directors. W. W. Lytzen, mgr.

Company is the successor of the Big Ledge Development Co.

Inc. in Arizona, Jan. 20, 1915. **Cap.,** 3,000,000 shares; par value $5; fully paid and non-assessable; increased from $1,500,000, Aug. 31, 1917; outstanding., Dec., 31, 1918, 2,865,587 shares. Listed on New York Curb. The Development company was converted into an operating company, Feb., 1916, the name being changed to Big Ledge Copper Co. and the par value of shares increased to $5, the number of shares remaining the same and exchange made share for share; 200,000 shares of this new issue were paid for the Tredwell or Great Western smelter at Mayer, said to be a junk heap. In June, 1918, new interests, known as the Interstate-Callahan crowd, took control.

The annual report states that all payments on the Henrietta and Butternut mines have been made; on O'Brien, Laurene and Treasurer groups only $13,500 remains unpaid. Shipments of ore for 6 months realized $102,278, a sum sufficient to cover operations and meet deferred payments.

Property: consists of 3 groups of claims aggregating approximately 1,900 acres. The Black Hills group consists of 43 unpatented claims about 4 miles east of Humboldt, Ariz. The Butternut group consists of 2 patented and 22 unpatented claims; the Henrietta group consists of 7 patented and 7 unpatented claims. In July, 1919, the Good Luck group of 6 claims was purchased for $30,000. They are said to be promising.

There is a spur of the railway line to the Henrietta orebins, and a 3,800′ aerial tram, costing $12,000 was partly erected in 1917, to convey Butternut ore to the railroad, but was not completed June, 1919.

Henrietta Mine

This property shows a fissure vein averaging 5′ thick, cutting through hornblendic schists near a diorite intrusion. The vein carries several shoots whose ore contains copper-pyrite with pyrite and zinc sulphides in quartz. The claims cover 4,000′ along the Henrietta vein and a considerable distance along a split or intersecting vein. The ore shoots so far developed an average width of 2′ of ore reported to average $20 in value.

Development: comprises a main haulage way, 2,300′ long called the Henrietta, or lower tunnel. From this level the Le Duc shaft has been sunk 650′ below the tunnel floor at a point of 2,000′ from the portal. A new double-drum electric hoist good for 1,500′ was installed in 1919, and the shaft is to be sunk to 850′ This shaft has 3 levels on the vein at 300′, 450′ and 650′ below the tunnel.

Still farther west and over the hill workings, made in former years, and recently reopened, comprise shaft No. 1 with hoisting equipment to 300′ depth and by No. 2 shaft to 450′ level and below. An old upper tunnel 327′ above the Henrietta is connected with it by a raise. At 150′ below the main tunnel, the Henrietta vein is opened by over 550′ of drifting. This will eventually be connected with the west workings noted above.

An interesting vein, the Invincible, meeting the Henrietta where the

Le Duc shaft is sunk, shows several inches of high-grade ore, making a workable ore shoot at the intersection. This vein is reported to be opened by a 100′ drift south on the 150′ level of the Le Duc shaft, with an upraise to the tunnel. The Henrietta vein is reported to be about 2.5′ wide on the 300′ and 4.5′ wide on 450′ level, values varying from $15 to $40 per ton.

The Butternut Mine

This mine has a zone of silicified, pyritized schist over 20′ wide, in which large lenticular masses of pyrite occur, showing low average values in copper and silver. A foot-wall band 2′-3′ wide carries high zinc content. The mine output will, it is believed by us, average less than 2% copper, being largely iron pyrite and quartz. This does not accord with the press reports sent out by the LeDuc-Batre clique of 48′ of 4% ore on the 300′ level, and of 10% ore on the 425′ level.

Development: includes two old 1-compartment shafts, only 150′ apart, one 300′, the other 425′ deep, and the new 3-compartment, Batre shaft 98′ deep. Principal development is on the 300′ and 420′ levels, drifts running along the vein showing 6′ to 12′ of pyrite ore. Mine has electric power, compressor, hoists, etc., and aerial tram 3,000′ long will take ore to the railway.

The Black Hills or Big Ledge group of claims, 4 miles east of Humboldt, comprises an extensive acreage of land not considered worth paying taxes on.

Opinion: in Volume XIII an opinion was given based on a careful examination and report on the property made by our Mr. Weed. Since then Walter Lytzen, an engineer formerly of Butte, Mont., is reported to have made a more optimistic report of the present and future of the company. This report has not been made public, nor furnished this office. Personnel of the company is worthy of respect, but company will have to live down its former reputation, by developing ore and adhering to facts, if it is to get public confidence.

BIG LEDGE DEVELOPMENT CO. **ARIZONA**

Merged into Big Ledge Copper Co., which see.

BIG PINE CONSOLIDATED MINING CO. **ARIZONA**

Prescott, Ariz.

Officers: A. Bjorkman, pres.; Richard Lamson, sec.; A. Bergquist, treas.; with Felix Durocher and C. H. Dunning, directors. C. H. Dunning, supt.

Inc. April 30, 1915, in Arizona. **Cap.**, $500,000; shares $1 par; outstanding, $400,000. Annual meeting 1st Monday in April. Commercial Trust & Savings Bank, Prescott, registrar. Is a consolidation of the Big Pine Mng. Co., and the Lake Superior & Western Mng. Co., each of companies receiving 200,000 shares for its property.

Property: 14 claims in Senator district, 12 miles south of Prescott.

Ore: gold occurs in 3 parallel veins, which cross the claims.

Development: by 7 tunnels, principally on a vein claimed to show ore for 700′ in one tunnel, 1,100′ in a second, 1,600′ in a third, and 400′ in a fourth. Company claims ore reserves of 10,000 tons, average grade $9 per ton.

Mill: the 100-ton cyanide plant of the Mascot mine, Lake Sup. & Western Co. was moved to the Big Pine property and erected near portal of tunnel No. 6. Electric power is obtained from the Arizona Power Co. H. C. Shotwell, who sampled the mine and assisted in the promotion of the company, reported that there was ample ore of milling grade to keep the mill supplied, but mill returns from two months' run were unsatisfactory owing to unexpected low grade of ore and mine was shut down for a while. Reported April, 1918, to have resumed operations and repaired damages caused by fire.

BIG REEF COPPER CO. **ARIZONA**

Office: Mayer, Ariz.

Officers: John Frank, pres.; Dell Riggins, sec.-treas.

Inc. in Ariz. **Cap.,** $1,000,000; $1 par; 519,997 shares in treasury.

Property: 19 claims, 380 acres, located 2¼ miles from Mayer, in Big Bug mining district, Yavapai county, Ariz. The mines of the Cons. Ariz. Smelting Co. and Big Ledge Copper Co. are but a few miles distant. Claims cover an area of Yavapai schist traversed by a wide zone of silicification containing disseminated copper ore chiefly oxidized, with segregations in quartz veinlets.

Development: about 300′ of shallow work has been done to date and chalcopyrite ore reported shown in 60′ shaft. Property favorably reported on, 1917, by J. H. Shockley, of New York.

Treasury issue of 50,000 shares offered the public, April, 1917, at 35c a share, proceeds to be used in developing property to 200′ depth and drifting 1,900′ north to get under 100′ ledge seen on surface. Is regarded as a promising prospect.

Idle, 1918. Expects to resume soon.

BIG SEVEN GROUP **ARIZONA**

Near Harrington, Yavapai county, Ariz. Mine, developed by 1,200′ tunnel, shows a well-defined vein with high value in gold, silver and copper.

Mail returned unclaimed, March, 1919; presumably idle.

BLACK CANYON MINING CO. **ARIZONA**

Address: Claude Baker, gen. mgr., Turkey, Yavapai county, Ariz.

Officers: W. A. Moses, pres., Kansas City, Mo.; A. L. Harroun, v. p.; Edna Harroun, sec., Kansas City, Mo.

Property: the Black Canyon, or J. D. Thompson mine, 10 miles south of Mayer and 2 miles from Turkey. Claims show a vein reported as 8-16′ wide, opened by 800′ drift, with 300′ back. Ore carries silver, lead and zinc and is of milling grade.

A flotation mill was planned for 1918. No recent returns.

BLACK CHIEF COPPER CO. **ARIZONA**

Mine near Dewey, Yavapai county, Ariz. John Milligan, pres.; J. M. Sullivan, Welsh, La., v. p.-mgr.; Eugene Milligan, sec.-treas.; preceding officers are the directors.

Inc. 1908, in Arizona. **Cap.,** $2,000,000; $1 par; 1,170,000 shares issued. Annual meeting, 2nd Tuesday in July. About $30,000 expended to date.

Property: 6 claims, 10 miles south of Jerome, known as the Uncle Sam group, has tunnel, 200′ shaft, drifts and crosscuts, with a total of 1,300′ of underground workings, showing ore said to give assays up to 25% copper, $4 gold, $3 silver, 6% zinc and 10% lead. Has a hoist and 2 pumps.

BLACK DIAMOND MINING & DEV. CO. **ARIZONA**

Address: J. Irwin, P. O. Box 403, Prescott, Ariz., supt.; .C N. Brown, mgr.

Property: located in the Walker district, 7 miles south of Prescott said to be producing gold-silver-lead ore from a vein 24-36″ wide, worth $50 per ton. Shaft 200′ deep with short drifts on the 100′ and 200′ levels. Report purchasing steam hoist, compressor and pumps. Intention is to sink to the 250′ level and to build small mill.

BLOCK MINES CO. **ARIZONA**

Address: Prescott, Ariz.

Officers: A. J. Head, pres.; E. Block, v. p., treas.-mgr., with H. Brinkmeyer and M. Goldwater, directors.

Inc. August, 1913, in Arizona. **Cap.,** $1,000,000: shares $1 par; 500,000 shares in treasury.

Property: owns the Billy Boy and Christmas group of mines on the Hassayampa river, Yavapai county. Billy Boy mine developed by 225′ tunnel showing 14″ paystreak carrying gold, silver, lead and copper ore, said to assay $70 per ton.

Is a prospect with some merit but needs financing and competent management to prove its possibilities.

BLUE BELL EXTENSION COPPER CO. **ARIZONA**

Office: L. A. Denman, sec., Humboldt, Arizona. **Mine address:** C. J. Murdock, mgr., Mayer, Ariz.

Officers: J. E. Garber, pres.; C. J. Murdock, v. p. and mgr.; L. A. Denman, sec.

Property: adjoins the Blue Bell, on south. Was sinking shaft 1919 in expectation of finding ore on an extension of the Blue Bell vein of the Consolidated Arizona Smelting Co. of Humboldt.

BLUE BELL MINE **ARIZONA**

See Consolidated Arizona Smelting Co.

BONNIE MINING CO. **ARIZONA**

Address: R. M. Garrett, Prescott, Ariz.

Mine on upper Lynx Creek, Yavapai county, Ariz., is an old one reopened in 1916. The shaft is nearly 300′ deep. Drifts will be opened on the 300′ level to connect with the orebody. The ores formerly carried gold-silver values, but are now mined for copper.

BRADSHAW COPPERMINES CO. **ARIZONA**

Office: 229 Broadway, New York City.

Officers: W. J. Peterman, pres.; John J. McNamara, sec.-treas. and supt.; J. G. M. Browne, asst. sec.-treas.

Inc. Dec., 1916, in Arizona.

Property: 21 claims near the Senator mine, Copper Basin district, Yavapai county.

It is said that this is a rank promotion floated by a New York house, investigation proving that the company did not own the mines; that over $17,000 was missing from the treasury, and that the officers were merely dummies acting for a clever crowd of apparently unscrupulous men.

Reported June, 1915, that Mr. Alex. Ratcliff, apparently the real owner, had taken over the property of the now defunct Bradshaw copper mines, intending to operate the mines.

BRADSHAW REDUCTION CO. **ARIZONA**

Office: Crown King, Ariz.

Officers: F. S. Viele, pres. and treas., Prescott; D. B. Gemmill, sec. and mgr., Crown King; J. F. O'Brien, F. W. Stehr, G. D. Morris, directors; Mark Gemmill, supt. **Transfer office:** Prescott, Ariz.

Inc. Aug., 1916, in Arizona, to take over properties of the Yavapai Cons. G. S. C. Co., and to establish a custom mill at Crown King and Old Tiger mines. **Cap.,** 1,000,000 shares; $1 par; non-assessable; 400,000 shares outstanding; no bonds. Annual meeting in August.

Property: 78 claims, 34 patented, about 1,500 acres, includes the Wildflower and Crown King mines.

In 1916 the 480′ Crown King shaft was retimbered. Two upraises, 40′ and 60′, have been made on the orebody 600′ from the shaft on the 480′ level, blocking out 20,000 tons of $20 ore. According to old reports there is between 40,000 and 60,000 tons of similar ore blocked out.

Equipment: company has rebuilt 150-ton Crown King mill and a 2-mile tramway between it and the Wildflower mine and will remodel the mill at the Old Tiger mine.

Company made considerable money treating the old tailing dumps of the district and evolved a process which promises to be equally successful with the Wildflower ores. It is the only important producer of the district; has capable management, and directors able to finance the company's undertakings.

Reported closed down 1919, owing to high costs.

BROOKLYN ARIZONA MINING CO. **ARIZONA**

Address: care of J. B. Hill, sec., Andover, Mass. Mine near Mayer Yavapai county, Ariz. Benj. B. Tuttle, v. p.; Jas. S. May, treas.

Inc. March, 1907, in Me. **Cap.,** $2,500,000; shares $10 par; non-assessable; fully issued. Bonds authorized $500,000; about $75,000 outstanding.

Was promoted by the American Securities Co. Annual meeting first Wednesday in April.

Property: 82 claims, about 1,600 acres, including the Brooklyn group of 14 claims, in the Squaw Creek district, about 20 miles S. E. of Mayer, carries auriferous and argentiferous copper sulphides.

Development: by 750′ main shaft and 2,500′ tunnel.

Equipment: includes compressor, double-drum hoist, 3,000′ cable and Partridge smelter. Former rank mismanagement fully described in Vols. X and XI. Company reported in new hands, 1915, but no later returns received.

BUCKEYE COPPER & GOLD MINING CO. **ARIZONA**

Bankrupt. Property near Turkey, Yavapai county, under execution on a judgment.

BUCKEYE GROUP **ARIZONA**

Address: Sam Parker, Turkey, Yavapai county, Ariz. He and others bought the mine, formerly owned by the Buckeye Copper & Gold Mining Co., under execution of judgment.

Property: 35 claims, 720 acres and a 20-acre smelter site, in 3 groups, is 2 miles from Turkey, in Black Canyon district of Bradshaw mountains. Claims show chloritic schists and diorite, carrying fissure veins with occasional native copper and malachite, but mainly azurite, chalcopyrite and bornite, estimated to average 4% copper, 3.5 oz. silver and from a trace to $6 gold per ton.

Development: 726′ two-compartment shaft on the Columbia claim, a 520′ two-compartment shaft on the Sullivan claim, with 2 other 200′ shafts, various pits of 10 to 40′ depth and tunnels of 87′ and 314′, with about 5,000′ workings.

Equipment: includes 15 h. p. and 40 h. p. gasoline hoists a small air compressor and several mine buildings.

Property idle in June, 1919, but a deal was pending for a bond and lease.

CACTUS QUEEN **ARIZONA**

Office: Phoenix, Ariz. **Mine office:** Congress Junction, Ariz.

Officers: H. H. Barbee, pres.; H. Borders, v. p.; A. G. Barbee, mgr.; with P. B. Wing, P. A. Hildebrand, R. H. Carrick, directors.

Inc. 1906, in Arizona. **Cap.,** $5,000,000; shares $1 par.

Property: 130 claims, located about 50 miles west of Congress Junction, Yavapai county. Developed by shaft 200′ deep, drifts on this level are reported to be in ore averaging 6% copper with some gold. Reported on by E. A. Ritter.

CASH MINE **ARIZONA**

Address: Prescott, Ariz.

Property: leased to N. E. Getchell, Maxton, Yavapai Co., Ariz., shows veins with gold-silver-copper-lead ore. Developed by a shaft with extensive workings.

Equipment: includes a 10-stamp mill. Six men employed. Shipments of concentrates made in 1915, but more since.

CASTLE COPPER CO. **ARIZONA**

Property: 11 claims, known as the Dunkirk or Mt. Tritle group, 12 miles south of Prescott, on the southern slope of Mt. Tritle, near the head of Slate creek, in the Hassayampa district. Formerly owned by Dunkirk Gold & Silver Mining Co., later by Mt. Tritle Copper Co., and purchased in 1914 by D. M. Clark of Prescott, Ariz. Is an old mine, with tunnels of 150′, 160′, 170′ and 300′, driven at vertical intervals of 100′, showing copper and lead sulphides, with value in copper, gold, and silver, in about the order named.

Equipment: includes steam and gasoline power, air compressor and electric light plant. A 40-ton mill has 4 Nissen stamps, 3 Wilfley tables, 100-ton ore bin and a 10,000-gal. water tank. Oil flotation unit installed

1915, reported to be an unqualified success, saving as high as 98% on assay value of ore, but no figures available.

C. B. S. MINING CO. **ARIZONA**

Office: care Granite Securities Co., Citizens Natl. Bank Bldg., Los Angeles, Calif.

Property: near Prescott, Ariz., in the Copper Basin district, Yavapai County. Claims show several veins with 62′ shaft developing a 6′ orebody, assaying 9% copper, $10 silver and $3 in gold. Vein dipped out of shaft and bottom of workings show a 10″ ore streak of native silver. Shaft has been sunk 100′. Owned by same people as the Climax Mining Co., near Prescott, Ariz.

CHAPARRAL MINING CO. **ARIZONA**

Officers: J. F. Rogers, Columbus, Ohio sec.-treas.; W. H. Jones, Chaparral, Ariz., supt.

Company has a lease on the Little Jessie gold mine, owned by the Ohio Mines Co., at Chaparral, Yavapai county, Ariz.

Property has not produced much since 1897. Production at that time was $800,000. Active operations have been discontinued.

Management states that lack of capital prevented development and production in past, and that operations were to be resumed in 1917, but nothing has been heard since.

CHERRY CREEK MINES CO. **ARIZONA**

Believed to be dead.

Former office: Cherry, Yavapai county, Ariz. Main shaft, 115′ said to show a vein with 3′ paystreak giving assays of about 12.5% copper, 4 oz. silver and $9.60 gold per ton.

CIRCLE PEAK MINING CO. **ARIZONA**

Mail addressed to John A. Peacock, Fort Worth, Texas, returned unclaimed, 1919.

Property: 10 copper claims known as the Old Corkscrew, 8 miles west of Mayer, Yavapai county, stated to be a porphyry dike, 1 mile long, with some gold and silver.

Presumably idle.

CLIMAX MINING CO. **ARIZONA**

Working under lease to Stewart Duncan.

Address: Prescott, Ariz. Owns the Climax gold mine on the Hassayampa river, near Prescott.

Development: by 5 tunnels, longest 1,000′, having a pay shoot 2″ to 3′ in width. Average grade of mill ore, oxidized, is said to be $35. Sulphide ore in No. 5 tunnel is said to average $21 per ton. It is claimed the mine has paid for itself since 1904. Company claims to have a large vein, 40′ to 150′ wide, and 7,000′ long, with ore that mills $4.54 per ton in gold. Property is equipped with 10-stamp mill, air compressor and good camp buildings.

CONSOLIDATED ARIZONA SMELTING CO. **ARIZONA**

Office: 15 Broad St., New York City. **Mine office:** Mayer and Middleton, Yavapai Co., Ariz. **Smelter and works office:** Humboldt, Ariz. G. M. Colvocoresses, gen. mgr.; W. V. de Camp, supt.

Officers: C. A. Kittle, pres.; E. S. Hooley, v. p.; F. A. Dillingham, v. p., with A. E. Cortis, J. A. Heintzmann, R. W. Kelley, H. E. Rogers, J. H. Flagler and R. M. Thompson, directors; F. W. Thompson, sec.-treas.; O. F. Janssen, aud.

Inc. Dec. 22, 1908, in Maine. **Cap.,** $9,200,000; $5 par; 1,635,000 issued. 177,000 reserved for bond conversion. Bonded debt: $1,200,000 5% 30-year income bonds authorized, $885,000 outstanding, and $1,000,000 6% 20-year gold bonds, $250,000 outstanding. In June, 1917, it was decided to purchase at par, $250,000 of the refunding 6% bonds, the full amount outstanding of this issue. Payment will be spread over 3½ years. Notes payable $270,000. Listed on Boston curb.

Dividends: initial dividend was declared in 1917. Payments have been as follows: 10c in 1917, 20c in 1918, none since.

Acquired at foreclosure sale the properties of the Cons. Ariz. Sm. Co. (see Vol. X), and the Ariz. Sm. Co. The intricate relationship of the old company and its subsidiaries is fully described in Vol. X.

Columbia Trust Co., trustee of 6% bonds; Equitable Trust Co., trustee of 5% bonds; Guaranty Trust Co., transfer agents; all of New York City.

Balance sheet of Dec. 31, 1918, showed: current assets of $627,539; current liabilities, $342,549; surplus $55,824 and net profits of $264,555. Total assets, $10,454,709, including property, $9,612,170; profit and loss account showed net profit of $703,656 derived from gold, silver, and copper produced, valued at $5,108,110 at a production cost of $4,404,453. Interest charges were $54,887.

Property: 40 claims, 20 patented, 725 acres, near Mayer and near Middleton, Yavapai county, Ariz. The most valuable mines owned are the Blue Bell and De Soto mines. The smelter and concentrator are at Humboldt.

The Blue Bell Mine: 3 claims, carries composite fissure veins in Yavapai schists; the ore has quartzite foot and sheared granodiorite hanging wall.

Development: 6 shafts, deepest, 1,200′ and 2 short tunnels, with about 27,300′ of underground workings. Ore contains pyrite and chalcopyrite, both slightly argentiferous and auriferous. The deposit has been opened to the 1,200′ level and explored by underground workings and by diamond drill holes. Nine lenses of ore have been worked, six extending from near the surface to the 1,200′ level. Ore lenses vary from 100′ to 400′ in length and from 5′ to 25′ in width, the ore averaging about 2.8% copper, 1.2 oz. silver and .04 oz. gold. Shrinkage stoping is used wherever practicable.

New work in 1918 totaled 4,638′ at a cost of $14.68 per foot, developing about 69,290 tons of ore. Produced 131,090 tons with average content of $3.76 in gold and silver and 2.77% copper. Reserves estimated at 470,000 tons carrying 2.80% copper and $2.50 in gold and silver in Dec., 1918. With increasing depth the gold-silver content is increasing while the copper values are decreasing.

Mine is connected with the Bradshaw Mountain R. R. by a tram line, and has electric machinery taking current over an 18-mile transmission line.

The De Soto mine: also in schist and in the Bradshaw range a few miles from the Blue Bell, is developed by 4 tunnels, 5,000′ in length, to depth of 1,000′ with total workings of 14,400′. New work, in 1918, totaled 875′ at a cost of $19.39 per foot, and was disappointing in its results. Reserves estimated, Dec. 31, 1918, at 33,000 tons. Production in 1918 was 42,800 tons, carrying $2.74 silver and gold and 2.57% copper.

Ore reserves: for both the Blue Bell and De Soto mines are officially given as 503,000 tons, but are currently believed to be larger if partly developed ore be included.

Equipment: the reduction plant, well placed for custom business, includes sampling, concentrating, roasting, smelting and converting departments, with a machine shop and smithy. All buildings are of structural steel frame, with brick walls or corrugated-iron sheathing, floored with cement. This plant was reconstructed in 1914, and many improvements and additions have been installed since then at a cost of over $1,597,266; it is considered a modern and efficient plant in every respect.

A 250-ton Minerals Separation flotation plant was installed in 1913. The concentrator has two 200-ton units, each having one 10x20″ and two 7x10″ Blake crushers, 1 Symons disc crusher, 3 elevators, 2 sets of rolls 2 ball-mills, 10 Wilfley tables, 8 Overstrom tables, 8 vanners, 4 trommels, 8 Callow tanks, classifiers and flotation machines. The mill has a large slime pond, and overflow water is returned to the mill for re-use.

During 1918, 104,633 tons of ore and old tailings were treated, making

an average recovery of 89.52% copper; 67.16% gold and 71.9% silver values. The ratio of concentration was 3.34 to 1; the mill produced 31,369 tons concentrates. Average cost of milling, including flotation royalty was $1.92 per ton in 1918, as against $1.77 in 1917.

The remodeled smelter has four 7-hearth Wedge roasters, 22′ 6″ dam. fitted with auxiliary oil-burners and supported on step bearings instead of trunnion. There are two reverberatory furnaces, burning oil and rated at 400 tons daily capacity. Matte from the reverberatory furnaces is tapped into a launder, which delivers it to a ladle in the converter room. Production averages 1,800,000 lbs. blister copper per month from company ore and custom material. Smelting is done in a 250-ton water-jacket blast-furnace for copper. Slags are granulated. The stack is of reinforced concrete, 180′ high, 18′ in diameter at the base and 11′ at the top.

The converter department has 2 stands, with shells of barrel type, rotated electrically. Equipment includes a 40-ton Whiting electric crane with a 15-ton auxiliary crane, cranes also taking hot slag from the converters and pouring same into the reverberatories and delivering shells.

The power plant has four 345 h. p. Stirling water-tube boilers, burning waste gases from the reverberatories, steam being sent therefrom through a 10″ pipe line, under 150-lb. pressure. Machinery includes 2 Connersville blowers, a Nordberg duplex cross-compound air compressor, with 40x42″ air cylinder and 18x36x42″ steam cylinders. There are two 300 k. w 480-volt 3-phase 60-cycle generators, direct-connected to two 16x32x36″ Nordberg cross-compound engines, and an electric turbine pump. Electric power is furnished the Blue Bell mine, 18 miles distant, current being transmitted at 15,000 volts, stepped down to 440 volts, at the Blue Bell transformer station.

The smelter treated 160,328 tons of domestic and custom ore and concentrates in 1918, producing 18,800,073 lbs. copper; 442,809 oz. silver; 14,178 oz. gold. Smelting cost $3.17 in 1918, a decrease of $1.03 per ton from 1917. Costs per ton, 1918: mining, $3.76; milling, $1.92; smelting $3.17. Cost per pound of copper 14.68c; average selling price, 24.30c per pound.

Production:

	Tons Mined	Copper Lb.	Silver Oz.	Gold Oz.	Profit
1918.....	173,960	9,472,075	254,583	10,509	$703,656
1917.....	147,256	9,229,113	207,600	8,620	881,816
1916.....	109,452	7,242,347	127,228	4,858	859,015
1915.....	90,531	5,473,740	100,682	3,174	194,943

In Aug., 1919, production was 12,200 tons of ore and 650,000 lb. of copper.

Management is exceptional and working along conservatively sound, yet progressive lines, building for the future.

CONSOLIDATED HOMESTEAD MINES, INC. ARIZONA

Subsidiary of U. S. Continental Mines Co., which see.

Mine at Walker, Yavapai county, Mark Bradley, mgr. **Cap.**, 600,000 shares, $1 par.

Property: a mineral claim, patented, carries a vein yielding a complex sulphide, ore containing copper, lead and zinc, with gold and silver. Former production is said to be $35,000. During 1918, the U. S. C. M. Co. spent $27,483 at the Homestead. A 40 or 60-ton mill is planned, and money is on hand for new shaft equipment and exploration at depth of 250 ft.

COPPER HILL GROUP ARIZONA

Taken over by Garford Syndicate, which see. Fully described Vol. XIII.

COPPER LODE MINES CO. ARIZONA

Address: care Industrial Dev. Corp., 608 South Dearborn St., Chicago, Ill.

Believed to be idle. Described in Vol. XIII.

COPPER MOUNTAIN MINES CO. **ARIZONA**

Address: Celora M. Stoddard, Phoenix, Ariz.

Is a reorganization of the Stoddard Copper Co.

Officers: Celora M. Stoddard, pres.; Senator Reynolds of N. Y., v. p.; M. A. Pickett, sec.-treas., Phoenix, Arizona. S. C. Chaney, supt.

Inc. 1912, in Arizona. **Cap.,** $5,000,000; shares $5 par.

Property: the old Stoddard mine on Copper Mountain, a mile from the Arizona Binghamton, and near Mayer, Ariz.

Mine reopened, Nov., 1917, gasoline hoist installed; shaft retimbered and sunk to 250′ level. Ore shoot encountered at depth of 100′.

COPPER QUEEN GOLD MINING CO. **ARIZONA**

Address: Stoddard, Ariz.

Officers: Louis Goldman, pres., Los Angeles, Calif.; E. G. Ball, v. p. and mgr.; A. B. Owens, sec.; V. S. Wardlaw, treas.; preceding with J. K. Bywaters, A. Goldman. C. R. Caldwell, J. H. Gooch and A. N. Rogers, directors; Chas. Cramp, supt., Stoddard, Ariz.

Cap., $2,000,000; shares; $1 par.

Property: 25 claims, 23 patented, about 360 acres, and a mill-site on the Agua Fria river, 6 miles east of Humboldt, adjoins the Arizona Binghampton. Claims show great beds of silicified schist, cut in places by rhyolite dikes.

Development: by tunnels; No. 1, 593′ long with about 2,500′ of workings, including shaft and workings on 300′ level; No. 2, 600′ long, with 2,100′ of workings on adit level, a 500′ inclined shaft and 3,900′ of workings. On the 900′ level there are two orebodies, 7′ to 12′ wide, containing chalcopyrite and tetrahedrite, with some gold and silver. Diamond drilling said to show good results.

Equipment: consists of two 400 cu. ft. electric driven air compressors and 30 h. p. electric hoist. Development work is being done on a substantial scale.

Ore reserves are said to be 50,000 tons of 3% copper ore. A 100-ton mill was ordered in July, 1919.

COPPER VALLEY MNG. CO. **ARIZONA**

Address: Skull Valley, Ariz., or Thos. A. McKennell, of McKennell & Appell, Prescott, Ariz.

Inc. April, 1917, by D. C. McIver and Rich. Lamson. **Cap.,** $1,000,000; shares $1 par.

Property: 10 claims known as the Ehle group in Copper Basin, about 4 miles from Skull Valley, Yavapai county, Ariz., said to show a mineralized schist belt over 100′ wide and carrying some ore of commercial grade.

Development: by 3 shafts 30′, 45′, 60′ deep.

A prospect only. Presumably idle.

DEVELOPMENT COMPANY OF AMERICA **ARIZONA**

Practically defunct. T. G. Norris receiver, Prescott, Ariz.

Company has small interests in several subsidiary concerns, none of them prosperous. Stock considered almost worthless.

DOLPHIN MINE **ARIZONA**

Frank Ritzel, mgr.

Property: near Poland, Yavapai county. Shaft 125′ deep. Gold predominant near surface, changing to silver content at 100′.

A prospect.

DOS ORIS MINES **ARIZONA**

Office: care J. B. Tomlinson, Prescott, Ariz.

Property located 14 miles from Prescott, consisting of the Dos Oris, Buzzard and Raven silver mines, formerly property of R. H. Burmister, reported to have produced about $200,000 in the '80's. Dumps said to contain good value in silver.

EQUATOR MINING & SMELTING CO. **ARIZONA**

Office: 20 Exchange Place, New York, N. Y. **Mine office:** Jerome, Yavapai county, Ariz.

Officers: Hon. Wm. A. Clark, pres.; Jas. A. MacDonald, v. p.; Harry H. St. Clair, sec.-treas.; preceding with Chas. W. Clark and Jas. H. Anderson, directors.

Inc. March 19, 1900, in West Virginia. **Cap.,** $500,000; shares $5 par; issued, $250,000. Annual meeting, third Monday in February.

Property: the Iron King mine, on Equator hill, adjoining the Copper Chief, 6 miles by wagon road, south of Jerome, shows a lenticular, canoe-shaped body of pyrite ore in schist near a granite porphyry contact. Mine owns north half of the Copper Chief orebody.

Closed down since 1904.

EUREKA GOLD AND COPPER MINING CO **ARIZONA**

Address: Jerome, Yavapai county, Ariz. Dr. A. J. Murietta, pres.; A. A. Macpherson, sec.-treas.

Property: 8 claims, 7 miles south of Jerome, near the Iron King mine, is opened by 2 tunnels, showing a 30′ vein with an 8′ paystreak carrying bornite and chalcopyrite, with occasional visible gold, but has not developed ore in commercal quantities. Mainly idle, for some years, excepting annual assessment work.

FAIRVIEW GOLD & COPPER CO. **ARIZONA**

Address: John Slak, mgr., Turkey, Ariz.

Office: care of H. M. Coffman, South Bend, Ind.

Officers: F. N. Bonine, pres.; Wm. Miller, v. p., 200 Sheidley Bldg., Kansas City, Mo.; H. M. Kaufman, sec.-treas., with M. T. Knapp, directors.

Inc. Sept., 1916, in Arizona. **Cap.,** $1,000,000; shares $1 par; non-assessable; 500,001 outstanding.

Property: 9 claims, 180 acres, in the Peck mining district, Yavapai county, 1 mile E. of Turkey Creek, and said to lie on Blue Bell contact. Claims reported to show an orebody, 200 to 300′ wide, of oxidized ore, strongly leached, with gold, silver, and copper. Reported property is to be developed as a copper mine.

Development: plan sinking vertical shaft with drifts and crosscuts at 100′ intervals. The mine is equipped with a 35 h. p. gasoline hoist and small compressor.

FERGUSON GROUP (AZTEC GROUP OR LOGOS MINE) **ARIZONA**

Under lease and bond to Argonne Copper Co., see p. 333.

Address: F. E. Andrews, Prescott, Ariz., owner. Property formerly under bond and lease to the Logos Mng. Co. and previously to Aztec King Mng. Co.

Property: 9 contiguous claims, in the Agua Fria mining district, 2½ miles N. E. of Cordes, Yavapai county, Ariz., and 10 miles from Mayer. Claims cover an area of Yavapai schists between diorite and granite. Copper ore occurs in small quantities at all openings with ore of commercial grade exposed on the main, or Aztec King, vein.

Development: by many shallow shafts and a 160′ tunnel.

FORD GOLD & SILVER MINING CO. **ARIZONA**

Address: Prescott, Ariz.

Reported having acquired the Promoter group in Crook canyon from C. E. Warren and B. F. Peters of Prescott.

A tunnel and shaft are said to have developed a 4′ vein of concentrating gold ore. Company intends to sink shaft deeper, install a Lane mill and treat the mine dump.

FORD MINING CO. **ARIZONA**

Probably dead. Described, Vol. XII.

FORTUNE MINING CO. **ARIZONA**

Purchased at mortgage sale by the Boone County Bank.

Property: the Wizard mine and other claims in the Big Bug mining

district, Yavapai county. Is a gold mine in which some high-grade copper ore occurs.

Development: 1,200′ tunnel on the vein showing 4 to 6′ of ore in a shoot 800′ long; 225′ shaft and crosscuts.

Equipment: includes 10-stamp mill and two 50 h. p. gas engines. There was 10,000 tons of milling ore reported on dumps in 1917; but nothing is known about company's present standing.

FRANCO-AMERICAN COPPER CO. **ARIZONA**

Office: Box 338, Prescott, Ariz.

Officers: F. S. Clark, pres.; Fred Bowler, v. p.; J. E. Russell, sec.-treas. G. W. McGarvey, supt.

Inc. Nov. 15, 1918 in Arizona. **Cap.,** $5,000,000; 10c par; issued 50,000 shares.

Property: 15 claims, 5 patented, 8 miles S. E. of Humbolt, Yavapai county. Ore with gold, silver and copper occurs in a steeply dipping 8′ contact vein between schist and porphyry.

Development: shaft is 250′ deep with 900′ of underground workings said to block out 300 tons of ore. Operated in 1912 by Yavapai Metals Mining & Red. Co. when some ore averaging 2 to 10 oz. gold, 4 oz. silver, 27% copper was shipped, yielding $8,000.

In Aug., 1919, the old shaft had been retimbered and was to be sunk another 50′; a wagon road to Mayer was nearly finished; 1,500 tons of 20% dump ore was to be shipped to smelters; a new ore-shoot had been opened; and a hoist, compressor, and other machinery was being installed. In November, a dispatch from Prescott used the words "astonished"; "the Goldfield gang would send it up into the millions over night:" "the big bunch over the mountain would float it at half a million in one day, and easily;" the Franco-American is an enigma"; "the property is now financed," all of which would indicate that something tremendous is in the developing. We hope so.

GARFORD SYNDICATE **ARIZONA**

Mine is at Skull Valley, Prescott, Ariz. G. M. White in charge.

Property: 14 claims, unpatented, 245 acres, in Copper Basin mining district, Yavapai county, formerly known as the Copper Hill group. Main shaft reported as being sunk to 1,000′ level. Also reported having acquired the "Robinson" group, a zinc, lead, copper property.

Ore: copper bearing, with molybdenite, gold and silver in shoots and streaks in breccia, surrounded by granite, diorite and porphyry. Ore shoots vary from 5′ to 15′. Average assays reported as copper, 3.75%; molybdenite, 4.25%; gold and silver, $1.15. Property has shipped about 200 tons.

Development: in 1916, 1,500′ of development work was reported and 75,000 tons were blocked out. Property has three shafts 45′, 50′ and 140′ deep. Intend building flotation mill and installing new hoisting plant.

GENERAL MINES CO. **ARIZONA**

Main office: Salt Lake City, Utah. **Mine office:** Walker, Ariz. C. N. Brown, supt.

Property: the Amulet mine, near Walker. An old mine, previous production estimated at $100,000. From drifts on 200′ level from new shaft a shipment of 200 oz. silver ore has been reported. The ore is a silver galena with some gold.

Equipment: includes, hoist, compressor.

GOLD BLOSSOM MINING CO. **ARIZONA**

Address: G. M. Spicer, Prescott, Ariz.

Inc. in Arizona.

Property: the old Perry silver mine 9 miles south of Prescott, comprising 40 acres, patented, Yavapai county, Ariz. Lies immediately west of Mary E. mine. Shows complex silver-gold-lead copper-zinc ore.

Development: by 360′ incline shaft and levels. Water was up to the 70′ level.

Equipment: 25 h. p. engine, hoist, new cable, etc.

Being reopened in Oct., 1919.

GOLD KING MINING CO. **ARIZONA**

Office: Everett Moffitt, 1030 Wheeling Ave., Muncie, Ind.; George Donner, supt., Crown King, Ariz.

Officers: Everett Moffitt, pres.; Otto Williamson, v. p.; G. A. Brownlee, sec.-treas.; with W. E. Toohey, Ralph Clark, Harve Leffler, A. G. McDill and Grover Plumer, directors.

Inc. Jan., 1904, in Arizona. **Cap.,** 1,000,000 shares, $10 par, non-assessable; 475,000 outstanding. Bonds authorized, $100,000; issued, $10,000. In July, 1919, an issue was being offered at $1. Annual meeting second Monday in January.

Property: 22 claims, 450 acres, in the Peck and Crown King districts in Bradshaw mountains, 22 miles S. E. of Prescott.

The deposit is a contact in slate and porphyry, ore carrying copper, silver, and gold, the two former predominating.

Development: 4 tunnels, 600, 800, 1,100 and 1,500 ft. long, have opened the mine to depth of 600 ft. Total workings amount to 6,000 ft.

At mid-1919, company was contemplating erection of camp for 50 men, 50 h. p. compressor, etc.; and was offering shares at $1, in order to raise $30,000 for further development. Considering its enormous capitalization company is doing but little work; operating expenses last year were $10,000.

GOLD WARRIOR MINING CO. **ARIZONA**

Office: Prescott, Ariz.

Officers: O. S. Wakeling, pres.; A. M. McOmie, v. p.; D. C. MacIver, sec.-treas.; foregoing, with P. H. Osborne and J. R. Esposito, directors.

Inc. 1916 in Arizona. **Cap.,** $500,000; $1 par; outstanding, 210,000.

Property: 6 unpatented claims in the Hassayampa district, 11 miles from Prescott and about three-fifths mile from the Big Pine mine, at which mill Warrior ore is to be treated.

Geology: gold-silver contact deposit in blue diorite and quartz-diorite, dipping 45°, with N. E.-S. W. course. Pay-shoot is said to be 6′ wide with metal contents evenly distributed. Ore reported to assay from $14 to $37 per ton.

Development: by 100′ tunnel on the vein. C. H. Dunning, cons. engr., estimated if conditions hold, the first 1,000′ of level should yield 25,000 tons of $10 ore, but whether it did or not we cannot find out.

GOOD HOPE MINING CO. **ARIZONA**

Address: John Slak, mgr., Mayer, Ariz.

Property: in the Turkey Creek district, has some merit. A recent prospectus is alleged to have murdered the local geology, and was full of exaggerations.

GREAT WESTERN SMELTERS CORPORATION **ARIZONA**

Dead. Property and assets transferred December, 1919, to **Mayer Smelters Corporation—q. v.**

GRIJALVA NUEVA MINING CO. **ARIZONA**

Company started operations in Dec., 1915, and went out of business in 1917. See Vol. XIII for details.

HALE MINING & MILLING CO. **ARIZONA**

Constellation, Yavapai County, Ariz. Felix X. O'Brien, supt. Has gold and copper ores in veins. Equipped with gasoline power. Inactive save for yearly representation work.

HALF MOON COPPER CO. **ARIZONA**

Officers: F. J. Hobson, pres.; O. B. Kemp, treas.-mgr., Mayer, Ariz.; C. L. Wilson, sec., Prescott, Ariz.

Inc. June 23, 1916, in Arizona. **Cap.,** $1,500,000; $1 par; 750,000 shares in treasury. Registrar & Transfer Co., N. Y., transfer agents.

Property: 14 claims, 280 acres in Agua Fria mining district, about 4 miles N. of Mayer, Ariz., shows copper glance in sericite schist, over a zone 50′ to 200′ wide and traceable a half mile. Property equipped with gasoline hoist and air drills. Development work begun in Aug., 1917. Sinking shaft, 1918. At mid-1919, company was preparing to start work on claims in the Copper Mountain district.

Property reported to be well worthy of exploration.

HANEY COPPER CO. **ARIZONA**

Company owns properties at Ramsgate, 12 miles west of Prescott, with pyritic ore of very low gold-silver-copper values. Reported that 8″ of high grade hornsilver ore has recently been encountered.

HAYDEN DEVELOPMENT CO. **ARIZONA**

Operating the Copper Chief mine of the Copper Chief Mining Co., which see.

HILLSIDE DEVELOPMENT CO. **ARIZONA**

Address: care E. D. Gluwas, supt., Hillside, Yavapai county.

Reported shipping 45% zinc ore by motor truck from property near Bagdad, Eureka district.

HUMBOLDT CONSOLIDATED COPPER CO. **ARIZONA**

Formerly Shill Gold Mining Co., and name changed, 1917.

Address: Mesa, Ariz.

Officers: F. J. Davis, pres.; G. W. Silverthorne, sec.-treas.; M. G. Shill, Frank Griffin and W. J. Lempke, directors.

Inc. 1914, in Ariz. **Cap.,** $1,200,000; shares $1 par. Company offered 50,000 shares at 50c in Jan., 1917.

Property: the Mesa Copper Group, one mile south of Humboldt smelter, shows veins in Yavapai schist belt.

Development: two shafts with levels at 100′ and 200′, said to block out 12,500 tons of $12 to $75 ore.

Several requests for information in 1919, have been unanswered.

HUMBOLDT ORE CO. **ARIZONA**

Controlled by Consolidated Arizona Smelting Co.

INTERNATIONAL COPPER & MINING CO. **ARIZONA**

Mine office: Mayer, Ariz.

Officers: John Slak, v. p., sec. and mgr.

Inc. Feb. 1, 1916, in Ariz. **Cap.,** $1,500,000; shares $1 par. Annual meeting Feb. 15th.

Property: 12 patented claims, 200 acres, in Black Canyon mining district, Yavapai county, shows fissure veins in lime-porphyry-schist formation. The main orebody has N. S. strike and dips 10° from vertical. Average assays reported to run 6% copper, $5 gold, $3 silver per ton.

Development: by incline shaft and 3 short tunnels.

Equipment: includes 25 h. p. gasoline hoist and 10x10″ Ingersoll compressor. Management plans sinking to 500′ depth and crosscutting every 100′.

INTERNAT'L. SYND'TE. OF MINES & SMELTERS **ARIZONA**

Office: Prescott, Ariz.

Officers: Judge E. C. Whitesitt of Kansas City, pres.; Dr. L. P. Morgan, cons. engr.

Property: 100 claims in the Copper Basin mining district, Yavapai county, about 12 miles S. W. of Prescott, including the Arizona Portland 30 claims, Martin Schuber group 26 claims, the Ruth, Brown and Rainy Day groups. The Arizona Portland adjoins the Loma Prieta, and the Phelps Dodge's Commercial mine on the S., and is reported to carry the extension of the Loma Prieta orebodies. The orebody is reported to be from 50′ to 250′ wide with N. S. strike and easterly dip, with chalcopyrite with slight gold and silver values disseminated through monzonite porphyry.

Development: by 1,000′ of workings, including a 250′ incline shaft and 4 tunnels.

Equipment: includes a 2 drill compressor, hoist and steam power. Operating expenses for 1918 were $8,000. Values so far developed are too low grade to be profitably mined, even with a flotation plant, but officers hope to open up higher grade ore by further work.

IRON QUEEN MINING & SMELTING CO. **ARIZONA**

Address: Wm. T. Read, 15 William St., New York City. Mines near Mayer, Yavapai County, Ariz.

Directors: F. W. Wood, Wm. T. Read, A. D. Barnhart, I. D. L. Williams and H. B. Bishop.

Cap., $3,500,000; shares $10 par. Company formed to take over, subject to a mortgage for $130,000, the greater part of the former holdings of the George A. Treadwell Mining Co., sold at tax and foreclosure sales. The Boggs and Hackberry properties are not included, being bought by the Commercial Mining Co., controlled by Phelps, Dodge & Co. The organizers of the Iron Queen offered stock at 75c a share to stockholders of the Treadwell Co.

Property: consists of Iron Queen group near Mayer, the narrow gauge railway, 31 claims and interests in 3 others in the Verde mining district. The Iron Queen group was favorably reported upon by M. A. Finney, former manager of the Consolidated Arizona Smelting Co. (Humboldt smelter), who states that property is leached down to 300′ level, has zinc ore between that and 400′ level and has 6′ pyritic ore carrying 3% copper, 38% iron and 38% sulphur below that and on the 500′ level.

Smelter was bought by the Big Ledge Copper Co. interests and an operating company formed, known as the Great Western Smelters Corp., which in turn was unloaded on the Big Ledge Co.

No news since 1917.

JEROME PRESCOTT COPPER CO. **ARIZONA**

Address: W. A. Cline, Prescott, Ariz.

Officers: W. A. Cline, pres.; A. J. Matthews, v. p.; F. R. Dyas, sec.-treas.; above with F. O. Smith and W. E. Saunders, directors.

Inc. in Arizona. **Cap.,** $1,500,000; shares $1 par; 500,000 issued. Registrar and Transfer agent, New York, registrar and transfer agent. Kastel & Co., 20 Broad St., N. Y., fiscal agents.

Property: the Hub, or Sanders group of 33 claims, about 660 acres, several miles west of Copper Basin in Skull Valley, 4 miles from the railway and 12 miles from Prescott, Yavapai county, Ariz. Claims cover a schist belt 30′ wide, along a monzonite contact, which shows green copper stains; also several quartz veins carrying gold values and one containing hornblende with associated chalcopyrite.

An examination by W. H. Weed showed the property worthy of very modest development for gold, but lacking any of the earmarks of a successful copper mine. Promoters distributed garbled copy of above report, with all unfavorable comments and opinions eliminated. Stock was boosted by rigging to $6.75 per share, breaking to 25c. per share, when manipulation ceased.

JUANITA MINING & MILLING CO. **ARIZONA**

Company defunct.

Former officers: M. Dwight Jennings, pres.; W. S. Hefflin, v. p.; D. A. Seaman, sec. and gen. mgr.; E. J. Bennett, treas.; preceding, with B. F. Peters, Otto Kring and E. Payne Palmer, directors.

Inc. April, 1905, in Arizona. **Cap.,** $1,500,000; shares $1 par; non-assessable; issued $1,200,000. Annual meeting, first Tuesday after second Monday of April.

Property: 16 claims, unpatented, 300 acres, and a 5-acre mill site about 4 miles from the Senator mine in the Hassayampa district, about 17 miles S. of Prescott. Property said to carry 11 fissure veins in porphyry and schist with 4 under development of 1 to 60′ width, traceable 1,000 to 3,000′ carrying copper sulphides assaying 2 to 10% copper, to 100 oz. silver and $1 to $1,700 gold per ton. Apparently the main vein is of 8′ average width.

Development: by 210′ shaft and several tunnels from 45 to 450′ long, with 3,500′ of workings estimated, 1913, to have blocked out 5,000 tons of ore with 25,000 tons in sight.

Equipment: includes 25 h. p. hoist, 2 stamp mill, 7 tons capacity.

In June, 1917, D. M. Jennings and others of St. Louis, received a deed on the property from the Sheriff.

LAKE SUPERIOR & WESTERN MINING CO. **ARIZONA**

Office: 208 Glencoe Bldg., Duluth, Minn.

Officers: A. Hagberg, pres.; A. Bjorkman, v. p.; A. Borgquist, sec.; A Johnson, treas., with Magnus Olson, John Peterson, A. R. Norman, Ed. Falk and A. Kolstad, directors.

Inc. 1912, in Arizona. **Cap.,** $1,000,000; shares $1 par; $250,000 issued; assessable, subjects to calls from 60c-$1. Authorized bond issue $300,000; $134,000 bonds outstanding. Annual meeting, first Tuesday in February. Is a holding company, owning a ½ interest in the Big Pine Cons. Mng. Co., which see.

Property: the Mascot gold mine and a 100-ton cyanide plant at Crown King. After expenditure of $250,000 on the mine and mill, ore proved to be too low-grade to pay and property was abandoned. In 1915 a consolidation was effected with the Big Pine Cons. Mng. Co., a $500,000 corporation, on the following basis: 200,000 shares of the Big Pine C. M. Co. stock were issued for the Big Pine properties and 200,000 shares and $32,150 in cash paid the Lake Superior & Western Co. for its mill, which was moved to the Big Pine ground. No recent information received, but corporation is now a holding company, whose only asset is apparently its 200,000 shares Big Pine Cons. Mng. stock.

LAWLER; ESTATE OF JOHN **ARIZONA**

Office: care Ed. W. Wells, Prescott, Ariz.

Property: 6 patented claims in the Eureka district, Yavapai county.

Vein is 1.5′ wide, 3,330′ long, developed by tunnel, shaft and 10,000′ of lateral work. Average grade of ore is given as $23 in gold and silver; ore reserves 40,000 tons.

Mill equipped with 5 stamps, Wilfley tables and slimers, capacity about 15 tons.

Now idle. Mr. Wells reports production to date as ⅓ ton gold, 13 tons silver.

LIBERTY COPPER MINES **ARIZONA**

Office: 511 Republic Bldg., Kansas City, Mo. **Mines:** Mayer, Ariz.

Officers: F. Huttig, pres.; C. B. McClusky, v. p.; A. W. Johnson, sec.; A. E. Leonard, treas. First 3 with N. S. Shannon, J. E. Alley, directors. R. D. Shore, supt.

Inc. 1917 in Ariz. **Cap.,** $10,000,000; $1 par; outstanding 5,200,000 shares. Annual meeting, July.

Property: 26 patented claims, known as the Jean group near Copper Mountain 4½ miles N. E. of Mayer, traversed by a ledge of mineralized schist, and said to be from 50 to 150′ wide, and to carry gold, silver and copper values.

Development: 3 compartment vertical shaft being sunk in May, 1919, vertical shaft showing iron sulphides from 30′ to 120′ depth.

Reported on by F. J. Hobson, D. G. Kidder, G. R. Fansett, R. W. Hart, C. P. Basye.

An undeveloped prospect with no ore and heavy capitalization.

LINDEN GROUP **ARIZONA**

Address: Wm. Linden, Groom Creek, Yavapai county, Ariz., owned and mgr., at last accounts.

Property: the Cottonwood and Vera groups, 7 claims, 140 acres at Groom Creek, in the Hassayampa district, shows gold-silver-copper-molybdenum ore in quartz contact vein traversing diorite-schist formation.

Development: by 50′ vertical shaft and several tunnels, deepest 300′

Shipments: in 1916, totaled 100 tons from the Cottonwood claim and

averaged 17% copper with some silver and gold. Owner planned installing 50-ton Marathon mill and cyanide unit and driving a 400′ tunnel in 1916.

All letters written by us since 1917 returned. Probably idle.

LITTLE EGYPT COPPER MINING CO. **ARIZONA**

Address: Mayer, Ariz.

Wm. A. Davidson, of Prescott, mgr.; A. L. Blumenauer, supt.

Inc. 1918 in Ariz. to take over the copper property of C. A. Vivian of Humboldt and W. O. Belford of Mayer. A grass root tunnel was driven in expectation of taking out sufficient ore to pay for development. Reported to be in financial difficulties necessitating reorganization.

LITTLE JOHNNIE MINE **ARIZONA**

Owned by Harrington Blauvelt, Prescott, Ariz.

Property: in the Hassayampa district, Yavapai county, shows a fissure vein 3′ to 8′ wide, carrying gold ore said to run as high as 2 oz. gold, with 1% copper values appearing at depth. Average assays given as $18 gold per ton.

LOCEY-PABST GOLD MINES CO. **ARIZONA**

Address: Prescott, Ariz., W. J. Casey, mgr., Walker, Ariz.

Reported in 1918 to be prospecting various small properties including the Union mine at Chaparral and the Mud Hole gold mine at Walker, Yavapai county.

LOGOS MINES CO. **ARIZONA**

Dead. Claims re-located and known as the Ferguson Group, which see.

LOMA COPPER CO. **ARIZONA**

Company is a reorganization of the Loma Prieta Mines Co., stockholders getting share for share.

Address: Prescott, Ariz.

Officers: Arthur Hendy, pres.; J. I. Gardner, v. p.; R. H. Burmister, sec.-treas.

Inc. 1918, in Arizona. Annual meeting, 3rd Monday in Sept. **Cap.,** $2,500,000; shares $1 par.

Property: 28 claims, 500 acres in the Copper Basin mining district, Yavapai Co., Ariz., 12 miles S. of Prescott, adjoining the Commercial mine of Phelps Dodge Corporation.

Ore: minerals are primary, chalcopyrite occurring with secondary quartz, and while high-grade bunches of sulphides appear, the deposit will be mined as a mass of low-grade concentrating ore of disseminated character. Samples show an average of about 2% copper, and 36 to 48c silver per ton.

Development: by 414′ shaft with drifts and crosscuts at 400′ level.

Equipment: includes steam hoist and compressor.

Production: one carload shipped in 1917 assayed 8.6% copper, $1 gold and 1.5 oz. silver per ton.

Is a property, likely to develop a large tonnage of low-grade concentrating ore.

LOMA PRIETA MINES CO. **ARIZONA**

See Loma Copper Co.

LOMA VERDE MINE **ARIZONA**

Believed to be idle. Mail returned unclaimed from Humboldt, March, 1919.

Property: 2 miles S. E. of Humboldt, known as the Lone Pine, when it was worked as a gold mine, is said to show copper-gold values, in a small body of concentrating ore. Developed by shallow tunnel and shaft.

LOOKOUT COPPER CO. **ARIZONA**

Main office: Prescott, Ariz.

Officers: T. G. Norris, pres.; A. W. Edwards, v. p.; Geo. D. Morris, sec.-treas.

Property: the Lookout group, 5 copper claims; Mark Twain group, 3 silver-lead claims; Davis group, 8 gold-silver-copper claims, in the Slate Creek mining district, Yavapai County, Ariz.; Bodie group, 13 silver-lead

claims, in the Hassayampa mining district, Yavapai county, Ariz.

Development: a 100′ shaft was sunk on the Lookout property with short levels at 45, 60 and 100′; 800′ north of the shaft are other workings, consisting of a crosscut to the vein and two drifts north and south with a 60′ winze and raise to the surface from the north drift. At the mouth of the raise a gallows frame was erected and a hoisting plant installed. An excellent wagon road about 3¼ miles long connects the mines with the main road leading to the Davis mines.

On the Mark Twain group very little development work was done, although the mine had been worked in a small way at a profit, before acquired by the Lookout Co. The Mark Twain, Blue Dick, and several other promising properties should be consolidated, insuring, under good management, a profitable mining enterprise.

The Davis group is one of the old mines of the district. From the surface and shallow workings much high-grade ore was shipped in the early days. The principal development work was by tunnels and winzes, all showing good ore; the high-grade ore carries considerable copper, though principal values are in gold and silver.

On the Bodie group of mines a good deal of development work was done on the patented claims. A shaft was sunk some 340′, with levels at 55, 85, 170, 230 and 335′, all said to show ore. The 3-compartment vertical shaft was started at a central point. Work was stopped on all the Lookout properties in 1910.

Surveys were completed for an ore road from the Walker end of the Poland tunnel, through the Senator district to Lookout camp. A branch was also surveyed from this line to the Bodie. The road measures 13.6 miles from the tunnel to Lookout and 8 miles to Bodie, with a maximum grade of 4%. It was intended to build a 30″ gauge road with good roadbed and heavy rails, and operate it by steam. Two miles of railroad purchased from the Metals Milling Co. constituted the first 2 miles of the Lookout ore road. This contemplated road would furnish cheap transportation and tap a country that should produce large amounts of ore.

Part of the company's property was being operated under lease in 1917, since when no news.

LUCKY STRIKE MINING CO. **ARIZONA**

Office: 415 National Bank of Arizona Bldg., Phoenix, Ariz.

Officers: J. C. Brown, pres.; Arthur Luhrs, v. p.; A. G. Hulett, sec.-treas.

Inc. 1917 in Ariz. **Cap.,** $1,200,000; $1 par.

Property: 160 acres including the Old Stein property in the Walnut Grove mining district, 9 miles S. E. of Kirkland, said to have an iron vein, 3′ wide containing gold, silver and from 1.5% to 17% copper. Developed by 160′ shaft with 170′ of workings. Gold values are about $1.80 per ton.

LYON COPPER CO. **ARIZONA**

Reorganized as Arizona Merger Gold & Copper Co., which see.

MADIZELLE MINING CO. **ARIZONA**

Address: 413 Fleming Bldg., Phoenix, Ariz.

Officers: G. U. Young, pres.; E. C. Moon, v. p.; G. N. Cunningham, sec.-treas.; above are directors.

Inc. 1905 in Arizona. **Cap.,** $500,000; $1 par; 3 issued; proposed in Aug., 1917, to sell 30,000 shares.

Property: 25 patented claims, 2½ miles N. of Copper Basin and 6 miles W. of Prescott, said to show a quartz vein with schist hanging and porphyry foot-wall. Ore carries copper as chalcopyrite and bornite, with gold and silver values, and assays from $12 to $40 per ton, 25,000 tons and 5,000 tons in reserve, respectively.

Development: by tunnels from shafts, 500, 700, 800 and 130′ long, with total of about 5,000′ of workings.

Equipment: includes steam hoist, compressor, pump, steam and gas power, and 5-stamp mill.

MARK TWAIN MINE **ARIZONA**

Mail returned unclaimed, March, 1919, from Prescott, Ariz. J. F. Moore, J. F. Healey, and O. F. Smith are reported to have an option on this old silver mine.

Said to have produced $250,000 from a 16′ ledge. Workings opened by 3 tunnels.

MAY MINING CO. **ARIZONA**

Office: Sidney, Ohio. **Mine:** Mayer, Ariz.

Officers: M. L. Heffelman, pres.; J. D. Barnes, sec.; H. C. Heffelman, mgr.

Cap., $200,000; $1 par.

Property consists of 2 patented claims, adjoining the Blue Bell on the North. Copper ore occurs in a fissure vein in schist, claimed to be 2′ wide and to be a continuation of the Blue Bell lode. Developed by 200′ shaft with 700′ of workings. Has been idle of recent years. Appears to be worthy of further exploration and development.

MAYER ORE PURCHASING CO. **ARIZONA**

Address: P. O. Box 134, Mayer, Ariz. H. A. Wagner, mgr.

Cap., $300,000; $1 par; all issued.

Does a general custom sampling business. Also buys ores, operates a custom concentrator, assay-office, ore-testing plant, etc., and is installing a leaching department for oxidized copper ores.

Company leased and remodelled the Gray Eagle mill, where all shipments are consigned.

MAYER SMELTER CORPORATION

Address: Mayer, Ariz. Stock sales office, Industrial Dev. Co., 915 Olive St., St. Louis, Mo.

Officers: Chas. Batre, pres.; Frank J. Hobson, v. p.; Roy C. Walters, treas.; all of Mayer, Ariz.

Inc. 1919, in Arizona. **Cap.,** $5,000,000 common, $1,000,000 8% preferred, 1,250 pfd. and 25,000 common issued. Above subject to 250,000, 10-year 6% first mortgage bonds.

Property: 60 acres at Mayer, Ariz., containing plant, as described hereunder; also lime and silica deposits.

Equipment: 2,000-ton ore-bin, 1,000-ton coke-bin, 250′ railroad trestle, one 200-ton blast-furnace complete (blown-in March 12, 1917), Curtis turbo-generator, sample plant and laboratory, machine-shop, pumping plant, houses, etc. Product shipped to U. S. Metals Refining Co.

During July, 1917, a second furnace was blown-in. There has also been installed one 500 h. p. cross-compound Corliss engine, two No. 8 Connersville blowers, two 150 k. w. generator sets, three 250 h. p. marine-type boilers, and a Weber concrete stack. A two-stand converter plant was to be ready in 1918. Plant formerly regarded as a big junk heap.

It has been stated that the smelter at Mayer, between March 12 and up to April 21, 1917, ran 33 days. In that time, it handled 2,700 tons of ore, or only 82 tons per day. It was designed to handle 200 tons, and various reports stated that 150 to 200 tons of Big Ledge ore being handled every 24 hours and that a new 500-ton smelter addition was to be installed to handle increased production. Three shutdowns, for six days in all, were reported to be due to lack of ore supply even at 82 tons daily. Of the 2,700 tons smelted, 800 tons are said to have come from outside ore, and 1,900 tons from Big Ledge ore. Of Big Ledge ore, the Butternut mine contributed 1,300 tons, and the Henrietta mine 600 tons or less than 20 tons daily from the Henrietta, which was glowingly described in February, 1917, as ready to produce 200 tons daily as soon as the smelter should be ready. As to the smelter production reaching 15 tons of matte per day, the entire matte production from March 12 to April 21 was only about 80 tons, assaying 45% copper and about $60 a ton in gold-silver, equivalent to 26 lbs. yield copper per ton ore and $1.80 in gold-silver. These returns are so ridiculously low that the inference is that not all the matte has

been drawn from the furnace, but if the returns really represent actual recoveries from average ore, then 26 lbs. copper at 25c a pound and $1.80 in gold-silver, make a total of but $8.30 per ton in all. Stock regarded unfavorably.

See Big Ledge C. Co., owned by same interests.

McKINLEY MINING & DEVELOPMENT CO. **ARIZONA**

Prescott, Ariz. A. M. Gough, pres.; Chas. E. McKinley, gen. mgr.

Inc. 1906 in Arizona. **Cap.,** $1,000,000; $1 par.

Property: 38 claims, 760 acres, in the Copper Basin district, 11 miles south of Prescott. The Dixie group of 6 claims has veins of 5 to 15′ width, carrying copper ore. The Peacock group has a vein of 60′ claimed width, carrying surface ores said to average 3.7% copper, developed by the Peacock shaft, sunk to a depth of 700′.

In 1917, a crosscut at 700′ depth was driven 500′, where a strong flow of water was met with. High-grade ore is said to have been exposed at that point, also on the 400′ level.

Equipment: includes power plant with hoist good for 1,000′ depth. No recent returns.

McMAHAN GROUP **ARIZONA**

Zonia, via Kirkland, Yavapai County, Ariz. Owned by C. H. McMahan and brothers. Reported sold, Jan., 1919.

Property: the Cuprite mine and a group of 8 claims, unpatented, south of Zonia. Ore zone reported as 700′ long, containing 8 shoots, 50 to 75′ long and 3 to 20′ wide, assaying 2 to 9% copper in oxidized zone.

Development: consists of several shallow shafts.

MILDRED GOLD MINING CO. **ARIZONA**

Address: D. B. Genung, supt., Stanton, Ariz.; H. M. Canover, pres. Company has no debts.

Property: 14 unpatented claims near Congress Junction, Yavapai County, Ariz.

Development: 4,000′ of shafts, drifts, etc. Tunnel 1,150′ long has been driven from mill level connecting with main vein and incline shaft at depth of 520′. Retimbering shaft and putting in ore pocket.

Equipment: 2 hoists, 10-stamp mill and water supply 1¼ miles long.

MINGUS MOUNTAIN COPPER CO. LTD. **ARIZONA**

Office: 516 Grant Bldg., Los Angeles, Cal. Mine near Jerome, Yavapai County, Ariz.

Officers: W. W. Thomas, pres.; A. Gleason, v. p.; J. R. Thomas, sec.; above with A. M. McDermott, A. J. McDermott, and E. R. Jeffrey, directors.

Inc. June, 1900, in Arizona. **Cap.,** $3,000,000; shares $1 par; issued $2,400,000.

Property: 5 claims, 100 acres, in the Black Hills district 12 miles south of Jerome, the nearest railroad point, has good surface showings of carbonate ores. Assays from 2,800′ vein traversing property, N. E.-S. W., are reported to show .02 oz. gold, $1.45 silver and 6.39% copper. Orebody claimed to be 45′ in width, with dip of 60° E., but ore has only been found in bunches and streaks.

Development: by 4 shafts, deepest 430′, with several tunnels, giving a total of 4,240′ of workings.

Equipment: includes 50 h. p. steam plant, with 2 hoists, good for 1,000′ each, and several mine buildings. Out of cash and idle some years.

MONROE COPPER MINE **ARIZONA**

Address: John Curran, owner, Walker, Yavapai Co., Ariz. Mine, once owned by the Monroe Cons. Mines Co., long dead, is near the junction of Knapp gulch and Lynx creek, near Prescott. Formerly worked as a gold mine and said to have a 50′ dike carrying copper ore on the 300′ level. Development work consists of various tunnels.

Presumably idle.

MONTE DE COBRE COPPER CO. **ARIZONA**

Officers: W. A. Tucker, pres.; John Rose, v. p., of Bisbee; E. M. Walker, sec. and J. R. Robertson, treas. of Mayer, Ariz.

Property: The Barbara mine on South Copper mountain, near Mayer, Ariz., shows chalcopyrite and oxidized copper ore in a vein in schist.

Development: 60′ shaft and adit tunnel, now driving, said to have passed through a 40′ zone of mineralized vein matter.

MONTE CRISTO MINING & MILLING CO. **ARIZONA**

Chief owner, Ezra W. Thayer, pres., Phoenix, Ariz.; A. G. Pickett, sec.; Chas. B. Brann, supt., Wickenburg, Ariz.

Inc. Nov. 23, 1903. **Cap.,** $2,000,000; $1 par.

Property: Monte Cristo silver mine, adjoining the Arizona Copper Belt mine near Constellation, in Black Rock district, Yavapai county. The mine shows very remarkable high-grade native silver ore which in the bottom of the mine is changing to copper ore.

Development: by 1,100′ shaft with over 6,000′ of workings. Company was developing on 1,000′ level at last accounts, and has opened a large deposit.

Repeated requests for information concerning property have been ignored by management, but it is understood that stockholders are mainly personal friends or customers of Mr. Thayer, who stands ready to return their money at any time. It is a pity to have the property idle.

MONTEZUMA MINING & MILLING CO. **ARIZONA**

Address: Crown King, Ariz., but letters returned unclaimed, 1919.

Officers: J. P. Waldron, pres.; Philip Nohe, v. p.; P. Fink, sec.; A. Waldron, treas., with F. Fink and M. Devaul, directors.

Inc. in Arizona. **Cap.,** $1,000,000; shares $1 par; non-assessable.

Property: 7 claims, 5 patented, 120 acres, in Pine Grove district, 4 miles from Crown King. Shafts and tunnels reported to have opened some high-grade ore. Main tunnel 700′ long to be extended.

A 5-stamp mill recently installed.

Reports in Aug., 1919, stated that mine was sold to California and Colorado capitalists.

MOUNTAIN DRIVER & CALAMITY JANE MINES **ARIZONA**

Address: Alex Denny, Chaparral, Yavapai county, Ariz., but letters returned unclaimed in 1919.

Property: two claims, 40 acres, near Henrietta, in Big Bug district, 8 miles from Humboldt smelter. Ore occurs in quartz-porphyry and carries copper and gold.

Development: consists of 150′ shaft. Idle since 1916.

NELSON MINING CO. **ARIZONA**

Defunct. Property acquired by Philadelphia Mining Co., which see.

NIAGARA COPPER CO. **ARIZONA**

Presumably dead, and mine near Bagdad, Ariz., idle. See Copper Handbook, Vol. XI.

OCTAVE MINES CO. **ARIZONA**

Office: 882 Drexel Bldg., Philadelphia, Pa. **Mine:** Octave, Yavapai county, Ariz.

Officers: H. C. Gibbs, pres., 60 State St., Boston, Mass.; H. S. Hopper, v. p.; D. S. Leas, sec.-treas.; J. Nelson Nevius, mgr., 809 S. Los Robles Ave., Pasadena, Cal.

Company issued $150,000. 2½ year 8% collateral trust notes, dated April 15, 1919, due Oct. 15, 1921 for providing additional equipment. Notes sold at par, but with 100% stock bonus.

Property: 380 acres in the Wickenburg district including the Octave gold mine, an old mine with a record of $2,000,000 produced. Shows same geologic features as the Congress mine, 10 miles to east. The rocks are granite, intruded by acidic and basic dikes, including some of post mineral age.

Development: to depth of 2,000′ and for 2,000′ along the vein. To the East the veins were cut off by a fault. During 1915-17, new work found the veins beyond the fault and is said to have opened up an orebody 730′ long on the 800′ level. This ore is exposed on the 600′ level and 9 raises are said to prove it between the levels. The same orebody is exposed for 300′ on the 950′ level, the face of the drift, Oct., 1919, is said to show 4½′ of $26.50 ore. Management claims the mine has positively developed 40,000 tons assaying $13.89, with nearly all working faces in ore, and very important probabilities for further development.

Experimental mill work is said to show a probable recovery of 96%.

OHIO MINES CO. **ARIZONA**

Office: 614 Outlook Bldg., Columbus, Ohio.

Officers: H. W. Whitaker, pres.; L. W. Smith, v. p.; J. F. Rogers, sec.-treas.; preceding officers, R. S. Barbee, Thos. M. Murphy, W. G. Brossman, H. J. Rittenour, T. D. Brown, and W. H. Jones, directors.

Inc. Jan., 1909, in Arizona. **Cap.,** $2,500,000; shares $1 par; in $200,000 preferred and $2,300,000 common stock; issued 1,810,837 shares; $250,000 first 7% mortgage notes, $50,000 issued. Annual meeting, third Monday in January.

Property: 14 claims, partly patented, 400 acres in Yavapai county, with a 5-acre mill site, and water-rights on the Agua Fria river, 6 miles from the mine, in the Big Bug district. Property was bought of the Jessie Mines Co., which see in Vol. VIII.

Ore: gold, with small silver values occurring in granite.

Development: by 3 shafts, 659′, 206′ and 200′ deep, with 7,000′ of workings, and the mine is said to have produced upwards of $750,000 in gold, under an ownership previous to that of the Jessie Mines Co. Property under lease to Chaparral Mining Co., which has been doing development work only since Jan., 1916.

No recent information.

OLD VESUVIUS MINE **ARIZONA**

Address: C. H. McMahan and brothers, owners, Kirkland, Yavapai County, Ariz.

Property: the City Group, known as the Old Vesuvius mine, 6 claims, unpatented, 9 miles S. E. of Kirkland. Shows 4 veins at contact of diorite and granite and diorite and quartz diorite. Developed by several shallow incline shafts. Small shipments made in 1916-1917 are reported to have carried from 4-7 oz. gold per ton. Sinking was resumed in shaft on East vein, where high-grade ore is said to have been extracted. No recent information.

ORIZABA MINING CO. **ARIZONA**

Dead. Described in Vol. XIII.

ORO BELLE DEVELOPMENT CO. **ARIZONA**

Address: Crown King, Yavapai county, Ariz.

Presumably inactive. See Vol. XIII.

ORO BELLE & GRAY EAGLE GROUP **ARIZONA**

Address: Mrs. Hattie Barnes, owner, care Theron Davis, 170 Broadway, New York. Mine formerly owned by Tiger Gold Mng. Co.

Property: 10 patented claims, 172 acres, 5 miles S. E. of Crown King, Yavapai County, shows pyrite and chalcopyrite in fissure veins, 2-15′ wide. Veins strike N., dip 60° W. Ore is said to assay $20 gold, 2 oz. silver and 1% copper per ton.

Development: by 8 tunnels, longest 1,000′, and a 600′ shaft.

Equipment: includes a 50 h. p. steam hoist, compressor and 20-stamp mill.

Production: 19,010 lb. of copper, 9,937 oz. silver and 4,313 oz. gold in 1907; 3,639 oz. silver and 1,823 oz. gold in 1908; 4,802 lb. fine copper, 2,725 oz. silver and 1,226 oz. gold in 1909. Property was idle until Oct., 1915, when leased to Oro Belle Dev. Co. Again idle in 1917. No recent information received.

Mine credited with total production to date of $700,000.

PACIFIC COPPER MINING CO. **ARIZONA**

Office: 415 Board of Trade Bldg., Kansas City, Mo. **Mine office:** Crown King, Yavapai County, Ariz. John Kelley, pres.; W. J. Morse, sec.

Inc. Feb. 1907, in Arizona. **Cap.,** $3,000,000; shares $1 par; non-assessable; issued, $2,397,616.

Property: 30 claims, 10 patented, 600 acres, including a mill and smelter site, 4 miles from Harrington and 9 miles from a railway, in the Silver Mountain district of the Bradshaw mountains. Claims show a hornblendic phase of Yavapai schist, with an intrusive porphyry dike of 50 to 150′ width, carrying contact deposits of 9′, of 14′ and of 25′ estimated average width, traceable 3,000, with N.-E. strike. Gossans are much leached, carrying honeycombed hematite and limonite, with occasional copper carbonates.

Ores: malachite and azurite, succeeded at 50′ by secondary chalcocite, bornite and chalcopyrite. The management estimates ore to range from 3 to 15% in copper, with good value in silver and gold.

Development: consists of 1,500′ of work, with a 500′ shaft and several prospect workings.

Equipment: includes a 120 h. p. plant, with an 80 h. p. 3-cycle vertical engine, connected to a 4-drill Sullivan air compressor, a 20 k. w. triplex pump, and a 40 h. p. gasoline hoist. Presumably idle, for several years.

PALO VERDE COPPER CO. **ARIZONA**

Office: Akron, Ohio. C. H. Howland, Cuyahoga Falls, Ohio, mgr.

Officers: J. P. Loomis, v. p.; I. M. Shively, sec., with Chas. Currie, E. E. Quirk and C. H. Howland, directors.

Inc. in Arizona. **Cap.,** $2,000,000; shares $1 par; issued $1,000,000.

Property: 8 claims, is a copper prospect about 60 miles west of Phoenix, in the Saddleback mountains, between White Tanks and Eagle Tails districts, Yavapai county, Ariz.

Mine is opened by shafts of 50, 112 and 210′ depth and a 130′ tunnel. Surface ores said to contain 2 to 15% copper. Plans to resume work.

PAN-AMERICAN MINING CO. **ARIZONA**

Is a close corporation. C. P. Collins, pres., Tulsa, Okla.

Cap., $600,000; shares $1 par.

Property: 8 patented claims, near Prescott, Yavapai county, developed by several thousand feet of underground workings. Ore contains gold, silver, lead values, mostly of milling grade. Mine idle for several years.

PECK CONSOLIDATED SILVER MINES **ARIZONA**

Office: Edwards-Snapp Co., 1620 Consumers Bldg., Chicago, Ill.

Officers: C. B. Willey, pres.-treas.; C. A. Snapp, v. p.; M. L. Snapp, sec.; with W. H. Cade, directors. V. C. McAdoo, gen. counsel; A. J. Edwards, asst. sec. and attorney; E. W. Fisher, asst. sec.; L. G. Kirkland, mgr.

Inc. November 8, 1919, in Arizona. **Cap.,** $2,000,000; $1 par; non-assessable; 900,000 shares in treasury. Bonds, $300,000 of 8% bonds redeemable in 5 years, 50% of annual net earnings to be set aside for redemption.

Property: the Peck mine, and group of 16 claims, 320 acres, in Peck district, 38 miles south of Prescott, Yavapai county. The mine was discovered in 1874, but shut down, after having produced over three millions of dollars in a few years. Operation has been intermittent since then. At mid-1919 the property was examined by E. W. Fisher, J. J. Mears, and W. W. Williams.

Geology: claims are in a sub-mountainous region, 5,000′ above sea level and lie in a belt of metamorphic pyritized schist, having a N. W.-S. E. trend. The veins are said to parallel an acid granular eruptive dike 100′ wide and lie on the contact of schist and quartzite. They dip 80° to the N. W. and trend N. 20 to 30° E. The Peck vein outcrops continuously through 4 claims, in part as a big wall or reef, and is from 4 to 8′ wide. Four other veins are from 2 to 4′ wide. The principal silver minerals are the chloride, horn and native silver, argentite, stephanite and other antimony minerals, with some galena.

Development: present working shaft 250′ deep, abandoned by old company after striking rich ore on account of heavy flow of water which pumps could not handle, and by 4 shafts, 490, 387, 150, and 80′ deep, respectively, with over 10,000′ of workings. The Peck shoot has been stoped to 540′ or about 150′ below water-level, and the others considerably above that depth for over a length of 700′. Reserves are estimated by Mr. Fisher to be worth $2,719,360. This does not include ore below water-level, but includes $194,360 on dumps, $225,000 in old stopes and $2,300,000 in place. Mr. Williams made no estimate of ore in place, but gives the dumps and filling above water level as 20,000 tons of 15.7 oz. silver ore. This, at say $1 an ounce, would give a total of $314,000, against $419,360 for this material by Mr. Fisher. Construction of a mill is considered to be warranted.

Treatment of the ore was investigated, cyanidation being the method suggested at a cost of $3.60 per ton. One flow-sheet includes a ball-mill, concentrators, agitators, and filter; while another has Gibson mills, Pierce amalgamators, Hardinge mill, and cyanide plant.

Property seems to be well worth reopening and developing.

PHILADELPHIA MINING CO. **ARIZONA**

Address: Philadelphia, Pa. **Mine address:** Geo. P. Harrington, mgr., Crown King, Yavapai county.

Property: between town of Crown King and mine of that name. Has fissure vein 3′ wide, developed by 2 tunnels, 225′ apart vertically, the upper 1,000′ long, and 300′ incline shaft on vein. Drove a lower tunnel, 3,000′ long, to cut ore zone 700′ below old mine workings exposing 5′ of gold-bearing ore, and developing a large flow of water, that is a desirable asset.

Numerous assays show gold and silver in commercial quantities; also some lead, zinc and copper. Ore was sent to the flotation mill of the Bradshaw Reduction Co. at Crown King, adjoining the Nelson mine. The zinc-content, a detriment in the past, is valuable, forming by flotation a concentrate desired by smelters.

Company recently (1919) acquired the property of the Nelson Mining Co. at Crown King.

Equipment: includes 25 h. p. gasoline hoist and air compressor. Company was employing an average force of 15 men.

POCAHONTAS COPPER QUEEN MINING CO. **ARIZONA**

Office: Pocahontas, Ark. **Mine office:** Mayer, Yavapai county, Ariz.

Officers: W. H. Skinner, pres. and gen. mgr.; T. J. Burns, v. p.; D. A. Chapin, sec.; Benj. A. Brown, treas.; D. M. Rock, eng.

Inc. 1906, as successor of Big Bug Gold & Copper Mining Co. **Cap.,** $1,000,000.

Property: 14 claims, 3 miles S. E. of Mayer, in 2 groups, about 1,000′ apart. The smaller group of 4 patented claims carries gold-copper ore. The Spar group of 10 claims has a vein up to 14′ in width, carrying mainly gold, silver and lead, and the mine is said to have shipped 23 carloads of high-grade ore, under former ownership, that gave sufficient returns to pay the purchase price and the cost of development. The mine has a 200′ two-compartment shaft and a 120′ shaft. A level at this depth was being extended to develop 2½′ of ore, said to assay $49 in gold, silver, lead, cut in the bottom of the shaft, at last accounts. In August, 1919, the erection of a 100-ton ball-mill, table, and flotation plant was decided upon. Property has been worked in a desultory fashion for years, but the ore is of milling grade, carrying silver, gold, copper, and zinc.

POLAND MINING CO. **ARIZONA**

Mine office: Prescott, Ariz. T. G. Norris, pres.; A. W. Edwards, v. p.; George D. Morris, sec.-treas; L. B. Mulhearn, asst. sec.-treas., 26 Cortlandt St., New York.

Property: 37 claims, about 750 acres, extending through a highly mineralized mountain lying between the Big Bug and Lynx mining districts, Yavapai county, about 35 miles from Prescott by rail, or 15 miles by wagon road. The claims cover a granite mountain intersected by a num-

ber of well-defined, persistent fissure veins, disclosed in a tunnel which goes through the mountain a distance of some 8,000′. Two of these veins, the Poland and Accidental, have been extensively developed.

Equipment: air-compressors, drills, cars, and tools, and a thoroughly modern 20-stamp mill.

The tunnel will be of considerable value as a transportation tunnel when a railroad is built from Lynx Creek end, connecting the mines in the Walker district with the Prescott and Eastern Railroad at the Poland end of the tunnel. Was a subsidiary of the Dev. Co. of America, now dead.

PRINCE ALBERT MINING & MILLING CO. **ARIZONA**

Property disposed of. Described in Vol. XIII.

PRUDENTIAL COPPER MINING CO. **ARIZONA**

Office: 322 Federal St., Chicago, Ill. **Mine office:** 9 Bashford Bldg., Prescott, Ariz. H. H. Linney agt,

Officers: Shea Smith, pres.; F. B. Gibbs, sec.; G. H. Jenkins, v. p.-treas.; with W. H. Newhall, M. N. Murphy, Mrs. Emma S. Jennings and Mrs. E. A. Ewing, directors.

Cap., is 500,000 shares, and company is controlled, through the ownership of 422,778 shares, by the Estate of Maj. Shea Smith.

Property: 12 claims, patented.

Idle for years.

QUAKER GOLD MINES CO. **ARIZONA**

Address: care Thos. J. Brodnax, Board of Trade Bldg., Kansas City, Mo.

Property: 10 claims, patented, the Gold Note and Richinbar mines, 12 miles from railway, in Harper district, Bradshaw Mts., Yavapai county, Ariz., shows quartz vein carrying gold ores, reported to average $8 per ton.

Development: 5,000′ of work, in shafts, levels and tunnels.

Equipment: includes 20-stamp mill, hoist, etc., with electric power. Is a big low-grade proposition.

RANDOLPH-GEMMILL DEVELOPMENT CO. **ARIZONA**

Addresses: Crown King, Ariz., and Prescott, Ariz.

Officers: M. P. Randolph, pres.; F. S. Viele, v.p.; David B. Gemmill, engr.

Property: the remodeled Crown King mill, in which 70-80 tons per day of the old tails from the mill are re-treated. These tails are complex, carrying 0.3 oz. gold, 4½ oz. silver, 11% zinc, 0.8% copper, 10% iron, and 53% insoluble. They are tabled, and treated by oil flotation, making a 4 to 1 concentrate. The bulk concentrate is re-treated, making 15 tons zinc and 7 tons iron concentrate from each 100 tons tails. Zinc product carries 43% zinc, 10% iron, 4½% copper, 15 oz. silver and 0.6 oz. gold; the iron product carries 1½ oz. gold, 10 oz. silver, 2½% copper, 12% zinc, 30% iron and 5% insoluble. These products yield a net profit of about $4 per ton of tails treated after paying $1.50 per ton royalty. No information for several years.

RICHARDS COPPER CO. **ARIZONA**

Out of business. Formerly owned the Black Hills Copper Co. whose property was near the Equator mine, Jerome. Property sold in 1917.

RIO TONTO COPPER MINING CO. **ARIZONA**

Mail returned from former address, 137 No. Central Ave., Phoenix, Arizona.

Inc. Nov., 1917, in Arizona.

Property: the Patton Copper mine, 4 miles east of Mayer, said to have high-grade ore exposed in several openings. Evidently idle.

ROSALIE COPPER CO. **ARIZONA**

Letters returned from last address, Haddock & Shackelford, 424 Dwight Bldg., Kansas City, Mo. Mine near Mayer, Yavapai county, Ariz. G. C. Meese, Los Angeles, Cal., pres. and gen. mgr.

Inc. in Arizona. **Cap.,** $3,000,000; shares $1 par.

Property: 9 claims, patented, 180 acres, in the Copper Creek district, 25 miles S. E. of Mayer and 18 miles from Cordes siding, the nearest rail point.

The mine has numerous pits and shafts, and a 1,000′ tunnel, developing a 2 to 7′ vein carrying native copper, in the oxidized zone, followed by bornite, chalcopyrite and occasional chalcocite ores, said to assay 4.15 to 7.3% copper, with small gold gold and silver values.

Equipment: includes a 50 h. p. gasoline engine and air compressor.

RUBY SILVER CO. **ARIZONA**

Address: Prescott, Ariz.

Officers: A. C. Gilmore, pres.; R. E. Morrison, v. p.; J. E. Russell, sec.; Lester Ruffner, treas., all of Prescott.

Cap., $500,000; shares $1 par. In 1918 was attempting to dispose of 50,000 shares at 10c per share.

Property: 3 claims in Hassayampa mining district, Yavapai county, said to show 3,000′ of the Hero vein, width of 6′ to 25′, with lead-silver ore. Work on 165′ tunnel was resumed in April, 1919.

SARATOGA MINING CO. **ARIZONA**

Crown King, Yavapai county, Ariz. J. L. Deming, mgr. According to report the company was reorganized in 1915, and in Dec., 1915, completed a 75-ton mill to treat Saratoga ore and also the dump ore of the adjoining Crown King mine, belonging to the Yavapai Consolidated Gold-Silver-Copper Co. No recent returns.

SHELDON MINING CO. **ARIZONA**

Address: care Stukey Bros., Walker, Ariz. John F. Pell, pres., Newark, N. J.; A. R. Ackerman, treas., Walker, Ariz.

Inc. Aug., 1916, in Arizona, as a merger of the Sheldon group, the H. T. Andrews holdings and those of the Empire Mining Co., Metals Mining Co. and the Majors Mining & Milling Co. These holdings include nine very attractive copper-gold properties, several of them pioneer mines of the district. The tract is a few miles south of Prescott.

Idle and change of management was made in 1917, but no later report.

SHILL GOLD MINING CO. **ARIZONA**

Name changed, 1917, to Humboldt Cons. Copper Co., which see.

SILVER BELT CONS. MINING CO. **ARIZONA**

Address: 212 Ideal Bldg., Denver, Colo.; J. B. Dudley, sec.-mgr., Prescott, Ariz.; and Humboldt, Ariz.

Officers: John J. Mahony, pres.; B. Rybon, v. p.; J. B. Dudley, sec.; H. J. Mahony, treas.; with J. G. Harney, John Faubel and R. H. Burmister, directors.

Inc. Aug., 1916, in Arizona. **Cap.,** $250,000; 10c par; 160,000 issued; non-assessable.

Property: 8 claims, 2 patented, 200 acres, in Big Bug mining district, 2 miles from Humboldt, Yavapai county, said to have a contact vein between diorite and Yavapai schist.

Development: by 295′ shaft at S. end of property, with workings exposing a 4′ vein of silver-lead ore on the 114′ and 230′ levels. There is also a 125′ shaft at N. end of property and a third shaft being sunk 1,000′ N. of the 295′ shaft, was 265′ deep in Sept., 1919. On 250′ level there was 20″ of rich silver-lead ore.

Equipment: includes a 50 h. p. oil engine, 15 h. p. hoist, compressor, pump, blower, houses, etc.

Management claims to have 30.000 tons of $11 ore on the dumps, and to have had operating expenses of $30.000 in 1918. A shipment of 37 tons, sent to El Paso in September, yielded $5.000 net.

SILVER CROWN MINING CO. **ARIZONA**

Address: Crown King, Ariz.

Officers: L. V. Swiggert, pres.-treas.-mgr.; T. M. Anderson, v. p.-supt.; F. F. Swiggert, sec.; above are directors.

Inc. July, 1917, in Arizona. **Cap.,** $1,000,000; shares $1 par; 600,000 issued; non-assessable.

Property: 3 unpatented claims, 60 acres, at Crown King, said to show a contact vein between schist and granite, with copper-silver ore.

Development: 150′ upper, and 260′ lower tunnels. Management states operating expenses in 1918 were $3,800. Plans continuing lower tunnel.

SILVER CYCLE MINING CO. **ARIZONA**

Address: C. T. Maloney or E. W. Meyers, Prescott, Ariz.

Property: the Davis Dunkirk and Poverty groups on Slate creek, Senator district, Yavapai county, acquired late in 1919. Ten mines are included. Ores carry silver, gold, and copper.

SQUAW PEAK COPPER MINING CO. **ARIZONA**

Address: Edison Thacker, Jerome, Ariz.

Officers: J. J. Cain, pres.; H. E. Thacker, v. p.; Edison Thacker, sec.-treas., with R. Thacker and A. W. Whitaker, directors.

Inc. in Arizona. **Cap.**, $2,000,000; shares $1 par; 100,000 issued; non-assessable.

Property: 21 claims, 420 acres, in Squaw Peak district, 2 miles W. of Verde river and 28 miles S. E. of Jerome, Ariz. Examined in November, 1916, by W. E. Defty, whose conclusions were not favorable. Claims said to show copper ore with chalcopyrite and oxide minerals in quartz, occurring in fracture planes and veinlets in granite, capped to the W. by Cambrian rocks.

Development: 400′ main tunnel and several shorter ones, also a 75′ shaft.

Equipment: steam boiler and compressor; inadequate for proposed work. No late information.

STODDARD MILLING CO. **ARIZONA**

Described in Vol. XIII. Property now owned by Arizona Binghamton Copper Co.

STODDARD MINES CO. **ARIZONA**

Succeeded by Arizona Binghamton Copper Co., which see.

STORM CLOUD MINE **ARIZONA**

Property near Senator, Hassayampa district, operated by M. J. O'Brien, Ltd., of Cobalt, Ontario.

SWASTIKA DEVELOPMENT CO. **ARIZONA**

Property: in the Bradshaw mountains, Yavapai county, was leased to Frank W. Giroux, 1915, and under bond and lease to Cons. Ariz. Smelting Co., who worked dumps in 1919. Sold in May, 1919, to the Swastika Silver & Copper Co., which see.

SWASTIKA SILVER AND COPPER CO. **ARIZONA**

Office: Huntington, W. Va. **Mine office:** Mayer, Ariz. **Freight and express office:** Peckes Siding, Ariz.

Officers: L. N. Frantz, pres.; Wm. Brown, 1st v. p.; C. E. Balton, 2nd v. p.; F. W. Giroux, gen. mgr.-asst. treas.; John Faulkner, sec.-treas.

In May, 1919, company bought the property of the Swastika Development Co.

Property: the old Black Warrior, Silver Prince, Isis, and Hardscrabble claims, located in the Bradshaw Mountains, Yavapai county, one mile from the railroad. During 1915-1919 the property produced about $100,000. From 1910 to 1915 the Swastika Dev. Co. shipped ore with a value of $116,000. From 1874 to 1910 the Black Warrior and Silver Prince are said to have produced about half a million dollars.

Development: by 4 shafts, 70′, 225′, 250′ and 447′ in depth with several thousand feet of drifting. Company estimates ore reserves of 100,000 tons milling ore, assaying 12 to 16 oz. silver per ton. High-grade ore occurs in pockets. The Prince vein has three known ore-shoots. On the property are five veins, only two of which have been worked to any extent.

Equipment: includes 12 h. p. gasoline hoist, one 9 h. p., and 6 h. p. gas engine. Swastika camp has accommodations for 30 men.

Management preparing to build a 50-ton cyanide plant and meanwhile are shipping ore to the Humboldt smelter.

THUMB BUTTE CONS. MINES CO. **ARIZONA**

C. P. Crawford, mgr., Prescott, Ariz.

Address: C. P. Crawford, mgr., Prescott, Ariz.

Property: the old Anderson silver group of claims, in Thumb Butte

district, 8 miles W. of Prescott.

Development: to depth of 125′ by 2 shafts with total workings of 500′. Said to be several good showings on the property; ore contains silver, lead, copper and gold. Plans new equipment and developing in 1920.

TIGER GOLD MINING CO. **ARIZONA**

Formerly owned the Oro Belle & Gray Eagle mine, Crown King, Ariz., which see.

TILLIE STARBUCK MINES CO. **ARIZONA**

Address: A. J. Pickrell, Prescott, Ariz.

Officers: A. J. Pickrell, pres. and treas.; Alan Gardner, v. p.; Richard Lamson, sec.; also directors.

Inc. July 17, 1916, in Arizona. **Cap.,** $125,000; shares $1 par; non-assessable; 100,000 issued.

Cash on hand in June, 1917, $45,242. Operating expenses in 1916 were $4,758.

Property: 12 claims, 1 patented, 242 acres, on Slate creek, 15 miles S. of Prescott, Ariz., said to show a quartz fissure vein in porphyry and granite; 2′ to 6′ wide, dipping nearly vertical with N.-S. course. Three shoots, each 100′ long, have been developed, with ore reported to assay $12 per ton in gold and silver.

Development: by tunnels, 2,000, 800, 150 and 600′ long. Workings total 4,000′ to depth of 600′. Raises have been driven between tunnels to cut the vein. Has been developing for past 5 years.

A cyanide plant was proposed in 1917, but whether erected is not known.

TIP TOP CONSOLIDATED MINING CO. **ARIZONA**

Address: Prescott, Ariz.

Officers: C. W. Davis, pres.-treas.; A. F. Muter, v. p.; F. L. Haworth, sec., with W. W. Elliott and D. E. Nelson, directors.

Inc. 1916, in Arizona. **Cap.,** $375,000. Company was organized to operate the old Tip Top silver mine about 25 miles south of Prescott, credited with a production of several million dollars, 1875-85, under Haggin, Head and Hearst.

The mine was originally opened to the 800′ level; the present management has reopened it to the 200′ level. The dumps, stope filling and low-grade ore left in the mine will be worked for silver and for the tungsten, which was formerly passed over. It is reported that there are 120,000 tons in the dumps that will assay 1½% tungstic acid, and over $5.20 per ton silver, largely as chloride.

Mine examined by G. A. Thayer, who estimated ore worth $792,000 to 300′ depth and $2,000,000 under water to 800′. No information since 1918.

TUSCUMBIA MINING & MILLING CO. **ARIZONA**

Address: Jas. H. Sullivan, supt., Crown King, Ariz.

Inc. March, 1916, in Arizona. **Cap.,** $1,000,000; shares $1 par.

Property: the Tuscumbia mine, in the Bradshaw Mtn. district, carrying silver ores, said to be like those of Tonopah. A vein opened in May, 1916, is reported to show 3.8% copper and 115 oz. silver per ton in a shoot 50′ long and 4′ wide.

In March, 1917, ore was coming from 4 adits to a depth of 300′. No later report, probably idle, although in August, 1919, the mine was being sampled by outside capital.

UNITED ARIZONA COPPER MINING & SMELTING CO. **ARIZ.**

Office: P. O. Box 112, Phoenix, Ariz.

Officers: C. H. Dunlap, pres.; R. C. Baker, v. p.-treas.; C. W. Stott, sec., with C. F. Ainsworth, R. G. Brady, F. O. Longcor, E. F. Jones and Chas. H. Clarkson, 66 Broadway, New York, directors.

Inc. March, 1916, in Arizona. **Cap.,** $2,000,000; $1 par; non-assessable; 802,000 issued. Listed as a prospect on New York Curb.

Property: 22 claims, near Mayer, Yavapai county, Ariz.

Development: started June 1, 1916. Shaft is 835′ deep and will be sunk to 1,200′. Crosscuts at 40′ and 150′ said to have cut vein 20′ in width. Ore contains copper, gold, and silver.

UNITED STATES CONTINENTAL MINES CO. **ARIZONA**

Office: Room 916, 30 Broad St., New York.

Officers: J. K. Farrington, pres.; P. O. Abbe, v. p.; R. B. Cross, treas.

Cap. $1,000,000; shares $1 par; outstanding, 711,450; non-assessable. Registrar & Transfer Co., New York, transfer office and registrar. Owns 364,514 shares of capital stock of the Cons. Homestead Mines Corp., cap. $600,000; shares $1 par. Report for 1918 said to show an investment of $27,483 in the purchase and development of the Homestead mine.

Property: The Homestead mine was acquired in 1916; the latter consists of one patented claim in the Lynx-Creek mining district, near Walker, Yavapai county, Ariz. This claim is said to carry the Homestead-Eureka vein, 4′ to 7′ wide in porphyry and diorite, showing gold ore, partly free milling, silver, lead, zinc and copper ore. The mine workings opened years ago were badly caved when present management acquired it.

Management reported in 1916, "two powerful veins opened for 1,500′"; that the deepest shaft is 120′ and estimates $210,000 yearly earnings on a basis of 100 tons ore daily, an output which will require much development work to realize.

New work on the Continental consists of two 100′ shafts, and total openings of 800′. A vein in quartz-diorite carries gold-copper ore with silver, lead and zinc. The north shaft is being deepened.

Mark Bradley, the company's engineer, in January, 1919, recommended building a mill 40 to 60 tons daily capacity; that the North shaft be equipped with compressor and steam hoist. Company claims it is financed for new shaft equipment and development on the 250′ level. See Arizona Victory Mining Co.

WESTERN COPPER CO. **ARIZONA**

Officers: W. W. Lawhon, pres., Hotel Commercial Block, Phoenix, Ariz.; W. D. Mahoney, gen. mgr., Jerome, Ariz.

Property: the old Patton property, 4 miles from Mayer, adjoins the Copper Queen holdings on the N. Developed to a small extent by shallow shafts and open cuts, all showing mineral. Plans sinking a shaft.

WICKENBURG COPPER M. & R. CO. **ARIZONA**

Address: Chas. Born, Prescott, Ariz.

Officers: B. B. Bloom, pres.; Chas. Born, sec.-treas., with R. N. Vyne, directors.

Inc. 1916 in Arizona. **Cap.,** $5,000,000; shares $1 par; non-assessable.

Property: 22 claims, in the Black Rock district, Yavapai county, Ariz. Mine was idle for 15 years. Examined by A. E. Boyce.

Development: in August, 1917, company was driving a tunnel 300′ on a silver vein. No later report; probably idle.

WOLF ARIZONA COPPER CO. **ARIZONA**

Office: Carl H. Wolf, Newark Bay Sm. & Ref. Co., Newark, N. J.

Mine office: McCabe, Yavapai county, Ariz.

Officers: Carl H. Wolf, pres.; H. C. Wolf, sec., and W. J. Woestendick, treas. Above are directors.

Inc. in Delaware. **Cap.,** $1,000,000; shares $1 par; non-assessable. Expenditures in 1916, $15,000.

Property: lease and bond on 7 claims, 6 patented, 85 acres, in Big Bug district, Yavapai county, Ariz., includes the McCabe and Gladstone mines. Examined by O. Longacre and W. C. Thomas. Claims said to show a vein in quartz diorite, dipping 75° and pitching E.-W. Ore-shoots are from 10″ to 5′ wide. Ore carries zinc, lead, gold, silver and copper; first class averaging $35 and second class $15 per ton.

Development: by 800 and 1,100′ incline shafts, working totaling about 5 miles. Reserves blocked out are given as 4,000 tons first class and 40,000 tons second class ore.

Equipment: includes steam hoist, compressor, pumps, 10-stamp mill and 100-ton Callow flotation plant.

Company is said to have a dump containing 20,000 tons of $6 tailing available for treatment.

WOLF CREEK MINING CO. **ARIZONA**

Officers: Jas. F. Keating, pres., Mayer, Ariz; A. J. McEwen, v. p.; H. W. Armstrong, sec.; John Rodden, treas., all of Clarksdale, Ariz.

Inc. 1919 in Arizona. **Cap.,** $500,000; par $1.

Property: 7 claims, 140 acres, 8 miles W. of Mayer, said to show gold-silver-coper ore. Management states that shipping ore will assay 0.65 oz. gold, 90-170 oz. silver, and 11-19% copper, but does not give any tonnage.

Development: by tunnel, which was in 300′ Nov. 1, 1919. Property is a prospect.

YAVAPAI CONS. GOLD-SILVER-COPPER CO. **ARIZONA**

Office: Prescott, Ariz. **Mine office:** Crown King, Yavapai county,

Officers: T. G. Norris, pres.; A. W. Edwards, v. p.; G. D. Morris, sec,-treas.; L. B. Mulhearn, asst. sec.-treas.

Lands: 18 claims, partly patented, including the Old Reliable mine, 3 miles from Crown King; the Wildflower group, in Pine Grove district; the Tiger group, in the Bradshaw Mountains, and the Crowned King mines, in the Bradshaw Mountains. The last named group, 18 claims, bought from B. A. Turner, receiver of the old corporation, for $75,000, half in cash and half in shares, has been a considerable producer, mainly of gold.

Property: is leased to the Bradshaw Reduction Co., which see.

Development: by several thousand feet of old workings on a contact vein, between porphyry and syenite, carrying slightly auriferous and highly argentiferous copper ores, opened by a 170′ shaft.

Equipment: includes steam power, compressors, 10-stamp mill and 200-ton concentrator. About 20,000 tons of old tailings were sold in 1915 and treated in a flotation plant.

Y. P. MINING CO. **ARIZONA**

Address: N. H. Getchell, mgr., Prescott, Ariz. Operates the Cash property, 14 miles S. of Prescott in the Senator district, Yavapai county.

Dividends paid are said to amount to $15,000.

Development: has continued for several years and is now at 750′. The 60-ton mill and concentrating plant has 5 Wilfley tables and a Monell slimer and at last accounts was reported as producing $8,000 gold bullion per month.

JEROME (VERDE) DISTRICT, YAVAPAI COUNTY

ARIZONA VERDE COPPER MINING CO. **ARIZONA**

Mail returned from the advertised postoffice address: care W. M. Lazenby, P. O. Box 814, Phoenix, Ariz.

Property: 26 claims, near Clarkdale, a ¾ interest in 16 claims in the New River district and 41 claims in the Cave Creek district. Company also had a 2-year option on 1,700,000 shares of stock in the Golden Reef Mining Co. (which see), owning the Golden Reef mine, 35 miles from Phoenix. Offered stock at 50c a share, May, 1917, solely on the prospective value of its holdings, calling itself "a corporation, with the possibilities of another Guggenheim Exploration Company," which is interesting, if true.

Presumably dead.

ARKANSAS & ARIZONA COPPER CO. **ARIZONA**

Office and mine: Jerome, Yavapai county, Ariz.

Officers at last accounts: John F. Boyle, pres.; H. P. Tear, v. p.; J. E. Leeper, mgr., Jerome, Ariz.; H. N. Jasper, sec.-treas., Little Rock, Ark., and W. D. Tickner, directors; W. H. Galligan, supt. Controlled by the Goodrich-Lockhart Co., 60 Broadway, New York city.

Inc. June 25, 1906, in Arizona. **Cap.,** $1,500,000; increased Jan., 1912, to $3,000,000, and 1916 to $6,750,000; $1 par. Company refinanced in 1915 and bond issue of $150,000 authorized for further development work; $68,800 issued.

Property: the Royal Irish group, 14 claims, 280 acres in the Verde district. Claims show felsite porphyry and diorite cut by olivine basalt dikes running north and south and dipping 60° to the east. Orebodies lie on each side of the basalt in the porphyry and quartz schist. Orebody said to be 85′ wide

MINING PROPERTIES OF THE JEROME DISTRICT.

where encountered on 1,400′ level and shows chalcopyrite and some bornite. Extent of shoot not yet determined. Company acquired the adjoining claims, 230 acres, of the Mowles Copper Co. in May, 1916.

Development: by 1,650′ shaft with about 6,000′ of workings.

Equipment: includes three 150 h. p. boilers, hoist good for 2,000′, air compressors, machine shop, power house, and a mile of road, connecting with United Verde Copper Co. railroad. Employs 50 men.

The property was shut down indefinitely, August, 1917, after spending $100,000 in a crosscut on the 1,000′ level It was reported the Goodrich-Lockhart Co. were bound by terms of contract to resume operations within 6 months after the close of the war. The pumps are out, but conditions warrant drifting on the pyrite bodies cut in the crosscut, in the hope of getting copper ore.

BIG JEROME COPPER CO **ARIZONA**

Mail returned unclaimed, March, 1919, from Los Angeles, Calif., and former Fiscal Office, Arizona Securities & Trust Co., Phoenix, Ariz.

Officers: L. L. Wallace, pres.; F. M. Dorsey, v. p.; Fred T. Sheppe, sec.; with C. T. Talbert and J. B. Bourne, directors.

Inc. in Arizona. **Cap.,** $2,500,000; 25c par; 5,000,000 shares given in payment for property are pooled, balance said to be treasury shares.

Property: 32 claims, about 640 acres, 1½ miles S. W. of the United Verde Co. and adjoining the Pittsburgh Jerome property and the Copper Shoe group in the southern part of the camp, near the Shea group.

Company's promotion stock was advertised luridly at 10c a share in December, 1916, during the Jerome boom.

No development work of importance has been done on the property. Unfavorably regarded. New York Tribune showed it to be a twin fake of the Ray Arizona of Wilson & Co.

BLUE MONSTER COPPER CO. **ARIZONA**

Address: Room 817, 7 Water St., Boston, Mass., and Cherry, Ariz.

Officers: L. N. Wombacher, pres.; Thos. Sutcliffe, v. p. and supt.; Jos. H. Morgan, sec., Prescott; P. J. Keohane, treas., with Jos. Lee, directors.

Inc. Dec. 26, 1916, in Arizona. **Cap.,** $2,000,000; shares $1 par. Property acquired for 640,000 shares, which are held in pool until $75,000 has been raised for development work.

Property: 33 claims, unpatented, and a water right on Cherry Creek, in the Verde mining district, Yavapai county, 12 miles S. E. of Jerome, 32 E. of Prescott. The group is said to be located along the great Verde fault, which drops limestones against schist, and in this group is in places covered by conglomerate and lava flows. The crushed zone, 300′ or more wide, is iron stained, and shows green copper stains, and on Blue Jay claim 4′ of 2% ore. W. B. Fisher reports that he believes valuable ore in commercial quantities will be found by development. Experience at the various other Jerome properties shows the faulting to be post mineral and the ore seen in the fault either drag or due to deposition by surface waters. Shaft 280′ deep, peacock ore reported at 100′ depth.

Property favorably reported on by W. C. Thomas and Cyril Wigmore.

BOSTON & JEROME COPPER CO. **ARIZONA**

Office and mine: Jerome, Ariz.

Directors: include Richard Kingdon, supt. U. V. Extension; J. S. Acker, L. E. Hesler of Prescott, and E. C. Farrel of Clarksdale.

Inc. 1907, in Arizona. **Cap.,** $1,500,000; shares $1 par; increased, May, 1908, to $2,500,000; shares $5; issued $129,090. Listed on San Francisco Exchange.

Property: the Juniper group of 9 claims, 146 acres, 2 miles south of Jerome, north of the Verde King (or Verde Central), and adjoins outlying detached claims of the U. V. Copper Co. There is a limestone cap over much of the property, but copper staining is said to show in some places.

Development: includes 3 tunnels of 400′ aggregate length and 130′ shaft, sunk on a large porphyry and schist reef carrying copper sulphide in small amount in bottom. Property was idle from February, 1908, to 1917. Is a prospect,

that is west of the well-recognized mineral belt of the district, though considered to be worthy of exploration. In June, 1919, property idle, company without funds and officers had no plans for financing.

CALUMET & JEROME COPPER CO. **ARIZONA**

Office and mine: Jerome, Yavapai county, Ariz.

Officers: G. W. Avery, pres. and gen. mgr.; John Rauber, v. p.; Geo. H. Avery, sec.-treas.; preceding, with Chas. P. Avery, directors.

Inc. May, 1907, in Arizona. **Cap.,** $1,500,000; shares $1 par;. issued 600,000. Money on hand May 1, 1919, $25,000. Listed on Boston Curb; 600 shares sold at auction in New York, July 23, 1919, at 37 cents each.

Property: 10 claims, patented, 160 acres, one-half mile south of the United Verde mine, and adjoining the Cleopatra. Claims show schist and quartz porphyry in part cut by basalt and covered by basaltic tuff. Rocks are identical with those of adjacent properties. New shaft going down through basalt, and cutting schist showing scattered particles of iron and of copper sulphides in places. During 1918, acquired a two-third interest in the 101, 102, and 103 claims adjoining the United Verde and a one-half interest in the Ohio claim.

Development: includes a main 13′x15′ three compartment shaft now 600′ deep, sunk on the N.-S. fault on Remington claim; several tunnels, one 1,115′; a new main tunnel, now 2,100′ long. At 360′ it is reported to have passed through the fault into mineralized green schist. Headings on the 600′ level are said to show "schist impregnated with pyrite and chalcopyrite, and similar rock is cut in a winze sunk from the 600′ level." Underground working total 7,000′.

Diamond-drill holes reaching a depth of about 450′ below the 600′ level continued in schist and greenstone showing pyrite and chalcopyrite, but failed to reveal ore of commercial grade. Company reports "a drill-hole on the Calumet claim cut body of pyrite and chalcopyrite ore for approximately 200′." Over 2,500′ of drilling had been done in 1919, to August. November 30, 1919, No. 8 drill hole down 500′. The ore opened on the Gadsden property, 1,000′ on the east of the C. & J. tract is regarded as a favorable factor.

Equipment: a 285 h. p. McIntosh-Seymour Diesel engine direct connected to a 200 kva., C.-W. generator and exciter with panel board and G. E. current regulator for 480 volts; a No. 10 Imperial, I.-R. type, 513 cu. ft. compressor by a 75 h. p. Westinghouse motor; Lidgerwood double-drum hoist counter-balance, driven by a 75 h. p. Westinghouse motor, good for 1,600′ depth; No. 17 Buffalo blower driven by 10 h. p. a. c. motor; No. 5 Leyner drill-sharpener and oil furnace; 9 I.-R. jackhammer drills; 2 No. 148 Leyner-Ingersoll drilling machines; No. 7 Cameron special sinking pump; 2, 4 stage No. 3 electric station pumps, cap. 170 gal. per min. against 540′ head, driven by two 50 h. p. a. c. motors. There are 3 cages, 8 mine cars; 40′ head frame; two 5,000 gal. cooling towers; two 5,000 gal. water tanks; two 10,000 gal. crude oil tanks.

The market manipulation of the stock and the misleading and often false statements given by various newspapers concerning alleged ore-bodies disclosed by crosscuts and drifts of the mine in 1917, 1918 and 1919, hurt the good name of a promising prospect.

CALUMET & VERDE COPPER CO. **ARIZONA**

Address: Jerome, Ariz.

Officers: John Rauber, pres.; H. M. Gibbes, sec.; Geo. S. Avery, Wm. Blue and N. C. McLeod, directors, being Calumet-Jerome interests.

Inc. Nov., 1916, in Ariz. **Cap.,** $1,000,000; shares $1 par.

Had an option on the 101, 102, 103, and Ohio claims, now controlled by the Calumet & Jerome Copper Co., which see.

CLEOPATRA COPPER CO. **ARIZONA**

Is controlled by Chas. W. Clark, trustee for himself and associated interests, Jerome, Yavapai county, Ariz.

Officers: R. E. Tally, pres.; F. S. Stephen, v. p.; C. L. Nabers, sec.

Inc. 1901 in Arizona. **Cap.,** $10,000,000; shares $1 par; assessable, 8,644,156 shares issued.

Property: 11 patented claims, about 149 acres, south of the United

Verde mine in the Verde mining district, shows fissure and gash veins carrying ores assaying 1 to 65% copper and 1 to 500 oz. silver per ton, with fair gold value. Has 6 shafts, of 25 to 150′ depth, and 9 tunnels, the Dillon tunnel 3,200′ long, planned to connect with the "1888' shaft.

As company is now practically owned by W. A. Clark (United Verde Copper Co.), no further exploration work will be done from the old workings.

CONS. KING DEV. & COLUMBIA COP. MG. CO. **ARIZONA**

Controlled by Chas. W. Clark, trustee for himself and associated United Verde C. Co. interests.

Office and mine: Jerome, Yavapai county, Ariz.

Officers: R. E. Tally, pres.; S. F. Denison, sec.

Inc. in Arizona. **Cap.**, $6,000,000; shares $1 par.

Property: 11 claims, 154 acres, south of the United Verde mine, showing several bodies of oxidized and sulphide ores, carrying fair values in copper, gold and silver. Mine has a 100′ shaft and a 750′ tunnel, with about one-half mile of workings. Idle since 1913.

COPPER CHIEF MINING CO. **ARIZONA**

Worked under lease and bond by Hayden Development Co., Jerome, Yavapai county, Ariz. W. S. Fulton, pres., Waterbury, Conn. Owned by the Hayden and Midgeon estates, Torrington, Conn., Franklin Brooks, Colorado Springs, Colo., and Arthur Hendey. J. F. Matson, supt.

Property: 21 claims, 11 patented, adjoining Senator Clark's Iron King mine in the Black Hills range, 3½ miles S. E. of Jerome. Two isolated claims cover the water supply and mill-site. The claims are in the belt of metamorphosed igneous rocks and schists forming the southern extension of the United Verde or Jerome schist area. The Copper Chief-Iron King ore-body, which runs across 3 of the claims, is 60 to 95′ wide, and consists of copper-bearing iron oxide carrying gold, silver and a little copper, the total value being from $8 to $13 per ton.

Development work on this deposit shows that it extends downward about 315′ below the outcrop. Material composing this lens is completely oxidized from the surface down to a depth of 226′. The bottom of the lens consists of massive pyrite with about 5′ of enriched ore between the sulphide and the overlying oxidized material. Less than half of the orebody is payable ore in the oxidized zone and about 15% of the lower lying sulphides can be mined at a profit.

Development: by 400′ shaft, 2,225′ of work on the 100′, 160′, 220′ and 280′ levels. The Wonderful shaft is 200′ deep with 250′ of drifts. A crosscut tunnel is being driven to connect with the bottom of the shaft. Mine reported to have a large tonnage of low-grade oxidized ore, which cannot stand transportation to a distance. Future of the property depends upon development of sulphide ore in quantity.

Ore reserves: 58,00 tons of oxidized ore of $12 gold and silver content; 8,240 tons of mixed-oxide and sulphide, 1,000 tons of $50 per ton enriched ore and 8,000 tons of other ores running from $15 to $25 per ton.

The Wonderful claim has been developed by a 160′ tunnel and 4 winzes with ore estimated at $25,000.

Equipment: includes 200-ton cyanide mill, erected in 1915, electric power, air compressor and hoist. During 1918, mill treated about 60 tons per day.

Production: from Jan. 1, 1916 to Nov. 1, 1916, was 30,148 tons with total net profit of $48,199. Gross value of ore milled was from $8.03 to $13.72 per ton with a recovery of 66% to 79%. Smelter shipments, September, 1917, amounted to about 320 tons of 3% copper ore per month. No reports of production have been received since.

DUNDEE-ARIZONA COPPER CO. **ARIZONA**

Address: Phoenix, Ariz.

Officers: Alex. Mackay, pres.; W. C. Foster, v. p.; A. J. Smith, sec.-treas., with L. H. Chalmers and F. S. Stephen, directors.

Inc. March 21, 1916, in Arizona. **Cap.**, $500,000; $1 par; outstand-

ing 425,000 shares, of which 225,000 belonging to F. S. Stephen and Alex. Mackay, former owners, were in escrow until September 20, 1917. Equitable Trust Co., New York, transfer agent. U. S. Corporation Co., New York, registrar. Listed on New York Curb as a prospect.

Property: 2 claims, the Greenup and Greenflower, lying between United Verde Extension on the east and Jerome Verde on the west, at Jerome; also a half interest with the United Verde Extension Co. in Jerome Tunnel Co., consisting of 5 claims and tunnel rights.

Claims show a blanket deposit of 5% conglomerate ore on the surface, 900′ long.

Development: main shaft is over 800′ deep, sinking was temporarily stopped owing to water, but was under way in August, 1919. Property gradually draining by tunnel of United Extension Co., which will soon be connected with the Dundee, providing an outlet for ores. Expecting to resume sinking to the 1,200′ level, about April, 1919. Total underground workings of 1,500′. Company reports about 30,000 tons ore in sight averaging 3% to 5% copper, expect to treat this by new leaching process, also that a contact of schist and quartz-porphyry passes through the property, which they consider important geological condition. Contact will be prospected on the 1,200′ level. During 1917, reported to have shipped 2,200 tons carbonate ore from near surface.

Equipment: includes 80 h. p. gasoline engine, 500 cu. ft. compressor, 3 electric motors, etc. New pumping plant installed, 1917.

In October, 1919 a carload of carbonate ore was being tested by leaching at the Humboldt smelter plant.

GADSDEN COPPER CO. **ARIZONA**

Office: Bisbee, Arizona. **Mine office:** Jerome, Ariz.

Officers: M. J. Cunningham, pres.; Arthur Houle, v. p.; Fred Sutter, sec.; M. Newman, treas., with W. B. Gohring, W. H. Brophy, and L. C. Shattuck, directors. J. K. Hooper, supt.

Inc. Dec. 2, 1916, in Delaware. **Cap.,** $1,000,000; shares $1 par; 300,000 issued for property. Control is held by the Calumet & Arizona Mining Co., which has an option on 70% of the stock, agreeing to spend $100,000 on the property, or about $10,000 monthly.

For each dollar so expended by the C. & A. Co. it shall receive one share of the stock of the Gadsden Copper Co. To July 9, 1919, approximately $460,000 had been spent in this development work. Annual meeting, second Wednesday in January. Listed on Boston Curb.

Property: 42 claims, about 650 acres, including the Monster, News Mining Co.. Walker-Larrimore and Howe groups. Land lies between the United Verde Extension and Green Monster properties.

Development: a 4-compartment shaft to 1,200′ depth with 4,000′ of drifting and cross-cutting. Work was retarded by bad ground and much water, but a depth of 1,230′ had been reached by September, 1918. Crosscut on 1,200′ level driven towards the North and South fault, cut it about 1,800′ to N. W. in December, 1919, and in their S. W. drift opened up ore running 8-10% copper, 3 oz. silver, and $3 gold. The rock is a decomposed schist showing occasional evidences of chalcopyrite and bornite. A winze is being sunk on this ore to determine its extent.

The site selected for the shaft is in the limestone covered area, north of the great Verde fault and about ½ mile from the Verde Combination shaft. Although this site shows no mineralization whatever, it was calculated by C. & A. engineers to reach underlying geological conditions of promise. Schist was cut at 400′ and quartz and jasper at 700′ in depth.

Equipment: one of the best in the camp, includes electric hoist good for 2,000′ depth and pump. Average flow of water is 600 gal. per minute.

Is a development proposition sponsored and managed by a company amply able to finance all needful development and exploration work.

GRAND ISLAND MINING CO **ARIZONA**

Address: Jerome, Yavapai county, Ariz. Chas. Anderson, supt.

Officers: R. E. Moore, pres.-mgr.; H. M. Gallagher, v. p.; E. Rucker,

sec.; F. P. Jones, treas., with J. S. Eberman, directors.

Inc. 1908 in Arizona. **Cap.**, $1,500,000; $1 par; 1,422,710 shares issued.

Property: 14 claims, in the Jerome copper district, adjoining the Copper Chief and Shea mines on the south. Idle from 1912, until company secured funds during the boom of 1916. Claims show a quartz vein 4′ wide on surface and 8′ wide on 200′ level, in porphyry-schist and sheared diorite. Ore carries copper with gold-silver values; 3 other narrow veins said to outcrop on property.

Development: by 520′ shaft with S. W. crosscut on 200′ level, in jasper and schist. On 500′ level expect to cut ledge within 200′ from shaft. Small hoist, compressor, etc., installed. Shaft enlarged to 3 compartments.

Considered a fair prospect.

GREAT VERDE EXTENSION COPPER CO. **ARIZONA**

Address: Shea Bldg., Jerome, Ariz. J. W. Hubbard, supt.

Officers: W. P. Geary, pres.; O. S. Wakeling, v. p. and gen. mgr.; H. H. Major, sec.-treas.

Inc. 1916 in Arizona. **Cap.**, $750,000; shares 25c par.

Property: 9 fractional claims, adjacent and E. of the United Verde Extension, at Jerome.

Development: by 3-compartment shaft, down 53′, Oct., 1917, in sand stone and limestone and reported to show carbonates, chalcopyrite and some copper glance.

One of the many speculative promotions formed during the 1917 boom at Jerome. No recent information.

GREEN MONSTER MINING CO. **ARIZONA**

Address: Jerome, Ariz.

Officers: W. S. Humbert, pres.; Phoenix, Ariz.; David Morgan, v. p. and cons. engr., Jerome, Ariz., with T. A. Riordan, Flagstaff; W. W. Lawhon of Phoenix, directors; G. G. Fuller, sec.-treas., Jerome; Le Roy Anderson, general counsel.

Inc. Dec. 8, 1915, in Arizona. **Cap.**, $750,000; 50c par; 1,200,000 shares outstanding.

The financial statement of October 31, 1918 shows cost of properties, $365,-081; buildings, machinery, etc., $60,986; cash, Liberty bonds, etc., $100,990; accts. receivable, and supplies, $14,225; development expense, $187,763; taxes paid, $1,664; deferred operating expenses paid, $85,014; total, $810,559.

Property: 37 unpatented and 32 patented claims, all but two in one group, situated 3 to 4 miles S. E. of Jerome; the 2 other claims adjoin the Calumet & Jerome and the Verde Combination. The group includes the Cliff mine, once the property of the Geo. A. Treadwell Mining Co.; also the Brookshire mine. The tract shows several large jasper outcrops, that the Cliff claim showing commercial ore at the surface.

Development: during 1918 included 620′ of shaft sinking and 2,312′ of tunnels. In the Gorge tunnel on the Cliff claim the low grade ore-body appeared to be bottoming in a quartz porphyry formation. The Dorothy May shaft is 930′ deep, bottom in diorite. On 500′ level, the N. W. crosscut cut the Revenue Vein and encountered quartz-porphyry contact at 600′, which here contained some chalcocite and chalcopyrite in a highly kaolinized leached zone. On 900′ level contact 160′ from shaft showed slight iron mineralization. The Cliff shaft connects with the Gorge tunnel. Drifts started both east and west on a mineralized quartz porphyry-diorite contact developed a low grade ore-body which 100′ below seemed to be bottoming in quartz-porphyry when work was discontinued.

Property contains very promising surface outcrops, perhaps the best seen in the district, but although the company's operations were supervised by expert men in financial, legal and technical lines, its operations have not as yet found ore in commercial amount, and in March, 1919, directors decided to suspend operations for an indefinite period.

HAYNES COPPER CO. **ARIZONA**

Succeeded 1916, by Jerome-Victor Extension Copper Co., which see.

HULL COPPER CO. ARIZONA

Address: Jerome Yavapai county, Ariz.

Officers: Robt. E. Tally, pres.-gen. mgr.; Geo. Kingdon, v. p.; Le Roy Anderson, sec.; C. L. Nabers, asst. sec., with Thos. Taylor and John H. Page, directors.

Inc. 1906, in Arizona. **Cap.**, $10,000,000; $1 par; non-assessable; 7,500,000 issued.

The suit filed, 1917, at Prescott, Ariz. v. the Hull Copper Co. and Chas. W. Clark, trustee, by minority stockholders, for the purpose of forcing the surrender and redistribution of 7,521,727 shares of stock for cancellation; also requiring an accounting and a temporary injunction to stop the "levying, seizing or selling" of Hull Copper Co.'s property or assets, was settled by compromise in the Superior Court of Yavapai county, in August, 1918. By the terms of this compromise, Clark is to return to the treasury of the company, 2,500,000 shares of stock for cancellation and is to have his title quieted to 5,181,173 shares still remaining in his possession. This gives Clark control of the Hull organization. The dismissal of the suit between the Hull interests and the United Verde Extension Mining Co., pending in the Supreme Court over the title to the Copper Chief claim is also embodied in the compromise.

Property: 21 claims, partly fractional patented, 249 acres, shows syenite, diorite and slate, a continuation of the formation of the United Verde, adjoining, reported by company to show 21 ore-bodies, carrying some oxidized ores, but mainly sulphides, as developed. The "1888" shaft, of 475′ depth, has produced a small amount of ore, but not at a profit.

Development: the Hull property and that of the Cleopatra Copper Co. have been developed by a 5,200′ adit driven from Deception gulch, through Cleopatra ground into the Hull property. A winze has been started on the lode at 5,000′ from the portal.

The Dillon tunnel extends completely around two sides of the United Verde ground. There are many drifts branching out from the tunnel and these usually follow a fracture plane in the rock showing 1 or 2′ of fractured country rock, which usually shows pyrite and may be slightly copper-stained. These drifts twist and turn in a manner showing lack of system and finally branch out like a tree, each branch following a fracture plane, some of which show 2 or 3″ of copper ore, and some are not even copper-stained. These fracture planes are described as being "leaders" from the big ore-bodies below, and because the country rock contains a small amount of pyrite disseminated through it, these ragged workings were stated to block out low-grade concentrating ore.

On the Silent claim a drift from the tunnel exposed an irregular body of excellent chalcopyrite from which 2 shipments were made, the ore assaying 8½% copper. The stope is about 60′ long, in places is 12′ wide and of irregular height. A 160′ raise shows it to branch into 2 seams of 2′ and 3′ wide. An inaccessible winze was said to show 13′ of ore, but inasmuch as shipments had ceased, this seems questionable. Beyond this ore-body the tunnel turns the southwest corner of the United Verde property and follows along its western boundary to the "1888" shaft. For part of this distance the tunnel follows a lens of quartz devoid of copper. Aside from the 1 lens of chalcopyrite mentioned the showing in the tunnel is exceedingly discouraging. The mine has upward of 2 miles of openings, but the manager states that these old workings are not deep enough to develop the extension of the main ore-bodies of the United Verde. No development work of importance done since 1916, nor is any contemplated.

Equipment: includes a 94 h. p. steam plant and a gasoline engine, with 2 hoists, one being a steam hoist, installed 1909, at the "1888" shaft. There also is a small air-compressor.

JEROME BISBEE COPPER CO. ARIZONA

Formerly Jerome Portland Copper Co.

Office: Jerome, Ariz.

Officers: Geo. Brockshire, pres.; L. H. Beyerle, sec.-treas.

Cap. $75,000 shares; par 50c; outstanding about 800,000 shares issued in exchange for Jerome Portland stock.

Property: in Jerome district, at site of old Equator smelter, near Copper Chief mine.

Development: shaft over 500′ deep, cutting diorite at 515′ with 2,800′ of underground workings. Flow of water fairly heavy.

The management of the former company apparently did everything possible to divert money from the devlopment of the mine into their own pockets. The policy of the present officers appears to be very different, and whatever money is raised will, it is said, be used to develop the property.

JEROME CENTRAL MINING CO. **ARIZONA**

Office: Jerome, Ariz.

Officers: W. M. Malady, pres.; Peter Gordon, v. p. and treas.; Dr. Almer Harding, sec.

Inc. 1918 in Arizona. **Cap.,** $1,000,000; shares $1 par; none issued.

Property: 3 claims, adjoining the Verde Combination, 2 miles from United Verde.

Management waiting to see results of development work at Verde Combination mine, before selling stock to finance the Jerome Central. Surface samples contain copper, gold and silver values.

JEROME CONGER MINING CO. **ARIZONA**

Office: Jerome, Ariz.

Reported company has been organized to acquire the Conger mine. Ore carries gold and copper.

JEROME COPPER MINING CO **ARIZONA**

Address: A. L. Johns, supt., Jerome, Yavapai county, Ariz.

Officers: E. A. Kastner, pres. and treas.; H. Brinkenmeyer, v. p.; G. N. Hoffman, sec., all of Prescott, Ariz.; Homer King, F. M. Burdick, Gus Zorke, B. M. Orde, F. Wellington Hay, Geo. A. Gilbert and H. E. Crawford, directors.

Inc. Nov. 25, 1916, in Arizona. **Cap.,** $2,000,000; shares $1 par.

Property: 5 patented (one fractional) claims, N. and W. of the Green Monster at Jerome, and long known as the Hooker Ewing group.

Development: 1,025′ tunnel to cut a diorite-schist contact exposed in a 98′ shaft at 860′ from portal. About 1,800′ of tunnels, crosscuts, etc., were driven, the results of which are said to have been unsatisfactory.

Option held by the General Development Co. has been abandoned.

JEROME DAISY COPPER CO. **ARIZONA**

Address: Box L., Jerome, Ariz.

Officers: J. F. Mowles, pres.; R. Kingdon, v. p.; A. J. Kisselburgh, sec.; J. J. Cain, treas., with J. F. Hubbard, H. D. McVay and A. G. Dulmage, directors; J. F. Mowles, supt.

Inc. Oct. 5, 1916, in Arizona. **Cap.,** $1,000,000; shares 50c par; 1,129,975 issued, non-assessable.

Property: 22 unpatented claims at Jerome, Ariz., said to show a copper bearing contact vein between quartz, porphyry, schist and diorite with limestone capping.

Development: by 235′ shaft, to be sunk to 500′, followed by lateral work. The present bottom is in sandstone, making 70 gal. water per min. Crosscutting under way on 230′ level in 1917 was said to have exposed a gossan body 17′ wide, on which a winze is sunk.

Equipment: 500 cu. ft. Sullivan compressor, 75 h. p. engine, 25 h. p. hoist, Cameron pump, etc.

A prospect whose shares are offered at 50c in 1919.

JEROME DEL MONTE COPPER CO. **ARIZONA**

Office: Room 1018, 50 Congress St., Boston, Mass. **Mine office:** J. A. Eldridge, supt., Jerome, Ariz.

Officers: F. E. Young, pres.; A. B. Ewing, treas.; above with Thomas S. Woods, E. P. Thompson, Fred Sutter, E. S. Armstrong, Tasker L. Oddie, directors; E. S. Armstrong, managing director.

Inc. in Arizona. **Cap.,** $2,000,000; $1 par; 303,000 issued. Listed on Boston Curb.

Property: 41 claims and fractions, about 700 acres, in the Verde mining district, Yavapai county, Ariz. Property being developed by 3-compartment shaft, down 500′ in September, 1917, and sunk in limestone; much water encountered.

Equipment: electrically-driven hoist of 1,500′ capacity, Ingersoll-Rand compressor, 400-gallon Cameron centrifugal pump.

A prospect. Idle since January, 1918.

JEROME GRANDE COPPER CO. **ARIZONA**

Address: Jerome, Ariz.

Officers: J. J. Cain, pres.; J. W. Hubbard, v. p.; J. C. Scott, sec.-treas.; with C. G. Lagstrom and W. Hales, directors.

Inc. July, 1917, in Arizona. **Cap.**, $1,000,000; shares 50c par.

Property: 5 patented claims, 71 acres, located on southern slope of Smelter Hill, the United Verde mine being on the opposite slope. Lands formerly were owned by Verde Grande Copper Co., which suspended operations in 1909. In 1917 bondholders, who were also stockholders in that company, foreclosed mortgage and the property was bought in at Sheriff's sale by J. C. Scott, as trustee, for the bondholders, who then organized present company.

Development: 838′ shaft, with 560′ crosscut from it. Also two tunnels with about 400′ of workings. Claims show diabase, diorite, slate, all schist ore, with stringers of ore carrying chalcocite, and auriferous chalcopyrite, occurring sprinkled through the schist, but not in commercial quantity. Management offers treasury stock to finance the company, planning to extend the crosscut above 400′, where ore in commercial quantity is expected. Property is favorably situated, but like most of the Jerome properties is a mining gamble.

JEROME NEW YORK COPPER CO. **ARIZONA**

Mail returned unclaimed March, 1919, from Jerome, Ariz.

Inc. June, 1917, in Arizona. **Cap.**, $2,000,000; shares $1 par.

Property: 2 claims in the Verde district with reported good surface indications. Stock offered at 25c, October 20, 1917. Believed to be idle.

JEROME-PACIFIC EXTENSION MINING CO. **ARIZONA**

Address: Jerome, Ariz.

Organized in July, 1917, by N. Schutz, J. M. Layman, R. E. Moore and T. F. Shea of Jerome, with a capital of $750,000, to develop an area S. of the Jerome-Pacific. A prospect. No recent information; believed to be idle.

JEROME-PACIFIC MINING CO. **ARIZONA**

Address: Jerome, Ariz.

Officers: Mrs. C. V. Hopkins, pres.; J. B. Harper, v. p.; foregoing with T. C. Mulcaire, I. M. Sutton, C. W. Small and H. F. Ashurst, directors.

Inc. Sept. 16, 1916, in Arizona. **Cap.**, $750,000; shares 50 par; 750,000 issued; non-assessable.

Property: 36 unpatented claims in Verde district, 5 miles S. E. of Jerome, on the E. slopes of the Black Hills.

Geology: replacement bodies in schists, dipping 80° N. and pitching E.-W. Surface conditions are similar to those at the United Verde and United Verde Extension mines, that is, they carry large jasper outcrops, and show oxidized ore, which assays up to 18% copper, 8 oz. silver, and $6.80 gold per ton.

Development: by 2 vertical shafts, 35′ and 65′ deep; also 6 tunnels from 35 to 270′ in length. These are to be sunk and extended. Expenses in 1916 totaled $9,000, covering 2½ miles of road and assessment work.

The property warrants development work, which will, it is said, be started when company is financed.

JEROME PORTLAND COPPER CO. **ARIZONA**

Reorganized as Jerome Bisbee Copper Co., which see.

The decision rendered in the suit filed by the minority stockholders in 1917, against the president of the company, A. B. Frame, stipulated that Frame return to the treasury 469,000 shares of stock fraudulently obtained by him. The company assets were bought in for debts at receivership sale for $14,000, by parties interested in the welfare of the company and an option given to the Jerome-Bisbee Copper Co. to purchase the property at the same figure. Accord-

ing to advices, stock could be exchanged share for share into Jerome-Bisbee stock until July, 1919, upon payment of transfer charge of 3c per share.

JEROME-ST. LOUIS COPPER MINING CO. **ARIZONA**

Address: W. P. Burke, pres., Jerome, Ariz.

Officers: A. Brockman, v. p.; J. M. Sullivan, sec.; G. Brookshire, treas.; J. E. Burke, E. E. McFarland and J. H. Sontag, directors; J. Riley, supt.

Inc. Nov. 13, 1916, in Arizona. **Cap.,** $750,000; shares 50c par.

Property: 8 unpatented claims, 3 miles S. of Jerome, between the Green Monster and the Jerome Portland, crossed by great Verde fault.

Development: shaft-sinking in limestone under way. Encountered water at 100′ stopping all work until pumps are secured. Has 25 h. p. hoist. About $10,000 said to have been spent to mid-1917. No recent information.

JEROME SUPERIOR COPPER CO. **ARIZONA**

Address: Clarkdale, Ariz., or 644 Title Insurance Bldg., Los Angeles, California.

Officers: Melville T. Fraser, pres.; Tod Ford, v. p.; G. D. Case, sec.-treas.; Geo. Mitchell, gen. mgr., with C. E. Selby, directors.

Inc. May, 1916, in Arizona. **Cap.,** $750,000; 50c par.

Property: 202 unpatented claims in Verde district, 1 mile N. of Jerome and 1 mile N. W. of Clarkdale includes Sutcliffe and Stanridge groups.

Development: shaft 700′ deep, Sept. 1, 1919, said to have an encouraging showing of chalcocite and copper iron sulphides. West drift on 500′ level reported in leached zone for 300′. Water handled, 40,000 gallons daily.

Equipment: includes 80 h. p. hoist, 6-drill compressor, assay office, etc. The new Verde Tunnel and Smelter R. R. crosses the property for 2½ miles.

JEROME VERDE COPPER CO. **ARIZONA**

Offices: 60 Broadway, New York; Phoenix, Ariz.; Jerome, Ariz.

Officers: E. O. Holter, pres.; W. R. Barbour, v. p.; I. M. Sutton, sec.-treas., with T. E. Campbell, Heath Steele, Robert Frese and F. V. Henshaw, directors; J. B. Harper, supt.; H. P. Henderson, cons. engr.

Inc. Dec., 1906, in Arizona. **Cap.,** $5,500.000; $1 par; non-assessable: 5,239,197 issued. Registrar & Transfer Co., New York, transfer agent and registrar. Listed on Boston and New York Curbs. Was organized as successor of Verde Queen Copper Co., giving old shareholders $2,501,000 in stock, which is held by the old company in a single certificate, and is practically escrowed; 1,000,000 shares of this were to be distributed on and after July 3, 1916. Annual meeting, second Monday in November.

In May, 1917, capital was increased from $5,000,000 to $5,500,000, by issuing 500,000 shares, which were offered at $1.50 each; 240,000 were sold; total shares in treasury, 180,783 in November, 1918.

Financial Statement, years ended October 1:

Year	Sale of Shares	Sale of Liberty Bonds	Sale of Ore	Previous Balance	Total Income	Mine Expenses, etc.
1918.....	.....	$100,080	$34,569	$181,718	$329,407	$311,041
1917.....	$408,735	.....	.....	166,948	588,370	212,168

On October 1, 1918, cash assets amounted to $137,121, and current operating bills, $17,724. A year later, cash assets were $100,228.

Property: 28 claims, patented, 480 acres, lying E. of the United Verde and adjoining the Little Daisy mine of the United Verde Extension, shows an iron gossan with outcrops of copper ore in limestone capping on the Verde and Columbia claims.

Development: by 1,060 ft. three-compartment Columbia shaft, with 12,000′ of workings, mainly on what is termed the 1,100′ level, which corresponds with the 1,400′ level of the U. V. X. These workings expose the typical mineralized schists of the ore-bearing formation beneath the limestone and lava capping; and in many places oxides, carbonates, and sulphides of copper occur. Average assays were reported by former management, at 8.4% copper. The mine is wet, and has electric pumps with 200-gal. capacity, working against 1,100′.

The promising disclosures on the Little Daisy mine of the United Verde Extension, adjoining this property, resulted in an option being given on the Jerome Verde property until June 15, 1915, to the U. V. X.. This option provided for the payment of $500 per month and that 100′ of work per month should be performed. Under the option 935′ of drifting and crosscutting was done on the 800′, 775′ on the 1,200′, and a little work was done on the 1,400′ level. Results were unsatisfactory and option was relinquished after an expenditure of $50,000. In April, 1916, an agreement was made with U. V. X. under terms of which said company is to do 150′ of development work per month, to be paid for by Jerome Verde on the basis of the company's working costs, plus 15% royalty; the work was being done on the 1,400′ level of Jerome Verde. This is the only interest U. V. X. had in Jerome Verde. This second agreement expired on December 23, 1917.

During the year ended September 30, 1918, new work totalled 6,039′, plus 8,503′ of diamond drilling. No ore was shipped. Workings from the Columbia shaft on the 1,100′ level were connected with workings from the U. V. X. mine into the Main Top and other claims. A raise connected the 1,100′ and 900′ levels. In order to send ore to the Humboldt smelter it must be trammed by mules from this raise to the Columbia shaft, a distance of 3,500′, hoisted to surface and hauled 5 miles by wagon to rail at Clarkdale. No new ore-body was found, but indications were encouraging. Early in 1919, a crosscut at 800′ depth opened some 21% ore, near the U. V. X. boundary. A raise was being put up in June to explore this shoot further.

During the year ended September 30, 1919, new work covered 5,388′. In September, 1919, it was reported that 5′ of 15% ore was opened on 800′ level. Most of the present work is in the Main Top shear zone at 1,100′.

Equipment: includes electric hoist, good for 1,500′ depth and 1,500 cu. ft. air-compressors. Current is taken from the Arizona Power Co.

Production: in October, 1917, company became a regular shipper, the ore coming from a small ore-body on the 1,200′ level (U. V. X. side) of the Main Top claim. Up to the end of 1917, 1,596 tons, averaging 8.8% copper, had been sent to the smelter at Humboldt. The last lot carried 9.77% copper, 2.25 oz. silver, and .06 oz. gold. Further shipments were resumed in October, 1918, at the rate of 20 tons daily, the total from then until July, 1919, being 3,500 tons of 8.7% ore. Present monthly shipments are 300 to 400 tons, which have recently carried 12% copper and several dollars in gold and silver. During year ended September 30, 1919, the output was $97,713 from 4.709 tons of ore.

Company perseveres in its exploration and diamond-drilling, but finds little. As geologic conditions are similar to those in the U. V. X. shares are a good gamble. The present output is profitable, though small.

JEROME-VICTOR EXTENSION COPPER CO. **ARIZONA**

Property sold in October, 1917, to the West United Verde Copper Co., which see. Shareholders getting four shares for one.

JEROME YEAGER COPPER CO. **ARIZONA**

Address: Jerome, Ariz.

Officers: J. W. Hudgeons, pres.; H. Wilson, v. p.; F. Hawkins, sec.-treas.; also directors.

Cap., $1,000,000; 50c par. Of the 2,000,000 shares, 800,000 are pooled, being given to the owners of the property, subject to complete financing.

Property: 360 acres in Yeager canyon being developed by shafts. Only a small crew employed at mine, which is a prospect. In October, 1917, 25c was asked for shares.

MICHIGAN VERDE COPPER CO. **ARIZONA**

Address: Jerome and care of Western Copper Syndicate, P. O. Box 325, Phoenix, Ariz.

Officers: L. B. Eaton, pres.; A. M. McLellan, v. p. and treas.; E. D. Bowles, sec.

Inc. 1916 in Arizona. **Cap.,** $2,000,000; 50c par; 800,000 shares held indefinitely in pool by Arizona Corporation Commission to enforce its orders.

Property: 29 claims, 535 acres, which according to the company's literature and "ex-geologist" Bethune, contains "outcrops" in a connecting belt of schist and diorite. The property is neither better nor worse than that of the many other Jerome companies who are exploring their tracts.

No development is claimed, but the stock-sellers advertised that the property is owned outright and the money derived from stock sales (offered at 50c in June, 1917) would be used for development.

The Michigan Verde was one of the worst of the many very questionable promotions of the boom days in 1916. The manner of its promotion and the character of its sponsors were open scandal in the camp, and when the company lost its option and the Arizona Corporation Commission ordered the return of its promotion stock and forbade the sale of shares, it was thought that the last had been heard of it. It is apparent that a new and different directorate has been successful in getting by the Commission prohibition, since the Western Copper syndicate, which has a postoffice box at Phoenix, Ariz., is advertising stock and sending out the same old hackneyed stories about the United Verde mine, and among other misleading statements says, this property end-lines the United Verde Extension property, whose mine workings are 1½ miles away, though an outlying undeveloped group of claims belonging to that company does lie between Michigan Verde and the U. V. mine.

From the known dip and extent of the ore-bodies of the United Verde and its great neighbor, United Verde Extension, it is certain that the Michigan Verde is entirely outside of any possible extension of those ore deposits. The geologic report published by the company is a rank example of supposedly technical writing.

Presumably idle; mail returned unclaimed from Phoenix, in March, 1919.

MONSTER CHIEF MINING CO. **ARIZONA**

Office: 27 William St., New York. Mine south of Jerome, Ariz.

Officers: Wm. Barret Ridgely, pres.; A. P. Thompson, cons. engr.; G. G. Rice, fiscal agent.

Cap., $2,000,000; $1,050,000 issued for property.

Property: 22 claims, 400 acres, adjoining the Green Monster on the southeast and the Jerome-St. Louis on the east. Mine is wholly undeveloped and without camp or equipment.

Is an undeveloped prospect. All available information on the company was from George Graham Rice's house organ. Stock 6c bid, 12c asked at Jerome, October 20, 1917. No present quotations obtainable.

A report by Arthur Perry Thompson, geologist, shows a big vein, called the Green Monster, crossing the Revenue claim of the Green Monster Co., into the Monster Chief group.

Idle at last accounts.

NEW MESCAL MINING CO. **ARIZONA**

Address: Jerome, Ariz. Is a reorganization 1914 of the Mescal Mining Co. L. C. Cherry, pres., State Bank Bldg., Little Rock, Ark.

Inc. 1914, in Arizona. **Cap.,** $1,500,000; shares $1 par.

Property: Owen & Allison group, 3 patented claims, a mile south of Jerome in Verde district, showing fissure veins in slate and diorite, one 3′ average width, traceable 1,600′ and workings show 1-2% copper with trace of gold. Company originally owned 7 claims, but 4 were allowed to lapse and were jumped. The 3 remaining were sold to J. E. Russell of Prescott, who sold them to J. M. Layman, who in turn transferred them to the Verde Combination Copper Co., and they now comprise part of its Jerome holdings.

Inactive since 1917.

NEW UNITED VERDE COPPER CO. **ARIZONA**

Address: 707 Pemberton Bldg., Boston, Mass.

Officers: A. Wiswall, pres., Providence, R. I.; J. T. Hinds, v. p., Prescott; H. H. Patten, sec.-treas., Boston, with W. F. Burns and S. C. Murch, directors.

Inc. in Arizona. **Cap.,** $1,000,000; $1 par, non-assessable.

Property: the Lucky Dime group of 13 claims, 255 acres, and the Logan mine, 7 claims, 140 acres, located 1½ miles from the Lucky Dime group, in southern part of Cherry Creek mining district, Yavapai county. The properties are 11 miles from Jerome.

Development: 216′ shaft on Logan property, said to block out $100,000 in gold ore. The Lucky Dime group has a 50′ shaft and several test pits, all said to show copper or gold and silver values.

Equipment: includes a 10-stamp mill on the Logan property.

Management plans on starting operations after sale of stock has provided sufficient funds. Their excessive optimism is hardly justified by the small amount of development work.

NEW YORK VERDE COPPER CO. ARIZONA

Address: Jerome, Ariz., and care W. W. Lewis, Kingman, Ariz. Is a reorganization of the Victor Copper Co.

Property: at Jerome, consists of 1,100 acres in the Southern Verde district, including 700 acres directly south of and adjacent to the Jerome Pacific holdings.

The Kingman property consists of 580 acres in the Maynard district, covering the Copper King vein. Company, at last accounts, drifting at 400′ depth to cut the vein which is said to show 3 to 4′ of copper ore in places. No recent information.

PITTSBURGH-JEROME COPPER CO. ARIZONA

Mine office: Chas. Arata, supt., Jerome, Yavapai County, Ariz.

Officers: Wm. M. McJunkin, pres.; C. A. Cooper, v. p.; E. F. Thompson, sec.; R. L. Smith, cons. engr.

Inc. 1904 in Arizona. **Cap.,** increased, March 9, 1906, to $3,000,000; shares $1 par; all issued. Listed on New York Curb as a prospect.

Property: 21 claims, 387 acres, lying 2 to 3 miles south of Jerome. nearly N. W. of the Black Hills property, and about midway between the United Verde and Equator mines.

Development: by main, or 500′, and the lower or 900′ tunnels and the 900′ Pittsburgh shaft, said to show argentiferous and auriferous sulphide ore of about 4% copper tenor at 358′ depth.

The 500′ or main tunnel, 1,279′ long, connects with the shaft. An east drift on this level shows copper carbonate; the west drift is in diorite. Several veins were cut, said to show leached ore averaging 2%; selected sulphide ore carried from 6 to 30% copper, $2.50 gold and 75c silver per ton, leading the management to hope for increased values below water level.

Equipment: includes a 150 h. p. Fairbanks & Morse hoist, 650 cu. ft. compressor and electric power.

Property closed down in fall of 1918; re-started operations in April, 1919, when horizontal diamond-drilling was started on the 500′ level. In October, 50′ of mineralized schist was cut.

SHEA COPPER CO. ARIZONA

Officers: D. J. Shea, pres.; E. G. Bush, v. p.; J. M. Goodwin, treas.; O. G. Engelder, sec. and mgr., together with R. E. Moore, directors.

Inc. 1916 in Arizona. **Cap.,** $750,000; shares 50c par.

Property: 5 patented claims, south of Copper Chief group, carrying 8 or 9 outcrops with gold, silver and copper.

Development: to depth of 325′ by incline shaft following the vein, with levels at 225 and 325′ and raise between levels, all in $50 to $250 silver ore. A 120′ crosscut on 325′ level, cuts parallel vein with 2′ stringer of ore that assays 14% copper and 417 oz. silver. Total development 1,035′, all in ore.

UNITED JEROME COPPER CO. ARIZONA

One of the companies that employed full-page advertisements during the boom at Jerome, trying to sell shares. Cannot locate promoters and letters sent to company are returned by postoffice.

UNITED VERDE CONSOLIDATED CO. ARIZONA

Address: Clarkdale, Ariz.

Officers: R. W. Wingfield, pres.; Paul McIntosh, v. p.; E. C. Farrell, sec.; D. L. Robinson, treas.; E. M. Barron, mgr.

Ins. Oct., 1916, in Arizona. **Cap.,** $7,500,000; shares $5 par; 471,758 issued.

Statement of August 25, 1917, showed receipts amounting to $67,008 from sale of shares; and expenditures, $59,781. The latter includes 1st payment on Ballard property, $10,000; drawn by promoters (Balentine, Farrell and McIntosh), $8,611; advertising, $17,898; commissions, $854; development of Maturin property, $3,259; road building, $650; telegraph and phone, $1,311; and sundries, $9,863. There was a balance of $7,226 unaccounted for. Due on the Ballard claims, $60,000, and outstanding indebtedness is $12,850. From these figures it is evident that only $4,000 was spent on the property, or less than 7% of total expenses; while over $37,000 went in advertising, commissions, etc., exclusive of promoter's commission.

Property: the Ballard claims, at one time belonging to the United Verde, Jr., Co. and Mahurin claims, 2% and 15 miles S. of Jerome, Ariz.

Development: drilling was to be done to 2,000′ early in 1917. Three tunnels driven by previous owners, 15 years ago, are said to have exposed good copper ore. No recent information.

UNITED VERDE COPPER CO. ARIZONA

Office: 20 Exchange Place, New York. **Mine office:** Jerome, Yavapai county, Ariz. **Smelter office:** Clarkdale, Ariz.

Officers: Wm. A. Clark, pres.; Jas. A. Macdonald, v. p.; J. H. Anderson, sec.; H. H. St. Clair, treas.; Chas. W. Clark, gen. mgr.; officers are the directors; Robt. E. Tally, asst. gen. mgr.; H. DeWitt Smith, supt. of mines; Thos. Taylor, smelter supt.; Charles Kuzell, asst. smelter supt; J. B. Johnson, chief engr.; C. M. Hoffman, supt. of machinery; Dave Hopkins, purch. agt.; A. L. Reese, chief chem.-assayer.

Inc. 1883, in New York and reorganized Sept. 2, 1899, in West Virginia. Again reorganized in Delaware, May 9, 1917. **Cap.,** 300,000 shares of no par value; fully issued and fully paid. Is practically a close corporation, having 22 shareholders, and is controlled, through stock ownership, by W. A. Clark. Five hundred shares were sold at auction, March, 1910, for $70 per share.

Gross sales of copper, silver and gold were $5,368,672 in 1909, $5,605,488 in 1910, $4,736,834 in 1911, $5,899,457 in 1912, $6,171,116 in 1913, $5,186,999 in 1914, $9,519,419 in 1915, $17,185,881 in 1916, $15,276,954 in 1917; $19,275,567 in 1918.

Company's investments at end of 1918 were valued at $10,518,912, compared with $12,339,503 in 1917. Cash on hand and in bank totaled $2,743,256 January 1, 1919, compared with $1,958,528 the year before, and $523,028 December 21, 1919.

Dividends: were begun, 1892, by old company on the basis of 25c per share monthly. Recent dividends have been: $2,005,000 in 1905, $2,700,000 in 1906, $2,700,000 in 1907, $2,025,000 in 1908, $2,700,000 in 1909, $2,700,000 in 1910, $2,250,000 in 1911, $1,800,000 in 1912, $1,575,000 in 1913, $1,125,000 in 1914, $1,800,000 in 1915, $4,050,000 in 1916, $5,175,000 in 1917, $5,550,000 in 1918, $1,800,000 in 1919.

Property: 13 claims, patented, 230 acres with sundry adjoining property, including the North Venture and South Venture claims, which have produced a little high-grade ore, in the Verde district of the Black Hills range, at an average elevation of 5,500′ above sea level, and about 2,100′ above the valley of the Verde river.

Company also owns the Copper Giant mine, Wm. Neagle, supt., near Hackberry—acquired in 1913. It is developed by 750′ shaft, with various levels which show silicious ore carrying 2-7% copper with small gold-silver values. A concentrating plant will be erected if further development warrants it.

Geology: the property shows granular porphyritic igneous rocks, slate and schist, the ore deposit being connected with intrusions of acidic porphyry in dioritic rocks; the rocks are sheared and schistose, the overlying limestone having no genetic connection with the ore deposit.

The mine is opened on a single large deposit of sulphide ore, in a sheared diorite, about 600′ in extreme width and 1,900′ length, proven to depth of 1,500′.

The ore-body consists of more or less irregular masses, in a much broken and disturbed area, the ore-shoot having a dip of 72° and containing a 70′ quartz vein that carries about 1% copper and from 0.25 to 0.75 oz. gold per ton, this quartz being used for converter linings. The gossan outcrop, carrying auriferous and argentiferous oxidized ores extends to a depths of about 160′. The zone of secondary enrichment carries very little chalcocite, with some covellite, and other secondary copper ores, all highly argentiferous. The primary zone carries mainly pyrite and chalcopyrite, with a little bornite. No ore assortment is attempted, and no concentration is made, everything from the mine going to the furnaces, the average of ore from all openings formerly being about 6.5% copper and 15 to 32% sulphur, with considerable gold and silver values in the oxidized zone.

Development: to a depth of 2,300′, but production is mainly from the 6th and lower levels. The older portions of the mine are worked pillar-and-stall and timbered with square sets, filled with waste, worked-out stopes being filled with culls and barren rock blasted from the mountain side above the mine and run into abandoned stopes. The oxidized zone is being mined by open-cut and the milling system. In the newer workings, and parts of the old mine where the ground will permit, bottom slicing and a modification of the shrinkage system is used.

No. 5 shaft was being concreted from the 1,950′ to the 2,500′ level in September, 1919.

The ore is easily oxidizable, owing to its high sulphur tenor, and is therefore liable to spontaneous combustion, while, owing to the more or less shattered condition of the orebody, it is difficult to prevent entirely the access of air, very little of which will keep a sulphur fire burning incessantly. The fire on the 400′ level has been burning since 1897, and the mine is on fire in various places, from No. 9 level to surface, fire in stopes not worked being walled off by cement bulkheads. Mining until early in 1917 has been in progress for several years in the fire zone under the Plenum system, introduced by J. J. Shaw. By this method, air under pressure is blown against the face of the stopes by electric fans. The large volume of cold air has a cooling effect on the burning ore, reducing temperatures, and extinguishing the fire in the immediate vicinity of the working face, at the same time driving back the deadly fumes into the shattered rock mass and permitting extraction of the ore. The fire, while dangerous and annoying, does not destroy the copper, all of which will be recovered eventually, by mining or leaching.

The mine has one of the most perfect systems of mechanical ventilation known to copper mining. It was developed through the necessity of fire control, and cooling off of the heated parts of the mine, together with a plentiful supply of fresh air to the working faces.

Equipment: the compressed air plant on surface includes a 2-stage compressor, 28 and 52 and 26 and 44¼x48″ and 3 smaller units, including 2 machines driven by 600 h. p. and 300 h. p. motors, also a compressor driven by a 275 h. p. motor. No. 3 hoisting shaft has a first-motion hoist, good for 2,000′. No. 5 shaft has an Allis-Chalmers mechanical double-drum hoist, with electrical equipment, speed of 1,900′ per minute, and good for 3,000′ depth; 7-ton skips operated in balance are used. This installation is on the 1,000′ level, which is the collar of No. 5 shaft. Haulage equipment underground includes nine 4-ton, four 6-ton, and three 7-ton locomotives.

Smelter: the old smelter, built on the hanging-wall side of the mine and too close to the orebody, had considerable trouble from caving ground and was closed down and dismantled.

The new 3,000-ton smelter designed by Repath and McGregor has been operating since June, 1915. It is one of the most modern in the world, consists of a crushing and sampling plant, calcining plant, blast-furnace, converter, and reverberatory departments, and a power house, together with coke and ore-storage yards and bins with a total capacity of 26,000 tons. Buildings are built of steel and concrete.

The crushing and sampling plant has an Allis-Chalmers 30x18″ jaw-crusher, driven by a 50 h. p. motor; product passes up a long incline belt conveyor, capacity 2,400 tons daily, to top of sampling mill. This mill has three 20x10″

Blake crushers, three sets of Allis-Chalmers crushing rolls, 54x24", 36x12" and 24x12"; two 4x14' Gates trommels and four Snyder samplers with final sample of 1 to 250. Crusher product goes over conveyor belts to storage bins for fines or to the calcining plant.

As described by T. C. Roberts in the "Engineering and Mining Journal," July 21, 1917, the Hopewell crushing plant was built at the mouth of the 1,000' tunnel. It includes storage bins, No. 9 Gates crusher, shuttle conveyor, 42" steel bucket elevator, shaking grizzles, and 36" belt conveyor, from which the ore goes to the blast furnace bins. Undersize goes to two compound revolving screens 60 and 80" diam., 18 and 15' long, with ¾ and ⅜" holes. First reject, 1½", is crushed by 2 sets of 54x24" Anaconda rolls set to ¾"; the second reject, minus ¾" in crushed by two 24x54" rolls set to ⅜"; the third reject, minus ⅜", is taken to storage bins. Product from all rolls in re-screened and re-crushed as desired, the screens and rolls being in closed circuit.

The calcining plant has twelve 21½' Wedge furnaces, each with a daily capacity of 96 tons. The 7 hearths, 6 roasting and 1 drying, are lined with concrete. The plant is built so that it can be enlarged when required. Cooling blast is furnished by 1 or 2 No. 6 Sirocco, 3-oz. blowers, each having a capacity of 25,000 cu. ft. of free air per minute, driven by a 30 h. p. motor. Fumes pass to the dust chamber building, sides of brick and steel, roof of 24-gauge copper equipped with baffle plates, and then to the 400' stack. Calcines, as well as dust, are drawn into 15-ton cars, drawn by 10-ton electric locomotives. A second lot of 12 roasters is being erected.

The reverberatory plant has four 19x100' furnaces, placed at one end of the furnace building. Calcines, with oxidized ores, are fed to these furnaces. Slag is drawn off into Treadwell motor-tilted pots, drawn by an 18-ton electric locomotive, of which there are three. Three more reverberatories have been added. All reverberatories are fired by powdered coal, a storage plant of 14,000 tons capacity (12,000 tons can be stored in water), and pulverizing plant capable of reducing 500 tons daily through 200-mesh having been completed in 1919.

A Cottrell precipitating plant is to be added to the flue system.

The blast-furnace plant has four 48x320" blast furnaces, designed by Repath and McGregor. Feed consists of mattes from the reverberatories, rich oxidized and sulphide ores, with some calcite. Gases go to a second dust chamber, similar to the other, but with steel plate sides, before going to the 400' stack. Ore and flux for the furnaces is brought by 4 to 6 ton side-discharge cars. Reverberatory matte is poured hot.

The converter plant has four stands with five 12' shells of the Great Falls type, supplied by Allis-Chalmers Mfg. Co. Converters are basic, lined with Harbison-Walker magnesite. Tilting is done by 50 h. p. direct-current motors. Copper is poured into two copper casting machines, each operated by a 20 h. p. direct-current motor. There is a 75-ton reheating furnace in connection with these. Slag is drawn into Treadwell pots and charged hot into the reverberatories together with rich blast furnace slag.

The power plant will generate only part of the electric current used, remainder being purchased from the Arizona Power Co. Current is received at 44,000 volts and stepped down to 2,200 volts. Waste heat from the reverberatories is utilized for 6 Stirling Type M boilers, 713 h. p. each, 2 to each furnace. Three Parker type water tube boilers, using fuel oil, are held in reserve. A pumping station, equipped with 2 pumps, on the Verde river supplies the water. The cooling system of the furnaces, compressors, and the condensing system of the steam units are taken care of by a central cooling plant and pumping station. There are 3 condensers, 2 Weiss and an Allis-Chalmers, and 5 Allis-Chalmers centrifugal pumps, driven by motors.

There are 4 blowing engines, supplying the converters; a Southwork-Rateau-Smoot turbo-blower, capacity 24,000 cu. ft. free air per minute at 16 lbs. pressure, 2,500 r. p. m.; a Nordberg, Southwork and an Allis-Chalmers, with capacities of 21,000, 21,000 and 15,000 cu. ft. respectively. A Nordberg 2-stage compressor furnishes air up to 100 lbs. pressure, capacity 3,000 cu. ft. per minute. Air for the furnaces is supplied at 2½ lbs. pressure by 5 Roots blowers, two of 400 cu. ft., two of 300 cu. ft., and one of 224 cu. ft. Blowers are motor driven. A 16x32x36"

Allis-Chalmers tandem-compound engine operates one of the 400 cu. ft. blowers; a 3-cylinder Diesel engine operates one of the 300 cu. ft. blowers.

The electric generating units include 2 Parsons type steam turbines and generators; one is a 500-kva. Westinghouse unit, the other a 1,500-kva. unit made by Allis-Chalmers Mfg. Co., the former delivering current at 440 volts, the latter at 2,300 volts. Two Westinghouse synchronous 1,200 k. w. motor-generator sets take alternating current at 2,200 volts and deliver direct current at 250 volts for the electric locomotives, converter motors, cranes, etc. There are three 300 k. w., three 200 k. w. and three 50 k. w. transformers, also three 30 k. w. transformers.

The United Verde & Pacific railway, controlled by the company, has 28 miles of narrow-gauge line, traversing a very difficult country, connecting the mine and works with the Santa Fé, Phoenix & Prescott railroad at Jerome Junction. A standard-gauge railway, built 1912, by the Atchison, Topeka & Santa Fé R. R. Co., connects the new smelter at Clarkdale with its main line at Cedar Glade. For transportation between the mine and smelter another railroad, the Verde Tunnel & Smelter R. R. Co., has been built; it is operated as a separate organization.

Production:

Year	Lbs. Copper	Oz. Silver	Oz. Gold	Year	Lbs. Copper	Oz. Silver	Oz. Gold
1904...	29,275,503	668,842	23,754	1912...	31,565,539	484,222	15,082
1905...	32,683,951	486,041	15,915	1913...	35,334,694	641,074	20,666
1906...	38,827,265	428,317	12,913	1914...	32,448,170	646,572	21,400
1907...	33,015,457	356,938	11,733	1915...	45,127,832	902,880	28,221
1908...	36,183,089	494,574	20,334	1916...	58,299,573	1,030,850	26,416
1909...	36,694,063	495,480	17,022	1917...	71,753,111	1,222,607	29,497
1910...	38,663,880	563,133	19,267	1918...	77,560,204	1,298,414	29,145
1911...	33,167,987	461,145	15,239	1919..	42,927,666	665,328	16,838

Mine was shut down account labor troubles, Feb. 15 to May 15, 1919.

Company sold only 3,397,370 lb. copper at 18.45 cts. a pound in 1919.

In early years the United Verde made copper for 5c. or less a pound, if one deducts gold and silver values from the cost. The reported cost per pound of finished copper, after deducting gold and silver values, was 9.17c. per lb. in 1904; 9.27c. per lb. in 1905; 8.69c. in 1906, and 10.54c. in 1907. Under average circumstances the cost may be figured as 9 to 10c. per lb. The United Verde mine has been lied about more industriously than almost any other mine in the world, especially in the literature sent out by new copper mining companies with stock for sale. The United Verde has erroneously been pointed out as an example of blind luck, but the mine was taken by Senator Clark, when generally considered worked out, and it was developed, by cash and brains, into a magnificent copper mine, the credit being due to the keen mining sense and business acumen of Senator Clark and not to chance. The mine is one of the best copper mines of the world, with many years of large and profitable production ahead.

To accommodate its employees the company constructed a model town called Clarkdale, at a cost of $1,000,000. It includes upper and lower sections, with school house, restaurant, rooming house, business area, and residence, all supplied with electric light, water, sewers, and telephones.

UNITED VERDE EXTENSION MINING CO. **ARIZONA**

Office: 233 Broadway, New York. **Mine office:** Jerome, Yavapai county, Arizona.

Officers: James S. Douglas, pres.; George E. Tener, v. p.; Louis E. Whicher, v. p.; Chas. P. Sands, sec.-treas.; with Paul Armitage, R. M. Raymond, George Kingdon, gen. mgr.; Archibald Douglas and Andrew J. Pickrel, directors; Barry Hogarty, smelter supt.

Inc. 1902, in Maine, as a reconstruction of the United Verde Extension Gold, Silver & Copper Mng. Co. **Cap.**, $3,000,000; shares $10 par. Reorganized in Delaware, **cap.**, $4,000,000; shares $10 par; and again reorganized 1912, and cap. reduced to $750,000; shares 50c par; issued $525,000. In this reorganization, approximately 360,000 shares were set aside for exchange,

on a share for share basis for old shares outstanding; about 40,000 shares were issued in liquidation of debts; 150,000 shares were issued to Jas. S. Douglas for services; 50,000 shares were sold to Mr. Douglas for $25,000 cash; 400,000 shares were optioned to Mr. Douglas and his associates with the right to purchase all or a part of this block at par value at any time prior to June 15, 1915, and 500,000 shares were reserved for treasury purposes. Federal Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agt. Shares are listed on the Boston Curb, traded on New York Curb. Annual meeting, 3rd Tuesday in February.

Comparative Balance Sheet shows:

	ASSETS							
	Mining Claims	Equip. & Smelter	Inv'nt & Land Acq'd	Accts. Rec. & Inv.	Cash & Lib. Bonds	Due—Ore & Bul. Sold	O. & B. in Transit	Total
1919..	$40,604,915	$5,538,016	$1,840,613	$963,893	$3,939,192	$99,664	$4,424,100	.....
1918..	40,354,914	$.126,285	1,836,859	1,089,514	5,224,646	852,445	3,477,407	57,962,070
1917..	40,351,598	2,033,015	1,366,921	362,992	7,515,023	1,167,847	2,668,698	55,466,093

	LIABILITIES					
	Capital Stock	Accounts Payable	Reserves— Depletion Deprec., etc.	Developed Orebody	Surplus Account	Total
1919.....	$525,000	$2,610,996	$9,945,330	$38,425,000	$5,904,067	$57,410,393
1918.....	525,000	2,942,843	7,567,863	38,425,000	8,501,724	57,962,070
1917.....	525,000	477,306	4,019,257	40,000,000	10,444,529	55,466,093

Comparative Statement of Operations:

	1918	1917	1916
Gross income	$14,919,072	$14,583,649	$9,949,919
Other income	237,644	171,466	31,154
Total income	15,156,716	14,755,114	9,931,073
Expenses, taxes., depreciation, etc	11,825,662	6,498,997	3,042,872
Net earnings	3,331,054	8,256,117	6,938,101
Dividends	1,575,000	1,680,000	1,050,000
Surplus	1,756,054	6,576,117	5,888,101

Report of Aug. 1, 1919, showed: cash on hand July 1, 1919, $1,078,388; Liberty Bonds, $3,350,000; copper in transit and in hands of selling agent, the greater part of which was unsold, 17,594,000 lbs. On Nov. 1, these figures were, respectively, $677,363, $3,350,000 and 20,150,000 lbs; also bills payable, $250,000. On account of light sales of metal, company borrowed money against the surplus held in U. S. Bonds in order to pay the dividend of November 1, 1919.

Dividends: $1 in 1916; $2.85 in 1917; $4.50 in 1918; $2.35 in 1919 and 50c on February 1, 1920. The total is $11.25, equal to $11,392,500.

Property: 1,200 acres, known as the Little Daisy group, a two-thirds interest in the adjoining Florencia claim, and an option on 19 claims, 300 acres adjacent to the company's property on the S. and S.-E.; $130,000 was paid for this tract.

The Jerome Verde option was relinquished June 15, 1915, as the 2,127′ of development work from the Daisy shaft failed to disclose ore of commercial importance.

In November, 1919, the Haynes claims were acquired from the West United Verde Copper Co. Several small deposits have been opened, the deepest workings being 1,200′. The price was $250,000, and some West United shareholders tried to secure an injunction against the sale, considering the price too low.

History: original development was by an 800′ vertical shaft, the Edith on the Little Daisy claim, about 1,700′ from the main shaft of the United Verde mine, with collar 450′ lower. This shaft, after passing through 50′ of iron stains, encountered copper carbonates, continuing for depth of about 150′, succeeded by conglomerate, and from a depth of 425′ to 578′ passed through schist carrying copper sulphides and manganese. These old workings total about 5,000′ but develop only a little ore of about 2% copper, 1 oz. silver and $3 gold, on the 800′ level. A 130′ winze below this level was

bottomed in decomposed schist, showing considerable copper.

The early exploration work of the company was unsuccessful, and an option was taken in 1913 on the Jerome Verde group, and a new shaft, the Edith, was started 1,500′ farther east, sunk to a depth of 1,200′. Verde Extension's development of the Verde ground was disappointing but in the company's own ground a large body of very rich chalcocite ore was encountered on the 1,200′ level, Dec., 1914. This orebody was developed and worked during 1915, and the shaft was sunk to the 1,400′ level. Feb., 1916, a drift on this level cut the downward extension of the bonanza orebody found on the 1,200′ level. On the 1,400′ level the orebody was fully opened, and had an area of 60,000 sq. ft. on that level. Between the 1,400′ and 1,300′ levels the shoot was proved by raises. Oxide ore was encountered 60′ above the 1,300′ level, so no considerable quantity of ore is expected above that point. Jan. 1, 1920, reserves above 1,400′ level were 571,400 tons of 15% ore.

Conservative estimates gave 1,000,000 tons of 16% ore between these levels. A winze was sunk 200′ below the 1,400′ level, passing through 114′ of 15% ore and 46′ of low-grade ore. At 160′ an intrusion was cut, and at 200′ there was chalcopyrite again.

The ore thus far developed lies on the northerly downthrown side of a big fault, with a drop of 650′ or thereabouts, as shown by the limestone strata on each side of it.

Development: the new 3-compartment Audrey shaft has been sunk to the 1,700′ level and concreted; this permits of drifting on the 1,050′, 1,600′ and 1,700′ levels. The face of the crosscut to the orebody on the 1,500′ level was 450′ from shaft in Nov., 1919, and crosscuts had been started at 1,600 and 1,700′. There are 2 other shafts, the Little Daisy, used only for ventilation, and the Edith, used for supplies; in addition there are 2 raises to surface, one used for ventilation, the other for waste. Driving the 11,000′ haulage adit was completed in April, 1919; this connects with the mine at the 1,300′ level, enabling all ore to be shipped direct from the mine to the smelter and eliminating the use of the aerial tram. Ore-trains, consisting of electric locos and 30-ton cars, started operating in this tunnel in Nov., 1919. Overhead square-set stoping is used for very heavy ground, about 50%, and the Mitchell stoping method wherever weight of ground will permit, about 50%.

In 1918 new work amounted to 10,919′. No prospecting work was done and no new orebody developed. Now that the Audrey shaft has been completed prospecting and development will be resumed. Ore reserves not given.

Danger from fire has been minimized—the Edith shaft has a spraying system, the Audrey shaft has been concreted, and the Little Daisy shaft is naturally wet. The Mitchell stoping method leaves barriers of waste which will serve as fire-breaks in that part of the Bonanza orebody where this system is used.

A suction fan, capacity 40,000 cu. ft. per minute, is located at the top of the Little Daisy shaft, and another, capacity 135,000 cu. ft. per minute, will be placed at the top of the air-raise. With this equipment and the completion of the necessary underground work the mine will be one of the best ventilated in the southwest.

Smelter: designed by A. G. McGregor and staff, Warren, Ariz., and described by F. E. Nichols in "E. & M. J." of Oct. 19, 1918. Started operating in July, 1918. The plant includes one 48″x26′-8″ blast-furnace, two 25′x120′ reverberatories; six 21′ 6″ 6-hearth Wedge roasters, and three 12′ converters of the Great Falls type. Mine ore goes to steel receiving bins, 1,500 tons capacity, and by belt conveyors to crushing and sampling plant; from here the coarse material goes to the coarse bedding 5,300-ton bin, the fine material to the fine bedding 5,000-ton bin. The coarse ore goes by conveyor to the blast furnace building to bins to charge cars. Blast furnace has a daily capacity of 600 tons of ore. Slag is handled by 225 cu. ft. electrically tilted cars, drawn by 24-ton electric locomotives. The fines go by belt conveyor

to the roasting plant, after calcining they are taken in 15-ton cars to the reverberatories, each with a daily capacity of 500 to 600 tons. Reverberatories are coal-dust fired, the first time this has been tried in Arizona. The coal-crushing and pulverizing equipment consists of a 24″ Jeffrey single-roll crusher, a Fuller-Lehigh indirect fired rotating drier, and a battery of four 42″ F-L ball pulverizing mills. The converting plant has a 40-ton electric traveling crane.

Reverberatory waste heat is used in generating steam in 3 Stirling waste-heat boilers, 713 rated h. p. each; in addition there are 2 Stirling direct-fired boilers, 439 rated h. p. each, fired with pulverized coal.

The power plant contains two 2,200-volt turbo-generators; two 200 kw. motor-generator sets for direct current for the plant; two units, each consisting of a Roots 400 cu. ft. blower, direct, connected to a tandem compound Allis-Chalmers engine, for blast furnace air; two Allis-Chalmers 18,000 cu. ft. blowing engines for the converter air. Water is obtained from wells on the site at 100′ depth.

Production:

Year	Ore tons	Copper %	Gold oz.	Silver oz.	Cost per ton of ore	Net cost per lb., cents	Selling price per lb., cents
1919.....	96,546	15.5	....	....	.....	9.8	17,136
1918.....	133,535	20.35	.024	4.18	.....	....	.....
1917.....	115,064	27.5	.014	2.89	$32.88	5.8c	27.033c
1916.....	80,159	22.7	.032	1.60	29.91	6.6	24.145

	Lbs. Copper	Oz. Gold	Oz. Silver
1919.....	28,860,615	3,169	272,855
1918.....	55,491,077	3,046	503,739
1917.....	63,242,784	1,656	332,536
1916.....	36,402,972	2,570	128,467

On hand January 1, 1920, 27,220,393 lb. copper, compared with 19,206,934 January 1, 1919.

Labor troubles caused a complete shut-down of the property in Feb., 1919, operations were resumed June, and the company is again the lowest cost copper producer in the United States. Although the grade of ore now being smelted is lower, large profits should continue with the operation of its own smelter.

UNITED VERDE JR., CO. **ARIZONA**

Property, the Ballard group, reverted to owners. See Ballard group and United Verde Cons. Co.

VENTURE HILL MINING CO., THE **ARIZONA**

Address: Richard Lamson, sec.-treas., Prescott, Ariz. **Mine address:** C. T. Jolly, v. p., Jerome, Ariz. Ed. Shumate, pres.

Inc. 1900, in Arizona. **Cap.,** 3,000,000 shares; $1 par. In Sept., 1917, $25,000 was borrowed, for development, on 10% notes, secured by mortgage.

Property: 6 patented claims, 110 acres, 2 miles S. of Jerome, Yavapai county, Ariz., near the Verde Combination and others. Examined by W. H. Weed in 1916. Mine was idle for years, but was reopened in July, 1916, and closed down in October, 1917.

Geology: claims shows a complex of altered Yavapai schist, quartz porphyry and diorite, cut by fractures and fissure veins. Two veins show some scattered ore in shaft and tunnel, samples assaying 6.96% copper, 6.5 oz. silver and $4 gold per ton; ore in commercial amount had not yet been disclosed in October, 1917.

Development: by a joint shaft on the Verde Apex line, 265′ deep, which connects with the 575′ Socrates tunnel. The 2-compartment shaft has been in ore almost since the start, the schist showing pyrite and chalcopyrite.

Equipment: includes 60 h. p. Foos gas engine, 25 h. p. hoist, Sullivan compressor, bunk and boarding houses, etc.

Was regarded as a good prospect.

VERDE APEX COPPER MINING CO. **ARIZONA**

Address: J. H. Robinson, sec., Prescott, and E. L. Bartholomew, supt., Jerome, Ariz.

Cap., $3,000,000; shares $1 par; 750,000 in treasury; 450,000 issued; 1,800,000 in pool.

Property: 8 claims, 85 acres, in central part of the Verde district, one mile from Jerome, and some distance S. of the open cut of the United Verde mine. The claims are well located. As underground work is limited, the prospective value of the ground is largely a matter of geologic deduction and estimate, based on finding both oxide and sulphide ores in the tunnels, and with full knowledge of the 3 producers in the district.

Development: three veins are exposed in tunnels. The Black Horse is 6′ wide, carrying good ore; the Socrates is narrow, but has promise, and No. 3 vein in the upper tunnel shows oxide ore of commercial value. With the Venture Hill Mining Co., which see, a joint shaft is being sunk on the boundary of the two properties. This was 260′ deep, Oct., 1917; no later report. Was a promising venture.

VERDE CENTRAL MINES, INC. **ARIZONA**

Address: C. T. Joslin, sec., Prescott, Ariz.

Officers: W. F. Staunton, pres.; C. T. Joslin, sec.-treas., with J. A. Hope, C. C. Miller, Jr., and L. Spence, directors.

Inc. Aug. 16, 1916, in Arizona. **Cap.,** $2,500,000; shares $1 par; non-assessable; 500,000 issued.

Property: 20 patented claims, 308 acres, at Jerome, Ariz., in the center of the Verde district. Claims considered well located, and merit development of the known veins and prospecting along shear planes and beneath the limestone cap. Contains extension of the Venture vein, of claims owned by U. V. Extension.

Development: by 3 old prospect tunnels, probably 1,000′ long, on the Venture vein, and a 200′ shaft sunk on the northern part of the property. In 1918 the old workings were retimbered in preparation for future work. Tunnels show ore. Is regarded favorably.

VERDE COMBINATION COPPER CO. **ARIZONA**

Address: David Morgan, v. p.-mgr., Box O, Jerome, Ariz.

Officers: J. L. Dyer, pres.; J. C. Callaghan, sec.; Jas. F. Primm, treas.; with J. M. Layman, J. S. Eberman and W. N. Richards, directors. W. B. Kennedy, asst. sec.-treas.

Inc. in Arizona. **Cap.,** $1,000,000; 50c par; non-assessable; 1,600,000 issued. Union Bank & Trust Co., El Paso, Texas, transfer agent. Annual meeting in December.

Balance sheet, Oct. 31, 1918, showed that $229,027 had been spent on development, and in addition, $47,526 on equipment, etc. Total current assets, Dec. 1, 1918, were $174,994.

Property: 33 claims, 550 acres, 15 patented, in Verde district, Ariz. Company's engineers consider it is on the main fissure of the district, and surficially to possess all the favorable attributes for ore deposition.

Development: recent development is all at the north end of the property, by new shaft 1,300′ deep, which connects with extensive workings in the Mescal tunnel. This tunnel shows the great Verde fault, the master, and post mineral fault that traverses the Jerome district for 20 miles; also discloses 2′ of 5% copper ore, in a fissure vein, on which but little development save a raise has been done; also two promising contacts between diorite with stringers of copper. The old workings at the south end of the tract include 640′ and 500′ shafts, showing diorite with stringers of copper; and a 75′ tunnel opening a 3′ quartz vein.

In year ending Oct. 31, 1918, development work totaled 5,039′, of which 3,270′ was on the 700′ level and 1,769′ on the 1,100′ level. No commercial ore was opened up but indications on the 1,100′ level are said to be promising; that numerous stringers of rich chalcopyrite were cut. Reported in April, 1919, that the vein had been cut on the 1,300′ level, that it

was 6′ to 8′ wide, had no commercial ore, but contained numerous stringers of chalcopyrite.

VERDE GRANDE COPPER CO. **ARIZONA**

Reorganized in July, 1917, as the Jerome Grande Copper Co., which see. Described in Vol. XII.

VERDE HUB COPPER CO. **ARIZONA**

Address: 715 Millikin Bldg., Decatur, Ill. W. S. Owens, supt., Jerome, Arizona.

Officers: Wm. C. Field, pres.; F. P. Wells, v. p.; E. Linxweiler, treas.; Samuel Morthland, sec.; with C. W. Devore, C. C. McFann and N. M. Gillies, directors.

Inc. Nov., 1916. **Cap.**, $1,000,000; 50c par. A reorganization of the Decatur Copper M. Co.

Property: known as the Decatur, 1 mile S. of Jerome, Ariz.

Development: by 284′ shaft. Diamond drilling, in charge of Samuel Morthland, was started in Sept., 1917, but later was stopped on account of the war; drilling done is said to have been encouraging. Plans resuming work.

VERDE INSPIRATION MINING CO. **ARIZONA**

Mail returned, 1919, from Prescott.

Officers: E. H. Meek, pres.; A. L. Hammond, sec., Prescott, Ariz.; with M. Lynch, J. H. James and S. S. Allen, directors

Inc. Jan., 1917, in Arizona. **Cap.**, $1,000,000; $1 par; 125,000 shares went to owners and promoters, 125,000 for outstanding obligations, with 750,000 in treasury and offered to the public.

Company was organized to take over the Hillside Mining Co., 9 claims, 170 acres, 1½ miles from Cherry P. O. and 12 miles S. of Jerome, said to show gold ore $7 to $17 per ton with 20,000 tons ore blocked out Jan., 1918. Developed by several shafts; equipped with a 20-stamp mill which company planned on enlarging. No report since 1918.

VERDE MONSTER COPPER CO. **ARIZONA**

Officers: T. F. Shea, pres., Jerome, Ariz.; C. M. Pedley, v. p., and A. M. McLellan, sec.-treas.

Inc. in Arizona. **Cap.**, $2,000,000; shares 25c par; non-assessable.

Property: 600 acres, 8 miles N. of Jerome, Ariz. About the end of 1916 ore containing 4% copper was found near the surface. Not operating.

VERDE QUEEN COPPER CO. **ARIZONA**

Reported in Smythe's Obsolete American Securities, Vol. XI, 1911, "New Jersey charter void 1906, for non-payment of taxes."

At a stockholders' meeting held in Jersey City, N. J., May 6, 1916, dissolution of the company was approved. It was decided to make a distribution of part of its assets, consisting of 1,000,000 shares of Jerome Verde Copper Co.'s stock; holders of Verde Queen stock to receive in part liquidation 200 shares Jerome Verde stock for each share of Verde Queen stock.

Property of the company was taken over in 1906 by the Jerome Verde Copper Co.

VERDE SQUAW COPPER MINING CO. **ARIZONA**

Address: T. H. Gray, sec., Box 682, Jerome, Ariz.

Officers: J. B. MacDonald, pres.; D. W. Barter, v. p.; T. H. Gray, sec. and gen. mgr.; C. F. Benjamin, treas.; with C. C. and G. Reid, directors.

Inc. Jan. 8, 1917, in Arizona. **Cap.**, $1,500,000; shares $1 par; non-assessable; 915,000 issued. Annual meeting, second Monday in January.

Property: 15 claims, 275 acres, in Verde Valley, 4½ miles S. of Camp Verde, 25 miles S. E. of Jerome, Yavapai county, Ariz. Examined in 1917 by William Winkelman.

Development: prospected for 17 years by D. W. Barter, and 3 to 40% ore has been exposed in numerous places. The Barter tunnel now in 1,000′ is said to have cut a 30′ vein at depth of 500′; this vein is reported to have some bornite and also 8′ of lower grade sulphide assaying 1% to 7% cop-

per. A 2-compartment shaft has been sunk on the Boulder claim, a 40 h. p. hoist and a compressor added. Underground work here totals 270'.

Is a meritorious mining venture.

VICTOR COPPER CO. **ARIZONA**

Reorganized as New York Verde Copper Co., which see.

Address: W. W. Lewis, Kingman, Ariz.

WEST UNITED VERDE COPPER CO. **ARIZONA**

Mine office: Jerome, Ariz.

Officers: C. B. Stranahan, pres.; Arthur Terry, sec.-treas.; preceding with Wm. T. James, directors; John H. Banks, cons. engr., 61 Broadway, New York City.

Cap., $5,000,000; shares $1 par; 3,375,000 issued.

In Oct., 1917, company absorbed the Jerome-Verde Extension Copper Co. on the basis of 2,250,000 West United shares in exchange for 450,000 Jerome-Victor shares.

The Jerome-Victor Extension C. Co. was a reorganization of the Haynes C. Co., which in turn had succeeded the Jerome Mines Dev. Co.

Property: 8 patented claims, 160 acres, adjoining the United Verde on the N. W., shows lenticular orebodies in dioritic schist, reported to be 3'-19' wide and traceable for 2,000'.

Development: includes 1,200' shaft, with 2,000' drift and crosscut work on 700' level and 160' on the 1,200' level; also a 350' prospect shaft and 248' tunnel. Excessive flow of water encountered in drill-holes, 2-300' deep, said to have forced former management to pull the pumps and close down the property in 1914.

The mine had been unwatered to 1,200' in June, 1917, when the miners' strike resulted in suspension of work, allowing the shaft to fill again.

Equipment: includes electric hoist, 10-drill Ingersoll-Rand compressor, a 150 k. w. generator and 12 buildings.

Mine under water at present time—1919. Company is over-capitalized, and hardly worth further attention. In November, the United Verde Extension Company offered $250,000 for the property, and it was being transfered when certain shareholders thought that the price was too low, and thereupon started injunction proceedings against the sale.

YUBA COPPER CO. **ARIZONA**

Operated, 1918, a group of claims near the United Verde, Jerome.

YUMA COUNTY.

ALAMO GOLD MINING CO. **ARIZONA**

Office: Rol. King, 304 Wilcox Bldg., Los Angeles, Cal.

Officers: B. A. Kipp, pres.; Calvert Wilson, v. p.; Rol. King, sec. and mng. director; with F. R. Stewart, directors. J. V. Allison, supt.

Inc. Aug., 1917. **Cap.** 1,000,000; $1 par; 700,000 issued. All owned by officers.

Property: 6 claims in Alamo Springs district, Yuma county. Development by 310' incline shaft. In July, 1919, cross-cutting was under way for the hanging wall. The footwall carries gold throughout. Equipment includes 12 h. p. hoist.

ALVIN DEVELOPMENT CO. **ARIZONA**

Office: Houghton, Mich. Controlled by Tank Pass Consolidated Mining Co., Salome, Yuma county, Ariz. Idle except for annual assessment work. Described Vol. X.

AMERICAN EAGLE CO. **ARIZONA**

E. C. Lane, mgr., Parker, Ariz.

Property: in the Cienega district, Yuma county, reported to have made several shipments of copper ore to smelter averaging 20%.

ARGUS COPPER & GOLD MINING CO. **ARIZONA**

Addres: Planet, Ariz.

Officers: A. B. Jones, pres.; D. M. Jones, v. p.; A. B. Hardwick, sec.; Ernest C. Lane, mgr.

Inc. in Arizona. **Cap.,** $2,000,000; $1 par; 500,000 shares in treasury.

Property: 46 claims, 920 acres, adjoining the Planet mine at Planet, Yuma county, slightly developed and said to show several well-defined veins, carrying gold-copper ore, which will assay from $5-$20 gold and 10% copper per ton. Good ore reported from 120′ level in new shaft.

ARIZONA BUTLER MINES CO. **ARIZONA**

Address: F. D. Friend, San Francisco, Cal., or Bouse, Ariz.

Officers: F. D. Friend, pres.; M. L. Strong, v. p.; E. E. Hendee, treas.; D. H. Jackson, engr.

Property: 700 acres near Bouse, Yuma county, including claims worked in 1870. There are 18 shafts from 30′ to 300′ deep, exposing ore with gold, silver, copper, and lead values.

Equipment: includes oil engine and compressor.

ARIZONA EMPIRE COPPER MINES CO. **ARIZONA**

Mine office: Parker, Yuma county, Ariz

Officers: W. A. Moses, pres.; Gen. E. Bouton, v. p.; L. H. Knowlte, sec.; Newton Evans, treas.; with F. X. Pfaffinger, directors; Jas. H. Watson, gen. mgr.

Inc. Aug., 1909. **Cap.,** $5,000,000; $5 par.

Property: bought of Carnation Mining Co., comprises 41 contiguous claims, 820 acres, about ten miles north of Parker and three miles from Eagle Landing, on the Colorado River. Company also has 160 acres of ranch lands on the Colorado River, including Eagle Landing, held for a smelter site. Geological conditions are markedly similar to those at the Planet and Clara mines.

Development: by about 6,000′ of workings, deepest 300′, showing a large amount of copper carbonate, with sulphide zone not yet reached. On the 200′ level of the Carnation shaft is an orebody said to assay 5% copper and $5 gold per ton, carrying a 10′ paystreak estimated to average 10% copper and $6 gold per ton.

Surface showing is interesting, but development work was disappointing. Shallow excavations show irregular areas, often 50′ wide, well stained with copper carbonate; much of it could be shipped. This green carbonate ore has been carefully piled and makes beautiful patches of color on the desert scenery. Development usually reveals a sheared zone, copper-stained, but only a few feet wide. Throughout this region there are occasionally encountered pockets of rich gold ore with the copper. These seem to be lenses interbedded in the schist, and while one or two important orebodies have been found in the region, no mines of importance have been developed. Mines were reported taken over by a Los Angeles syndicate and shipments made to Hayden smelter, Feb., 1917.

Letters returned unclaimed from Prescott, June, 1919.

ARIZONA ENTERPRISE MINING CO. **ARIZONA**

Address: Dan McGlone, supt., Bouse, Ariz.

Property: 12 miles south of Bouse, Yuma county Sinking shaft to develop this prospect.

ARIZONA McGINNIS COPPER CO. **ARIZONA**

Mail returned unclaimed, March, 1919, from Parker, Ariz.

Officers: B. L. Vaughn, pres.-gen. mgr., San Diego, Cal.; E. C. Fleet, sec. C. E. Boydston, supt., at last accounts.

Inc. 1916, in California. **Cap.,** $1,000,000; $1 par.

Property: 13 claims, adjoining the holdings of the Empire Copper Co., about 12 miles N. W. of Parker, Yuma county, developed by 200′ shaft and 200′ tunnel. Ore occurs as a contact deposit in limestone and quartz schist, running N. 65° E., with 30-70° dip. The orebody is reported to be 50′ wide and 200′ long, opened to depth of 20′ on surface, with 2′ shoot of

shipping ore containing cuprite, malachite and chrysocolla, and said to run 10% copper and $8 gold.

Equipment: includes 35 h. p. oil engine, compressor and 1,100′ aerial tram. Several carload shipments made in 1917. Management planned sinking shaft and driving tunnel to get below the surface ore.

ARIZONA PORPHYRY COPPER CO. **ARIZONA**

Organized to acquire and work a property in the Swansea district, about 20 miles N. E. of Bouse, Yuma county. As a result of unfavorable reports from engineers the property was not purchased and all subscriptions for stock refused.

ARIZONA REVENUE COPPER CO. **ARIZONA**

Officers: at last accounts, David F. Johnson, pres., Phoenix, Ariz.; W. L. Williams, v. p.; Oscar M. Spence, sec.-treas., Parker, Ariz., with A. J. Beecher and Paul C. Thorne, directors. H. A. Morse, supt.

Inc. Dec., 1916, in Arizona. **Cap.,** $2,500,000; 50c par, of which 2,200,000 shares were given the owners for the claims and 200,000 shares offered to the public, March, 1917, at 15c.

Property: 72 claims, about 1,400 acres, in Cienega district, Yuma county, includes the Echo, Milton, Cecil, El Moline, Revenue and Elephant groups.

Development: about 3,000′ of workings, at a cost of $40,000. A 185′ shaft on the Echo group is said to show ore running better than 8% copper. The Revenue group is developed by 2 incline shafts, 285′ and 150′ deep. Ore consists of hematite containing oxidized copper minerals, and occurs as a replacement of limestone lenses in schistose rocks. Surface showings are promising and warrant further development at depth. Geology of the district fully described in U. S. G. Bull. 451.

Ore reserves: about 400 tons of high-grade ore on the dumps. Property formerly owned by E. E. Osborne. No recent returns.

ARIZONA STANDARD COPPER CO. **ARIZONA**

Address: J. T. Carrigan, mgr., Parker, Ariz.

Officers: T. Spellacy, pres.; O. M. Spence, sec.-treas.; with C. Leonardt and J. P. Sweeney, directors.

Inc. 1917. **Cap.,** $5,000,000.

Property: 21 claims, 420 acres, 14 miles E. of Parker, and about 4 miles from Midway, on the Swansea railroad. Claims reported to show surface indications of a disseminated copper deposit, which is interesting if true.

Development: by 3,000′ of underground workings. Reported prospecting at depth by means of churn drills.

ARIZOTA MINING CO. **ARIZONA**

Seth Bullock, pres., Deadwood, S. D.

Property: 59 claims in the Harcuvar mountains, 11 miles north of Wenden. Ore is said to contain copper and gold. Shaft 125′ deep.

BILLIE MACK MINING CO. **ARIZONA**

Claims now owned by Illinois Arizona Copper Co., which see.

BLACK GIANT MINES CO. **ARIZONA**

Operating the Black Giant and Little Giant Mines.

Main office: Mobile, Ala. **Mine office:** Wenden, Ariz.

Officers: A. Meaher, pres., Mobile Ala.; Dick Wick Hall, v. p., Salome, Ariz.; C. R. Hall, sec.-treas.; G. S. Leatherbury, A. Meaher, Pat. J. Lyons, A. Hubbart and Tom Stevens, directors, all of Mobile, Ala. S. B. Serf, supt.

Inc. April 3, 1917, in Arizona. **Cap.,** $1,500,000; $1 par; 1,300,000 outstanding. Annual meeting, first Monday in January. Transfer office, Mobile, Alabama.

Property: 8 claims, 160 acres, located in the Harcuvar mountains, about 10 miles N. of Wenden, in Cunningham Pass. In 1918, work was started on an incline shaft, down 240′ and sinking on ore. Ore opened up on the 110′ level. Orebody reported to be from 25-100′ long, nearly vertical, and running N. W.-S. E. It is in a fissure vein with iron gossan, with copper and gold values; 11 carloads of ore are said to have been shipped.

Equipment: 25 h. p. gasoline hoist and 4-drill compressor. Work begun in 1916.

BLACK REEF COPPER CO. **ARIZONA**

Office: 17 W. Adams St., Phoenix, Ariz. **Mine address:** Wenden, Ariz.

Officers: H. E. Willhalm, pres.-mgr.; F. H. Larsen, v. p.; T. M. Burroughs, sec.-treas.

Cap., $250,000; 25c par; 650,000 shares in treasury.

Property: 8 claims, 160 acres, on the south side of Cunningham Pass, Harcuvar mountains, 8 miles north of Wenden. Claims adjoin property of the Desert M. & D. Co.

Development: 400′ working shaft. The 170′ level runs 45′ west and 180′ east on the vein, which, though leached, shows some shipping ore. The vein is practically vertical and the shaft is bottomed in ore. Mine yields 1,000 gals. of water per day.

Ore: carries chalcopyrite and bornite associated with limonite and siderite. An ore shoot on the 300′ level is said to show $3-$40 gold, 3-35% copper and high iron values. Vein is 2′-3′ wide with swell to 6′ at 100′ in depth.

Equipment: includes 25 h. p. steam hoist, 50 h. p. gasoline engine and compressor.

In 1917 company offered the public 100,000 shares at 25c. for a development fund.

It was reported that the company was fully financed Sept., 1917, and the Arizona Corporation Commission has requested the officers to explain sale of stock after expiration of selling permit of July 1, 1917.

BLUE BELL MINING & REDUCTION CO. **ARIZONA**

Mine P. O.: Swansea, Yuma county, Ariz. W. P. Martin, pres.; E. T. Miner, v. p.-supt.; K. E. Newcomb, sec.

Property: 23 claims, about 5 miles from Swansea, just across the Bill William's Fork River from the Swansea pumping plant.

Development: 200′ two-compartment shaft and several hundred feet of tunnels, showing ore carrying up to 10% copper, with fair gold and silver values. No recent returns.

BOWYER GOLD & COPPER CO. **ARIZONA**

Office: Quartzite, Ariz. **Mine office:** Bouse, Yuma county, Ariz. Jos. Bowyer, pres.-treas.; E. N. Jenkins, sec., with E. E. Northrop and E. B. White, directors.

Inc. July 15, 1909, in Arizona. **Cap.,** $5,000,000; $5 par. Annual meeting, first Monday after first Tuesday in July.

Property: 7 claims, known as the Bowyer group, also 160 acres miscellaneous lands, in the Plomosa district, on the western slope of the Dome Rock Mountains, about 20 miles west of Bouse. Property has 3 contact deposits, between schist hanging and limestone foot, showing 50 to 200′ gossan outcrops and carrying malachite and chalcocite, estimated to average 2 to 10% copper and $1 to $10 gold per ton.

Development: by 50′ shaft near the hanging wall, all in ore crrying from 3 to 15% copper and a small amount of gold and silver. Sinking 300′ inclined shaft in Sept., 1919. Hoist and air drills installed.

Company reports being out of debt and having funds on hand to pay all expenses.

BULLARD MINE **ARIZONA**

Address: John C. Bullard, Aguila, Ariz.

Reported bonded to B. C. Wilson, W. Douglas and E. Bemdurant of Wickenburg.

Property: 36 claims located 10 miles north of Aguila, in Cunningham Pass, Harcuvar mountains, Yuma county. Shaft 225′ deep and 400′ adit tunnel. Leasers shipped 4 cars of ore during 1918. Reported to have 300,000 tons ore in the mine averaging 4% copper and $5 gold per ton.

CLARA CONS. GOLD & COPPER MNG. CO. **ARIZONA**

Declared bankrupt, Jan. 27, 1912. Reorganized as the Swansea Consolidated Gold & Copper Mining Co., receiving 1,500,000 shares of the total of 4,000,000

shares for the transfer of the property with its indebtedness and liabilities. A suit was filed against the Clara Consolidated in Oct., 1912, by George Mitchell, former president, for $75,000, and by Mary Mitchell for ejectment from several mining claims valued at $25,000 and the recovery of $200 a month rental therefrom.

Property leased in 1917, for 10 years, to the Swansea Lease, Inc., which see.

COBRITA MINES CO. **ARIZONA**

Address: Salome, Ariz.

Inc. 1916. In Jan., 1918, bond and lease was given to the Cobrita Verde Co., which see.

Property: 14 claims, 295 acres, with vein developed by 390′ tunnel and 200′ vertical, two-compartment shaft with 40′ crosscut at 100′ and 300′ drifting at 200′ level.

A level driven from winze, at 100′ below tunnel is on vein and shows several oreshoots. Mine has yielded car load shipments of 20% copper ore containing $7 to $15 gold per ton. Sixty thousand dollars spent on equipment of property. This was a promotion of "Dick Wick Hall," which caught many small investors.

COBRITA VERDE COPPER CO. **ARIZONA**

Mine address: Salome, Ariz.

Address: G. J. Kahn, pres., 1707 Leighton Ave., Los Angeles, Cal., or J. W. Whittington, 51 E. 42nd St., New York City.

Officers: Judge W. M. McCrea, v. p.; J. W. Whittington, sec.; above with C. A. Wilson, P. E. Parentean, directors. Parentean & Co., brokers, New York, fiscal agents.

Inc. Nov. 13, 1916, in Utah. **Cap.**, $2,500,000; $1 par; increased 1918 from $1,000,000; 1,400,000 issued; 500,000 pooled. In January, 1918, company took lease and bond on property of Cobrita Mines Co., described below, and relinquished Leatherby bond and lease on Vindicator and Little Grant Mines.

Property: 5 claims, Easy Money, Mochette and Mache, Nos. 1, 2, 3, about 100 acres, in Harcuvar mountains, 9 miles N. of Salome, Yuma county, on the Santa Fé R. R. Claims lie in basin on the Butler Valley (or north) side of range; elevation 2,200′ to 4,000′, between Tank and Cunningham passes. Rocks are diabase schist, and greenish prophyritic andesite and on the Mache claims gneiss cut by rhyolite dikes, and "iron stained dacite."

Black reefs of "diorite" 40′ to 50′ across, occur and are cut by mineral veins. Ore occurs in quartz veins and in iron veins, both carrying copper as oxides and sulphides, with glance in places.

Development: 160′ shaft begun in Dec., 1916, on strong 5′ vein exposed at surface with 8″ ore; also cut veins at 30′, 58′ and 81′ in shaft. Company plans sinking 500′ shaft. Main vein said to be 3½′ to 5′ wide with ore. Shipments have run 8% to 18% copper and $8 to $12 gold per ton.

CONTINENTAL COPPER & GOLD MINING CO. **ARIZONA**

Out of existence. Described in Vol. XIII.

COPPER CHIEF MINES CO. **ARIZONA**

Offices: C. A. Post, 20 W. 34th St., New York. Mine at Quartzite, Yuma county. Ariz.

Officers: Richard Darling, pres.-treas.-mgr., Quartzite, Ariz.; Richard Darling, Jr., v. p.; B. A. Darling, sec.

Inc. 1910. in Arizona. **Cap.**, $5,000,000; $1 par; outstanding, 3,000,000.

Property: 28 claims, patented, 560 acres, 20 miles S. W. of Bouse, shows schist and greenstone with a contact deposit dipping at 35° and containing copper and gold ore that assays 1.3% to 20% copper. Gold runs from $1 to $5 per ton.

Development: by 2-compartment 650′ vertical shaft, which has passed through greenstone into a replacement body of copper ore in limestone. Shaft is down to water-level, and crosscutting is proceeding. A pump is to be installed.

Examined by L. A. Dunham, who reported that the remarkably favorable iron outcrops on all the claims of this company would probably be underlain by high-grade copper ore.

Equipment: includes a 25 h. p. gasoline hoist, a small compressor, 50 h. p. engine, triplex pump, 20 k. w. generator, 20 h. p. motor, auto-trucks, and complete camp site.

No recent news available.

CRITIC MINE **ARIZONA**

Joseph Nolachek, lessee, Wenden, Ariz. Geo. B. Layton, New York, owner.

Property located in Cunningham Pass, Yuma county, developed to depth of 440'.

Ore contains gold, silver and copper. Has been operated by leasers during recent years who have made regular shipments assaying from $15 to $75 gold, 10 to 25% copper, with a few ounces of silver. Calaverite, a telluride of gold reported from 400' level. Equipped with 15 h. p. hoist.

Production said to total about $700,000.

CUPRITE INVESTMENT CO. **ARIZONA**

Address: Wenden, Ariz.

Property: the Wilkinson mine, 9 miles north of Wenden, Yuma county, Adjoins the Little Giant on the S. W. Developed by shallow tunnels and a 100' shaft. At 50' depth, report vein 18" wide. Shipments in 1918 said to have run better than $50 gold and 10 to 20% copper.

DESERT MINING & DEVELOPMENT CO. **ARIZONA**

Robt. W. Hollis, mgr.-cons. engr. **Cap.,** 500,000 shares; $1 par. Stricken from New York Curb, April, 1918. A prospect.

Property: 16 claims in Cunningham Pass, 9 miles N. of Wenden, and 27 claims at Wenden, total 540 acres.

Development: by 2 shafts, 200' and 325' deep on the Copper Hill claim, said to show a large body of disseminated ore.

DUTCHMAN MINE **ARIZONA**

Owners: Tom Bouse and Mr. McMahon, Bouse, Yuma county.

Property: 5 miles west of Bouse, operated in 1918.

EXCELSIOR GOLD & COPPER CO. **ARIZONA**

Address: Gus Mudersbach, pres., Bouse, Yuma county, Ariz.

Inc. Aug. 1, 1902, in Arizona. **Cap.,** $2,000,000; $1 par; stock owned by two Flagstaff men and the president. Is the successor of the Record Mines Co.

Property: the Mudersbach mine, with 34 claims, 8 miles S. of Bouse, on the main road to Quartzite, in the foothills of the Palomas mountains. The property covers the strike of a mineralized contact metamorphic zone showing gossan of specular hematite, underlaid by oxidized ores to shallow depth, succeeded by copper sulphides, an average sampling said to have given 4.5% copper.

Geology: ore occurs as bornite, chalcopyrite, pyrite and hematite in a garnet-epidote gangue; it is an irregular bunchy replacement, a few inches to a few feet thick, of limestone resting on schist and altered by quartz monzonite.

Development: by the 150' Excelsior shaft, with drifts at 50', 100' and 130', and the 200' Mammoth shaft, with 600' of drifts and crosscuts.

Equipment: includes two 15 h. p. gasoline hoists, a gas engine and air compressor.

Production: 48 tons of 12% ore shipped in 1916, and a carload of 4.25% copper ore with 50% iron and another of 6% ore. Work in 1917 consisted of a level at 50' depth of No. 2 shaft; sulphide ore was cut in the 200' level of the No. 1 shaft. No recent news is available.

FORTUNA MINES CORPORATION **ARIZONA**

Presumably idle.

Office: 31 State St., Boston, Mass., and F. G. Hobbs, sec.-treas.; Sharon Bldg., San Francisco, Calif.

Officers: F. E. Boland, pres.; Frank G. Hobbs, Thos. Pascoe, J. E. Manders, directors; T. C. Woodworth, cons. engr.; W. H. Enderton, supt.; F. B. Keever, mgr.

Inc. 1913, in California. **Cap.,** $500,000; $1 par; 423,960 issued. Listed on Boston Curb. Federal Trust Co., Boston, depositary.

Property: the Fortuna mine, 7 patented, 11 unpatented claims, 358.7 acres, 15 miles S. of Blaisdell station on the S. P. R. R., and 22 miles S. E.

of Yuma, Ariz. Claims are at base of W. slope of the Gila range. The Fortuna mine is said to have been worked by Chas. D. Lane of San Francisco, 1896-1904, with a gross production of $2,887,075 gold and to have paid $1,180,000 in dividends. The ore-shoot was lost in 1901, a fault from 800′ to 1,200′ level cutting off the ore, and $500,000 was spent in vain to recover ore beyond the fault. Present company started work May, 1913, and was reported to have spent $100,000 and to have recovered the vein on the 800′ level.

The Fortuna is a quartz vein in schist, near gneiss and granite masses. It runs E. W., dips 50° S. and has an average thickness of 4″, said to widen out to 30′ in lenses. The outcrop shows iron and copper oxides, but the ore is free milling.

Development: by an old 1,500′ working shaft whose levels have been utilized by present company. Crosscutting is reported to have found the ore-shoot, 5′ wide, on the 800′ level. A new shaft, 400′ E. of old workings, is said to show a 2′ vein of $40 ore. Company claims 1,000,000 tons of probable ore, which is regarded as too optimistic.

Mill has twenty 1,400-lb. stamps and receives water from a 4-mile pipe-line.

Mine has a good record and company has several eminent stockholders, but promotion record has been disappointing.

No recent information is available.

GLORY HOLE BONANZA MINES CO. **ARIZONA**

Address: Salome, Yuma county, Ariz.

Officers and Directors: Dick Wick Hall, pres.-mgr.; E. S. Jones, v. p.; H. W. White, treas.; E. G. Jesson, sec.

Inc. Feb. 5, 1916, in Arizona. **Cap.,** $150,000; 10c par; 1,250,000 outstanding.

Property: 12 claims, seven 8 miles N. W. and five 10 miles N. of Salome.

Geology: quartz vein, with 60° dip, N. W.-S. E. strike, in andesite and schist, shows small high-grade and large low-grade shoots of gold ore and some copper.

Development: by 4 tunnels aggregating 825′ in length. Workings to 175′ depth total 1,500′. Work commenced in 1916. Only exploration work done since high-grade pockety streaks were extracted.

Equipment: Fairbanks-Morse engine, 4-drill compressor, machine-drills.

Is an aftermath of the spectacular discovery of specimen gold ore made a few years ago. Advertising was decidedly lurid in local Arizona papers.

GOLDEN STAR MINES CO. **ARIZONA**

Office: 32 Broadway, New York. **Mine:** Polaris, via Mohawk, Yuma county.

Officers: D. M. Hyman, pres.; J. L. Tilton, sec.; H. B. Baruch, treas.; with C. E. Bamberger, E. M. Rogers, E. L. Grover, H. M. Robinson, directors.

Inc. Dec., 1908, in Maine. **Cap.,** $2,000,000; $5 par; 400,000 issued. Empire Trust Co., registrar.

Property: undeveloped gold claims at Polaris, 50 miles N. of Mohawk, Two men reported working in 1919.

GOLDZONA-SCOTCHMAN MINING CO. **ARIZONA**

Address: Bouse, Yuma county, Ariz.

Inc. by R. King, W. C. Miller, B. A. Kipp and others, of Los Angeles,

Property: 600 acres, on which $100,000 has been spent.

Equipment: gasoline hoist, compressor, drills, buildings. Probably idle.

GREATER AJO COPPER CO. **ARIZONA**

Miami, Ariz. **Officers:** G. F. Senner, pres.; A. E. Soderman, v. p.; J. Considine, sec.-treas., with A. B. Saling, R. L. Payne, E. Becher and B. S. Garcia, directors.

Cap., $5,000,000.

Property: 68 claims, at Palomas, Yuma county, Ariz.

The prospectus—if it can be called such—of this company is unique. It mentions nearly everything, the property receiving small space. One engineer predicts the Greater Ajo to be "The biggest mine in the State of Arizona."

Reported sold to a New York syndicate in Feb., 1918. No reports of more recent date.

HARQUA HALA RIDGE M. & M. CO. **ARIZONA**

Controlled by Ranier Mines Corporation through ownership of 90% of stock.

Offices: 27 School St., Boston, Mass. **Mine office:** Wenden, Ariz.

Officers: Angus McEachren, pres.; Chas. S. Hill, v. p.; M. A. Blood, sec.-treas., with Percy James and D. L. Aspinwall, directors. W. T. Gnash, mgr.

Inc. Feb. 28, 1917, in Arizona. **Cap.,** $3,000,000; $1 par; 1,800,000 outstanding. Annual meeting first Wednesday in February.

Property: 30 claims, in the Harqua Hala mountains, Elsworth mining district, Yuma county, about 7 miles S. of Wenden, said to show a contact deposit between quartzite and porphyry, 100′ wide and traceable for 1,200′ in length, containing copper, gold and silver.

Examined by W. J. Stoke in April, 1919. The Gold King group of 43 claims has, it is said "geological conditions such that they form the most favorable indications for a large mine. . . . You have, in my opinion, the greatest gold showing in the southwest." There is also a copper vein that has had little work done on it. A tunnel, to give a depth of 1,200′ is suggested.

Development: by tunnels and shafts, with a total of 1,200′ of workings.

The company offered to prospective investors "to crush and pan gold ore, taken from the property, before your eyes," at their Boston office.

HI HENRY MINING CLAIMS **ARIZONA**

Address: H. W. Fabrenbrick, Polaris, via Mohawk, Yuma Co., Ariz.

Property: 23 claims including fractions in the Polaris district, 1.5 miles N. W. of King of Arizona mine, about 50 miles N. of Mohawk, Yuma county. A report states that the quartz-porphyry ledge is 28′ wide with andesite and dacite walls, striking E.-W., and dipping 45° N., traceable for 1,000′ on surface. Ore said to carry gold with a little silver, varying from $2 to $25.

Development: by 50′ shaft with 53′ crosscut also a 293′ crosscut tunnel. Elevation of mine is about 3,500′.

ILLINOIS ARIZONA COPPER CO. **ARIZONA**

In 1917 acquired holdings of the Billie Mack Mining Co.

Office: 19 South La Salle St., Chicago, Ill. **Mine office:** Parker, Ariz.

Officers: Robt. Tarrant, pres.; H. M. Higinbotham, v. p.; Wm. H. Dowe, sec., with C. Horix, F. W. Peck, Jr., R. Pringle, D. N. Condit, W. H. Burrage, W. C. Little, directors. Ed. G. Kynoch, treas.; United States Corporation Co., N. Y., transfer agent and registrar. R. W. Michael, supt.

Inc. 1917, in Arizona. **Cap.,** $2,000,000; $1 par; 971,378 outstanding.

Property: 26 unpatented claims, 8 miles S. of Parker, including the Billie Mack, Lion, Butte, Jack Rabbit and Malapais groups.

Geology: claims cover an area of pre-Cambrian schist, with limestone whose beds dip steeply N. W. Intrusions of quartz-monzonite, and diabase are said to form dikes or stocks from 100′ to 1,500′ wide, mineralized with iron and showing copper stains, which, it is hoped, indicate copper ore below. The ore found thus far occurs in veins in the limestone and consists mainly of malachite, chrysocolla, and specularite with free gold in porous quartz. As a rule the ore though often very rich, occurs in short bunches.

Development: by 200′ shaft with levels at 100′, 150′, and 200′ and by numerous short tunnels and shafts, totaling over 4,000′.

Production: returns from 489 tons shipped were 8% copper, 1.1 oz. gold per ton. Total production to date estimated at $125,000.

Equipment: includes small hoist, air-compressor, gasoline engine, air drills, etc.

Reported on by H. E. Olund, J. B. Rossman and Y. S. Young.

INLAND COPPER CO. **ARIZONA**

Idle. Letters to 1017 Commerce Bldg., Kansas City, Mo., and to the mine at Planet, Yuma Co., Ariz., unanswered. L. E. Corbin, pres.; A. W. Bork, v. p.; S. D. Dodson, sec.-treas., at last accounts.

Inc. in Arizona. **Cap.,** $5,000,000; $1 par.

Property: 40 claims, including 2 groups of about 15 claims each, in the

Bill Williams range, near the Bill Williams Fork river, with a mill-site, smelter-site and water rights. The mine has 2 tunnels, and a 2-compartment shaft equipped with an 18 h. p. gasoline hoist. Company advertised for copper ores, presumably to show its stockholders, since it had no reduction plant of its own. Is not regarded favorably.

JEROME-WENDEN COPPER CO. **ARIZONA**

Address: A. J. Humbert, Wenden, Yuma county, Ariz.

Is a reorganization of the Nuevo Mundo Mining Co., and although it has Jerome tacked on to its name, the company is doing its mining work far from there. Vein said to be up to 5′ wide, carrying copper, developed by 3 short tunnels. A prospect.

JUNIATA GOLD & COPPER CO. **ARIZONA**

Office: 315 South Broadway, Los Angeles, Cal. **Mine address:** Parker, Yuma Co., Ariz.

Officers: P. W. Powers, pres.; E. S. Field, v. p,; Dalton S. Patterson, sec.-treas.; H. B. Ailman, supt.

Inc. October 29, 1907, in Arizona. **Cap.,** $1,000,000; $1 par.

Property: 10 claims, 200 acres, lying between the Gray Eagle and Carnation mines, in the Seneca district about 9 miles N. E. of Parker, on the E. side of the Colorado river. Claims show gray micaceous schists with interbedded limestone. The schists dip about 45° and are cut by shear zones in which copper ores occur.

Development: by 200′ shaft with 2 prospect shafts. Property is a prospect. No returns secured.

LA BELLE MINING CO. **ARIZONA**

Address: Vicksburg, Yuma Co., Ariz.

Officers: A. W. Hompre, pres.; E. B. Moore, v. p.; L. S. Judd, sec.-gen. mgr.; James Bayne, treas.

Inc. Aug. 3, 1909, in Arizona. **Cap.,** $100,000; $10 par; issued, $82,600. Company is a close corporation, entire stock issue being owned by officers.

Property was abandoned as development proved it of no value. All machinery and improvements sold, and company probably defunct.

LEADVILLE ARIZONA MINES CO. **ARIZONA**

Office: Wenden, Ariz.

Officers: J. H. Finnegan, pres.; R. O. Worley, v. p.; A. F. Kinsman, sec.; J. M. Campbell, treas.

Cap., $150,000; 10c par.

Property: 5 claims on the south side of the Harqua Hala mountains.

LITTLE GIANT MINE **ARIZONA**

Operated by the Black Giant Mines Co., which see.

MAMMON GOLD & COPPER CO. **ARIZONA**

Address: W. M. Boyce, mgr., Parker, Yuma Co., Ariz.

Officers: E. S. Osborne, pres.; J. M. Patterson, v. p.; F. M. Hall, sec.; Geo. E. Farrell, treas.

Property: 32 claims in Cienega district, 10 miles E. of Parker. In 1904 several carloads of oxidized copper ore were mined. Property passed through several hands until present owners acquired it.

Geology: ground largely covered with basalt. Schists show in watercourses and on lower slopes. The copper and accompanying hematite occur in distinct but small fractures, also in a persistent bedded or blanket deposit, apparently conformable to the overlying gneiss. The bedded vein has been the source of the ore mined, and must be relied upon as the main source of ore. Where fissures cross the orebed, ore occurs in fair quantities.

Development: apart from shallow shafts, consists of 3 short tunnels, connected by stopes. No. 3 produced some ore; No. 2 is not promising; No. 1 workings, below No. 2, show the downward extension of the orebed. An incline shaft was down 175′ in June, 1917, from which crosscuts have opened gold-copper ore. Churn-drilling was under way in 1917, reaching a depth of 164′ in that year. There was 60′ of schist, 25′ of vein matter carrying 0.25 to 1%

copper, and the remainder was in gneiss. The hole was continued in that rock to 300′ when hot weather stopped operations. Company proposed drilling to 500′ late in 1919.

Production: about 500 tons, shipped at various times in past 5 years, ore averaging well in copper.

Is a property worthy of careful exploration by churn-drilling.

MAVIS MINE **ARIZONA**

Address: F. G. Heath, National Bank Bldg., Long Beach, Cal.

Property: 5 patented claims in the Cienega district, 10 miles N. of Parker, Yuma county, adjoining the Empire Arizona Cons. Co.

Development slight. A 25′ shaft furnished 14 tons of ore running 19 to 30% copper, and $15 to $18 gold.

MOHICAN COPPER CO. **ARIZONA**

Office: 304 Wilcox Bldg., Los Angeles, Cal. **Mine office:** J. V. Allison, supt., Bouse, Ariz.

Officers: W. G. Miller, pres.; B. A. Kipp, v. p.; Rol. King, sec., with G. M. Swindell and Christ Walter, directors.

Inc. March 25, 1914, in Ariz. **Cap.**, $2,000,000; $1 par; 1,200,000 issued. Transfer office: Security Transfer & Registry Co., New York. Listed on New York and Boston Curbs. Balance sheet of March 31, 1918, showed that from March 26, 1914, to March 31, 1918, development cost $86,514, and $14,673 was expended for equipment. There was $480 cash on hand, and $3,500 notes payable.

Property: 31 claims, 9 patented, 5 miles W. of Bouse, in Plomosa district, Yuma county, said to show copper sulphide ore, with some gold.

Development: by 512′ shaft with others 35, 60 and 110′ deep, and total workings of 2,683′. At depth of 300′, 500′ from shaft, a 50′ vein was cut. It was leached, but contained lenses and streaks of high-grade copper ore. On No. 1 level, and in a winze below No. 2 there is ore.

Equipment: includes hoist and compressor. Mill and K. & K. flotation plant proposed in 1919, tests having been made at the mine. Examined by J. W. Finch, W. A. Farish, and T. A. Keegle.

MONTANA-ARIZONA COPPER CO. **ARIZONA**

Address: W. D. Greenough, mgr. (Greenough Bros.), Spokane, Wash.

Property: 26 claims, 520 acres, 30 miles north of Wenden, Yuma county, said to show 5 veins, on vein carrying gold.

Development: 300′ two-compartment shaft and a considerable number of trenches.

Equipment: includes 60 h. p. gasoline hoist.

MUDERSBACH MINE **ARIZONA**

See Excelsior Gold & Copper Co.

NAVAJO MINES CORPORATION OF ARIZONA **ARIZONA**

Office: Vicksburg, Yuma Co., Ariz.

Officers: E. P. Heald, pres.; William Vincent, 1st v. p.; O. B. Lefurgey, v. p.; C. Y. DeLay, sec.-treas-gen. mgr., with H. M. Anthony, O. P. Posey and Eugene Schutz, directors.

Inc. in Arizona. **Cap.**, $3,000,000; $1 par; 1,800,000 issued. National Security Co., New York, transfer agents.

Property: the Desert mines, comprising the Golden Mound and Gold Eagle quartz claims, and Safe Deposit placer, all patented, 51½ acres, 2½ miles from Vicksburg on the railroad.

Geology: rocks are pre-Cambrian schists, with overlying quartzite, cut by diorite dikes. There are reported to be 3 quartz veins 1 to 10′ wide, also a mound 400′ across, 140′ high at center. Ore contains gold, with small lead and copper contents and average assay is given as $8 per ton. Quartz in small hill is said to carry 4.3% copper and $17.15 gold and silver per ton.

Development: veins traced 800′ by pits, tunnels, open cuts and a 275′ tunnel with 2 crosscuts, 90′ and 40′ long′. Ore reserves were estimated by G. R. Boggs at 100,000 tons. W. Forstner estimates orebody 400′ long by 140′ high to contain 13,500 tons of $20 ore and 1,500 tons of $50 ore.

Equipment: includes concrete reservoir, buildings for 50 men, etc. Prospectus truly said: "This is not a stock for everyone." Development is, in our opinion, too meagre to warrant the estimates given of either quantity or quality and mining and milling cost of $2 per ton will be hard to attain on a small scale. Reported June, 1917, there were 5 carloads of ore ready for shipment, but no record of smelter returns has been received by us.

NEW LA PAZ GOLD MINING CO. **ARIZONA**

Office: 930 Merchants' National Bank Bldg., Los Angeles, Cal.

Officers: O. L. Grimsley, pres.-gen. mgr.; G. A. Scroggs, v.-p.-treas.; Geo. Renwick, sec., with J. E. Ransford and G. A. Reichard, directors.

Inc. May 2, 1910, in Arizona. **Cap.**, $1,500,000; $1 par; 933,282 issued. Operating expenses first 5 months of 1917 were $15,850.

Property: 14 claims, 1,606 acres, in La Paz or Weaver district, Yuma county, said to show a deposit of gold-bearing gravel 6 to 40′ deep, lying on decomposed granite and porphyry. There are reported to be 5,300,000 cu. yd. of gravel, averaging $2.15 per yard. Operations to be by hydraulicking, for which a 1,750,000 gal. storage dam and 12″ pipe-line from Colorado river were planned.

Property reported on by A. J. Condee, E. Shurley Wilson, A. B. Hall and E. A. Rasor.

NEW PLANET COPPER MINING CO. **ARIZONA**

Office: 61 Broadway, New York.

Officers: Alex. Rae, pres.; Geo. S. Barton, v. p.; Herman Cook, sec.-treas., with Julius H. Susmann, S. S. Rosenstamm, Geo. Crompton and T. M. Lloyd, directors.

Inc. July 13, 1909, in Delaware. **Cap.**, $4,000,000; $5 par; issued 342,905 shares. Is a reconstruction of the Planet Copper Mining Co., stock of which was retired by exchange for 240,000 shares of New Planet stock. Farmers' Loan & Trust Co., New York, registrar. Annual meeting, third Wednesday in June.

Property: the Planet mine, with 31 patented, 10 unpatented, and 3 fraction claims, 800 acres, in the Harcuvar district, on the southern bank of the Bill Williams Fork River, 21½ miles from Bouse on the Santa Fé cut-off and about 6 miles from Swansea.

Geology: copper occurs mainly as oxidized ore, though nucleal particles of sulphides mixed with specular hematite are seen in the deeper workings. The orebodies are replacements in limestone, the ore bed developed at the Planet shaft lying on the contact between this rock and underlying gneiss. This deposit is 3 to 20′ thick and dips 15° south. Much high-grade ore has been shipped from other parts of the property in past years; it was found as crusts, or shells, about impure hematite in limestone, especially near bodies of amphibolic rock now altered to black gneiss. A deep-seated mass of granite is the not improbable source of mineralization, although later igneous activity is shown in a volcanic plug not far distant and in the basalt flows which cover the surrounding country. The geology is very fully discussed in U. S. G. S. Bull. 451, p. 47, written by Howland Bancroft.

The ore deposits show a heavy iron gossan, mainly of hematite, apparently of workable grade, and it has been estimated that the property shows about 500,000 tons of 60% iron ore. The main orebody developed in the Planet shaft is about 300′ in width, has a thickness of 4′ 3″, and an average copper content of 5.9%, according to a report by A. H. Kellar.

Development: aside from open cut and tunnels, is mainly at the Planet shaft, an incline sunk on the ore bed at an average angle of 15° to a depth of 733′. There are drifts, crosscuts, etc., amounting to 2,500′. A vertical 350′ shaft connects with these workings and gives ventilation.

The old workings include 8 tunnels, longest 225′, and 12 vertical pits and shafts, of 25 to 325′ depth. About $150,000 was expended under the management of the General Development Co. in sinking the vertical shaft and putting down a number of churn-drill holes, 3 holes showing low-grade sulphide ore below the old workings.

The Planet mine is probably the oldest copper mine in Arizona. It was opened in 1864, worked in a small way until 1874, and reopened in 1884, when a 36″ circular blast furnace was erected. The property was taken over, 1902, by the predecessor of the present company. The mine produced, 1864-74, upwards of $500,000 worth of high-grade ore, ranging from 15 to 40% in copper, which was presumably shipped down the Colorado river to Guaymas, and thence to Swansea, for reduction.

Equipment: includes a 75 h. p. gasoline plant, with two hoists and a 5-drill air compressor. Buildings include a carpenter shop, smithy, 2 shaft houses and 3 dwellings.

Property considered as still unproven, churn-drilling being too limited to determine existence, or non-existence, of large orebodies, and the greater part of the area is unexplored.

Property was under lease to the Northwestern Leasing & Development Co. from October, 1915, to September, 1917, when the lease was surrendered. Since then no operations have been carried on at the property. The lessees, during their operations, shipped ore and paid royalty to the New Planet Co., which enabled it to pay off its debts and company now has about $87,000 in its treasury, $80,000 of which is in U. S. Liberty Bonds and U. S. Certificates.

NORTHWESTERN LEASING & DEVELOPMENT CO. **ARIZONA**

Company had a lease on the New Planet copper mine (which see).

Described in Vol. XIII.

ORO COBRA MINING CO. **ARIZONA**

Address: Mrs. Thos. Wilkinson, pres. and gen. mgr., 715 High St., Burlington, Iowa. Mine near Wenden, Yuma county, Ariz.

Inc. Oct., 1901, in Arizona. **Cap.,** $1,500,000; $1 par; fully issued. Annual meeting, second Tuesday in February.

Property: 14 claims, 280 acres, in the Tank Pass section of the Harcuvar mountains, Ellsworth district, 12 miles west of Wenden, Yuma county. The claims show diorite, schist, granite and porphyry, with several fissure veins, from a few inches to 20′ in estimated average width, carrying oxidized ores near surface, said to assay 12 to 15% copper, and $1.50 to $80 per ton in combined silver and gold values, with chalcopyrite, at shallow depth. Mine is opened by shafts of 250′, 150′ and 40′, and a tunnel of 110′ with 700′ of workings. Only assessment work done in recent years.

RANIER DEVELOPMENT CO. **ARIZONA**

See Ranier Mines Corporation.

Office: 216-27 School St., Boston, Mass.

Officers: and Directors: S. J. Gnash, pres.; W. W. Gnash, v. p.; W. A. Dean, sec.-treas.; S. J. Gnash, mgr.; W. T. Gnash, supt., Wenden, Arizona.

Inc. July 1, 1914, in Arizona. **Cap.,** $3,000,000; $1 par; 1,878,496 shares outstanding, of which 1,777,238 shares are pooled. Metropolitan Trust Co., Boston, transfer agent. Annual meeting, February 15th.

Property: 44 claims, including the Big Four, about 860 acres, in Ellsworth mining district, 10 miles N. of Wenden, Yuma county. Ore occurs in fissure veins carrying gold-silver-copper-iron. The main vein is reported exposed at surface for 80-250′ in width. Country rock is granite-schist, shale, porphyry and limestone. Two small shipments averaged $59 per ton.

Development: totals 2,000′ of workings, including several shafts, deepest 226′ vertical and a 130′ tunnel. A 2-compartment shaft was down 175′ in Nov., 1919, being sunk 500′. The vein was considered to be 600′ wide. The shaft was in low-grade copper-gold ore. A contract was let to deepen the deepest shaft in the Big Four, where good ore has been mined.

Equipment: 20 h. p. gas. hoist, 60 h. p. oil engine, compressor, drills, pump, tramway, and several houses. Twelve men are employed. Mine is connected by wagon road with Wenden.

RANIER MINES CORPORATION **ARIZONA**

Address: 216-27 School St., Boston, Mass.

Officers: John W. Wilson, pres.; A. R. Nickerson, v. p.; W. A. Dean, sec.-treas., with Angus MacEachern and Ralph L. Gustin, directors. S. J. Gnash, mgr.; W. T. Gnash, supt.; J. H. Shockley, cons. engr.

Inc. Oct., 1917, in Arizona. **Cap.**, $5,000,000; $1 par; outstanding 2,502,815 shares. Listed on Boston Curb. Transfer office, Metropolitan Trust Co., Boston. Registrar, Equitable Trust Co., Boston. Annual meeting, second Tuesday in January.

Company is a holding company owning 98% of stock of Ranier Dev. Co. (which see), and 90% of stock of Harqua Hala Ridge M. & M. Co. (Property near Wenden, Yuma county.) Operating expenses for 1918, were $7,521.

In a 45-page prospectus, the president of the company says, "The Corporation's vast holdings of 1,630 acres, comprising 84 mining claims in the very heart of the copper-gold producing district, with 2,500 outcroppings of copper ore, and 250 veins already exposed—one of them 290′ in width at one place, warrant the prediction that Ranier will soon rank as one of the biggest and richest copper-gold mines in the State of Arizona."

The company, in a year's operations has sunk a shaft less than 120′, but hoped to have it down 300′ by the end of 1919. It was 175′ deep early in November. There are about 10 men working on the property, and about 7 fiscal agents scattered over the country. The original promoters are said to have received 2,000,000 shares. To date, about 600,000 shares have been sold by the company, realizing $300,000, and company claims $7,500 to $10,000 cash on hand. Stock sells on the Boston Curb for over $1 per share, the salesmen of the company are reported offering them at 60c. per share, but the certificates sold by them are not saleable on the Curb for 2 years from date of issue.

RED CLOUD CONS. MINES CO. **ARIZONA**

Property: 40 miles N. of Yuma has a 500′ shaft developing silver-lead ore. A 300-ton mill started operating in 1918, equipped with crusher, ball-mill, and 3 dry-concentrating tables. Claimed the ore developed was sufficient to run the mill 5 years.

RED METAL COPPER CO. **ARIZONA**

Address: Parker, Ariz.

Officers: Dr. A. H. Littlefield, pres.; Lee Pritt, v. p.; Fred M. Hall, sec.; John Pritt, treas.-supt., with J. F. Raney, directors.

Property: 12 miles N. E. of Parker, adjoins the Western Arizona Copper Co. holdings on the S., and is said to show a contact deposit of porphyry with an iron gossan carrying gold and copper.

Development: by 225′ shaft. Company offers stock at 25c per share, in 1917, to procure funds for further development. In 1919, still trying to finance property.

RUBY GOLD AND COPPER CO. **ARIZONA**

Property near Parker, Ariz. Apparently acquired by the Billie Mack Mining Co., and later by the Illinois Arizona Copper Co., which see.

SHAMROCK MINING CO. **ARIZONA**

Address: Bernard McEntee, gen. mgr., via Vicksburg, Yuma Co., Ariz.

Property: in the Plomosa district. Ore as mined is said to carry 5% copper and 20 oz. silver per ton. Shipments amount to $12,000 to date.

SWANSEA CONS. GOLD & COPPER MINING CO. **ARIZONA**

Reorganization of the Clara Cons. Gold & Copper Mining Co.

O. M. Souden, trustee, c/o U. S. Nat'l Bank, Los Angeles, Calif. Leased to Judge W. J. Thomas of Los Angeles, early in 1915; operated, 1916, by the Thomas Estate. **Inc.** 1912. **Cap.**, $4,000,000; par $1.

In May, 1917, Swansea Lease, Inc., which see, secured a 10-year lease on the mine, calling for a 1,000′ shaft, 50% royalty on ore, to be not under $5,000,000 in 10 years. Shipments were 30 cars per week in Sept., 1917.

Trustee's report for 4 months ended Feb. 23, 1917, showed a net cash balance of $47,311, plus $22,335 carried forward, making $69,646. There were shipped 452 cars of ore, worth $252,466.

In May, 1917, company was discharged from bankruptcy, and had $30,000 on hand. There is still a bonded debt of $1,000,000. Company has $3,000,000 shares outstanding.

Property: reported as 132 claims, 3,300 acres, about 10 miles from Planet, includes the Signal mine, erroneously called the Clara, and the Moro and Clara groups, at Swansea, Yuma county, Ariz.

Geology: the Signal orebody is a replacement deposit formed in a limestone bed 15 to 100′ thick, associated with overlying shales and amphibolitic schist and resting on granite gneiss, all of pre-Cambrian age. The outcrop is an irregular replacement, 30′ wide, of copper-stained hematite, dipping at 52° N. This orebody extends 150′ downward in the mine, is 20 to 30′ wide, 90′ long, and contains boulders of unreplaced limestone. The orebody is encased in soft chloritic schist derived from amphibolite and appears to rest on a strong fault plane that separates the granite gneiss from the sedimentary series. Two parallel, smaller, but similar orebodies occur in the hanging wall of the deposit. The ore consists of soft, red hematite with manganese-oxide and chlorite, holding grains and nodules of chalcopyrite and pyrite. The ore as a whole averages perhaps 2.5% copper, though 4% ore is obtained for smelting by rough sorting. See U. S. G. S. Bull. 451, pp. 59-67.

Development: by 2 main shafts with extensive underground workings along the main fault or lode, and by stopes on 3 orebodies. The mine has 4 vertical and 2 inclined shafts. No. 1 shaft, 400′ deep, vertical, has a 15 h. p. gasoline hoist, raising ore with a bucket. No. 2 shaft, 325′ deep, is an incline, and has a 50 h. p. Western gasoline hoist, operating a 2-ton skip. No. 3 shaft, also inclined, is 200′ deep. No. 4 shaft, the largest and deepest, 3 compartments, is 500′ deep, with a hoist. No. 5 shaft, 373′ deep, has a 75 h. p. steam hoist, and No. 6 shaft, 250′ deep, has a 25 h. p. steam hoist.

Equipment: the power plant has two 250 h. p. boilers, a 300 k. w. d. c. motor, and a 150 k. w. belt-driven motor operating pumps at the Bill Williams Fork river, supplying water to the mine and works through 3″ and 6″ pipe-lines. A reverberatory furnace was partly completed when the mine closed down in 1913. The smelter has a water-jacket blast-furnace of 750 tons rated daily capacity, a 15,000 cu. ft. air compressor, and a blower direct-connected to a compound engine. Buildings include a machine-shop, sawmill and other structures. Slags are handled by a Jeffrey electric locomotive. The smelter building is of structural steel. The converter department has 2 stands and 9 shells, rotated electrically, with a 40-ton electric crane, having 2 auxiliary hoists, and a silica mill, with electric motor, for linings.

A new flotation mill was completed by the Swansea Lease, Inc, Sept., 1919, in charge of L. F. Barber.

The mines and works are connected with the Santa Fé, Prescott & Phoenix Railway by a 21-mile line, known as the Arizona & Swansea Railroad, operated, but not owned (controlled by George Mitchell of Los Angeles) by the company.

The company is an example of enthusiasm run wild, coupled with reckless stock selling and the foolish construction of surface works before the development of enough ore to keep them busy.

SWANSEA LEASE, INC. **ARIZONA**

Chas. W. Clark, pres., San Mateo, Calif.; J. Ross Clark, v. p.; C. O. Whittemore, sec.; F. E. Shaw, treas.

In 1917 obtained a 10-year lease on property of Swansea Cons. G. & C. Mng. Co., Swansea, Ariz., and in 1918 erected a 200-ton concentrator, and sank a 500′ working shaft. Property closed down in April, 1919, to wait for better copper market conditions. Production figures not available. Employing 30 miners in July, 1919. Larger and richer orebodies than formerly mined are said to have been revealed by drilling. A flotation plant was ready to work by Sept., 1919.

TANK PASS CONSOLIDATED MINING CO. **ARIZONA**

Address: A. Tennyson Pryor, pres.-gen. mgr., 933 Dime Bank Bldg., Detroit, Mich. Ward Smith, v. p.

Inc. Nov., 1909. **Cap.,** $3,000,000; $10 par. Company controls the Alvin Development Co. through stock ownership, and took over the property of the Cobralla Copper Co., March, 1910.

Property: known as the Ultimatum or Cobralla group, adjoins the Alvin, near Tank Pass in the Harcuvar mountains, Ellsworth mining district, about 10 miles from Wenden. The mine carries about 4,500′ of the strike of various fractures in a contact zone following granite intrusive in quartzite, amphibolite and limestone, the ores carrying bornite and chalcopyrite, and

estimated to average 3 to 5% copper, 5 to 6 oz. silver and $1 to $8 gold per ton, with occasional paystreaks and masses of high-grade ore.

Development: by the 150′ Carbonate Hill shaft and a 200′ tunnel.

Equipment: includes gasoline hoist. Is a prospect of merit. Presumably idle.

UNITED MINES COMPANY OF ARIZONA **ARIZONA**

Address: care L. M. Hart, 120 Broadway, New York City.

Officers: J. C. Denton, pres., Superior, Ariz.; George Christie, v. p.; S. H. Stewart, treas.; E. A. Goodrich, sec., with H. E. Woods and A. G. Halm, directors.

Inc. May, 1916, in Arizona. **Cap.**, $1,750,000; $1 par; 900,000 in treasury. Listed on New York Curb. On Dec. 10, 1919, at public auction, 1,000 shares were sold at $75 the lot.

Property: 30 claims, 600 acres near Bouse, including former holdings of Little Butte Cons. Mines Co., the Arizona Pride and Bullion groups.

Mine shut down 1916, as funds for development were nearly exhausted before reaching the point where engineers expected to find the orebody.

Geology: the holdings are in an extensive district of pre-Cambrian schists, quartzites and limestones, cut by intrusive granites and other igneous rocks, and covered by recent volcanic flows. The ore deposits of the country, though varied in nature, carry gold, silver or copper ores. The typical copper ores of the region contain specular red hematite, and the deposits worked at Planet, Mineral Hill and the Clara are largely replacements of limestone beds.

The **Little Butte** claims cover an area of sedimentary rocks running E. W. and dipping at 50°, including a 1,500′ belt of brown limestone in part overlaid by an old rhyolite breccia. These rocks are faulted against a coarse granite, the fault being mineralized, though nearby, the limestone caps and covers the granite. The vein outcrop shows an interlacing network of quartz-hematite stringers forming a wide lode. The underground workings show irregular lenticular bunches of oxidized ore on and above the 120′ level, and close to the granite hanging-wall, with 75′ or so of altered andesite (rhyolite) between the lode and the limestone. Shipments of 388 tons yielded $8,040, or $20.72 per ton. The lode is in part leached below these residual masses of ore, and former development was stopped at 388′ below which the richer ore probably lies. The association of chlorite, specularite and quartz indicates that the mineralization will extend downward to very considerable depth, and the ores will be chalcopyrite.

Development: by a 700′ incline shaft with 1,000′ of levels at depths of 75, 120, 210 and 310′. Water was encountered at 200′, but the lowest limit of oxidation has not yet been reached. The 120′ level shows ore bunches for 600′ along the drift. The 210′ level shows mainly leached vein matter with occasional bunches of copper ore, but the leached material is said to average $7 per ton for 200′ along the drift. Similar conditions obtain at 300′.

The **Arizona Pride Group** claims cover part of the granite area in which gold-bearing quartz veins occur. Development includes 50′ and 60′ shafts, both showing ore.

The **Bullion Group** covers a sedimentary area, cut by intrusions of diorite and andesite, with veins following the intrusive contacts. A 205′ shaft on one vein has not yet reached water level, the filling being leached.

Production: under former owners the Little Butte mine shipments produced 73,400 lb. copper, the ore averaging $7.60 per ton gold, 9.4% copper, 20% iron and 32.4% silica.

In April, 1917, property was examined by Henry C. Carr, who considered the gold-bearing vein of secondary consideration without a treatment plant. Copper ore will probably be found in commercial quantities at greater depth—predicted at 750′.

The property has attractive possibilities which are said to warrant carefully planned development.

VICTOR & BELLE CROWN MINING CO. **ARIZONA**

Address: Wenden, Yuma Co., Arizona.

Officers: J. E. Matteson, pres.; F. C. Piper, v. p.; J. H. Matteson, sec.-treas.; Geo. M. White, mgr., at last accounts.

Property: 10 claims, 180 acres, in the Harcuvar mountains, 8 miles N. of Salome, the nearest rail point, said to have a vein of 5 to 7′ width, with a 30 to 36″ paystreak, giving assays of 15 to 20% copper and $15 to $20 gold per ton.

Development: includes shafts of 80′, 35′ and 450′, and tunnels of 755′, 165′ and 230′, aggregating about 1,200′ of workings. In 1918, was driving a tunnel to intersect the veins at 600′ depth.

VINDICATOR MINING CO. **ARIZONA**

Address: care Otis E. Young, Phoenix, Ariz.

Property: located in Cunningham Pass district, Yuma county, said to show copper-gold ore. Developed by shaft.

WENDEN COPPER CO. **ARIZONA**

Address: I. H. Barkdoll, pres., Phoenix, Ariz.

Property: 3 miles N. of Cunningham Pass, Yuma county. Reported in 1918 that a 18″ vein of copper glance had been opened and several carloads of ore shipped. Property operated under lease.

WENDENDALE GOLD MIINING CO. **ARIZONA**

Property: near Wenden, in the Cunningham Pass district, is developed by a shaft, showing ore that gave returns of 13% copper and $12 gold per ton, from a test smelter shipment. Shipping ore was mined by lessees in 1916. No later report.

YUMA CONSOLIDATED MINING CO. **ARIZONA**

Address: F. W. Dunn, mgr., Quartzite, Ariz.

Property: placer ground in Quartzite district, Yuma county. Late in 1916 a dry treatment plant, including a Lidgerwood shovel, grizzly, Quenner crusher and Stebbins dry concentrators of 2,000 yards daily capacity was erected at a cost of $65,000. Shortage of water is the reason for this type of plant. As much as 97% of the gold said to be extracted. Gravel containing $2, $6.65 and $12 per yard reported available. In May, 1919, reported using a steam-shovel for ore extraction, and that 150 men were employed.

YUMA WARRIOR MINING CO. **ARIZONA**

Office: 41 Bank of Arizona Bldg., Prescott, Ariz.

Officers: H. W. Stevens, pres.; E. J. F. Horne, v. p.; C. T. Joslin, sec.-treas., with W. A. Drake, R. W. Hunt, O. W. Johnson and H. K. Chapin, directors. John B. Martin, supt.

Inc. in Arizona. **Cap.,** $3,500,000; $1 par; about one-half is outstanding.

Property: 365 acres in the Ellsworth district, 6½ miles from Salome, Yuma county, known as the Harqua Hala-Bonanza and Golden Eagle groups. Originally located in 1888, the mine is reported to have yielded gold worth $4,000,000 above the 200′ level. Examined by L. W. Getchell.

Geology: ore shoots occur in shear-zones in schists with intercalated limestone, extending down into the basal granite. Basic dikes are found and many veinlets of quartz and calcite occur. Geology is described in U. S. G. S. Bull. 451, 1911, p. 106.

Development: by incline shaft to 365′ vertical depth. On 5 levels free milling ore is said to have been opened; on No. 7 south, sulphide ore assaying $44 gold, 7.4 oz. silver, and 5.28% copper; and in a winze below No. 8, $16.54 gold, 7.85 oz. silver, and 6.15% copper ore, all above water level. At 350′ or 400′ lower, estimated water level, a considerable body of copper sulphide is expected. A new 3-compartment shaft may be sunk.

Equipment: complete mining plant, ⅞ mile aerial tram from Golden Eagle mine to Bonanza, 40-stamp mill, shops, and buildings. To treat the sulphide ore it was proposed to add tube-mills, concentrators and flotation plant, with capacity of 200 tons daily.

Production: is irregular; since Feb., 1917, the mill yielded gold worth $25,000.

Reported new orebodies may be valuable, but company should not bank on past production, which was gold from free-milling ore.

No later news, and mine presumably idle.

WARDWELL & OSBORNE COPPER MINES CO. **ARIZONA**

Dead. Property lost by failure to do assessment work, and subsequently relocated and now held by Mammon Copper Co., which see. Described in Vol. XII.

WESTERN ARIZONA COPPER C.O. **ARIZONA**

Mail returned, 1918, from former address, Miami, Ariz.

Officers: N. D. Brayton, pres.; J. P. Downey, v. p.; C. D. Duncan, sec.; F. E. Gassaway, treas.; G. R. Stewart, gen. mgr.; H. M. Foster, atty.

Property: 11 miles from Parker, on the Arizona side of the Colorado river. In April, 1917, two cars of ore averaged 12% copper and $4 gold per ton.

ARKANSAS

The zinc-lead region of northern Arkansas is in Boone, Baxter, Marion, Newton and Searcy counties. Carbonate and silicate ores are the principal products, though drilling has exposed sphalerite, but galena has not yet been found in large quantities. Open-cut mining is the general rule. Ore-dressing follows Joplin, Missouri, practice.*

Production statistics are given by the State Bureau of Mines. Most of the mines were idle during 1918, though several new mills were erected in Boone and Marion counties. Yearly production, in short tons, is as follows:

		Zinc concentrates			Lead concentrates	
Year	Sphalerite	Value	Carbonates	Value	Tons	Value
1919....	24	.....	141	.....	56	.....
1918....	310	$16,430	2,156	$68,333	155	$13,954
1917....	916	57,824	17,053	650,585	474	47,593
1916....	1,670	112,726	16,609	940,224	339	28,097
1915....	606	41,341	7,925	408,079	79	4,961
1914....	743	19,406	1,143	25,187	52	2,408
1913....	594	16,916	680	15,050	23	1,179

The output of the State for 1917 and 1918 is as follows:

	1917	1918		1917	1918
Crude ore, tons....	203,600	37,000	Concentrates:		
Zinc, per cent.....	3.70	2.86	Sphalerite, per cent..	58.40	59.00
Lead, per cent.....	0.19	0.32	Carbonates, per cent.	40.50	40.60
			Galena, per cent....	80.50	77.40

The total value in 1919 was $8,340.

The manganese region is tributary to Batesville.

The mines are arranged alphabetically.

AMERICAN BAUXITE CO. **ARKANSAS**

Office: 111 Harrison Bldg., Philadelphia, Pa. **Mine address:** Bauxite, Saline county, Ark.; Harmon Lewis, v. p.; J. R. Gibbons, mgr.

Operated as a close corporation.

Property: the largest producer of bauxite (oxide of alumina) in the State. The output is sold mostly to the Aluminum Ore Co. of East St. Louis. Employees number from 400 to 1,200, varying with demand for product. The bauxite occurs as blanket formation in clay and is mined by open-cut methods. The ore, which is of high grade, is crushed to 1½ in. size and dried, ready for market. The mine is described by Tom Shiras in the "Eng. & Mng. Journal" of June 21, 1919.

AMERICAN STAR ANTIMONY CORPORATION **ARKANSAS**

Office and mine: Gilham, Ark.

Officers: Gordon Battele, pres.; C. M. Fenton, v. p.-sec.-treas., with Harry S. Miller and G. B. Fenton, directors.

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*The field was described in the "Engineering and Mining Journal" of August 26, 1911, by Otto Ruhl, and on February 16, 1918, by Tom Shiras.

Inc. Dec. 10, 1916, in Missouri. **Cap.**, $24,000; $100 par; all issued. Conqueror Trust Co., Joplin, Mo., registrar and transfer agents. Annual meeting, second Monday in December.

Property: 3 groups, 440 acres, near Gilham, Sevier county, and a smelter in the town of Sevier. **Ore:** stibnite occurs in fissure veins, 6″ to 3′ wide and said to give average assays of 30% antimony, 33% sulphur, 6% silica, 3% iron, and 24% alumina.

Development: by 3 shafts, deepest 175′.

Equipment: includes 3 compressors, hoist and steam power. Management reported ore reserves of 2,000 tons in 1917. Developing.

ARKANSAS MINING & MERCANTILE CO. **ARKANSAS**

Address: F. A. Handlen, mgr., Fort Smith, Ark.

Property: zinc-lead mine between Boone and Marion counties. A 200-ton mill was to be built in 1919.

ARKANSAS-OKLAHOMA MINING CO. **ARKANSAS**

Address: Luther Evans, Batesville, Ark.

Property: a lease on a manganese deposit on Cave Creek, the ore being cleaned by a log-washer.

ARKANSAS ZINC & SMELTING CORPORATION **ARKANSAS**

Address: Robert L. Greene, gen. mgr., Van Buren, Ark. N. Y. address: 42 Broadway.

Smelter: one mile east of Van Buren, between St. L., I. M. & S. R. R. and St. L. and San F. R. R. Plant includes ore storage bins of 4,000 tons capacity, weighing apparatus, 2 Ropp type kilns of 20 to 25 ton daily capacity, crusher and mixing house, sampler, 4 blocks of 800 retorts each, pottery, electric power plant, and necessary buildings.

The ore and concentrate supply for this plant comes from northern Arkansas-Oklahoma mines.

B. & A. MINING CO. **ARKANSAS**

Address: J. W. Hammond, Okmulgee, Okla. C. L. Larson, mgr.; J. J. Sanford, mine supt.; E. W. Ellis, mill supt.

Directors: J. W. Hammond, O. F. Dickenson, W. M. Hodsdon, F. P. Snider, Villiard Martin, Charles Popkin, W. J. Seekatz, N. Lambertson, and Milo Brown.

Property: the old Davis mine, 15 miles N. of deQueen and 6 miles N. W. of Gilham, Sevier county. Claims were acquired in 1918, and $150,000 has been spent on development and machinery. The ore-zone is up to 40′ wide, and carries sphalerite, chalcopyrite, and galena. The first named mineral follows the footwall, while the others are disseminated. A 170′ shaft has been sunk. Mill employs rolls, jigs, and tables.

BIG HURRICANE MINE **ARKANSAS**

Address: J. C. Shepherd, Pindall, Searcy county, Ark.

Property: 480 acres, near Pindall, on the M. & N. A. R. R. The mine is in an ore-bearing fault running N. 82° W. Carbonates have been the principal output, but sphalerite has been found under them.

Development: by large open-cut 60′ deep, exposing a thin ore-bearing vein included in the fault. Ore is removed by cars drawn up an incline track.

Equipment: 3 mills of 125, 200 and 100-ton capacity, respectively. In No. 1, ore is crushed to ½″ mesh, and jigged. Tailing passes to No. 2, where a Hardinge mill grinds it to 1½ mm. size, concentration being on tables. No. 3 has 4 tables, which handle pulp from No. 2 mill without finer grinding. Losses of metallic zinc were reduced by the three plants from 5% to 3% and later to 1½%. Tailing piles contain 50,000 tons of 3 to 5% material. Production in 1918 was from 90 to 100 tons of concentrates per week. These contain 40% metal, and make grade B spelter. The mills recover 12½% as carbonate concentrates.

BLUE PIG MINING CO. **ARKANSAS**

Address: A. Besse, supt., Batesville, Ark., but letters returned in March, 1919.

Property: a manganese mine, on which a log-washer and other machinery was to be erected at last accounts.

BOO-GRA-LOO MINING CO. (THE) ARKANSAS

Address: Pawhuska, Okla.

Officers: W. E. Graham, pres.-mgr.; H. M. Loomer, sec.; R. B. Boone, treas., also directors.

Inc. Jan. 26, 1918, in Oklahoma. **Cap.**, $10,000; $1 par; all issued. Annual meeting, January 25. Gross earnings in 1918 were $1,500, and expenses $2,815.

Property: lease on 390 acres of patented land, at Zinc, Boone county, Ark. Ore-body is a chamber deposit of calamine in limestone.

Development: by 300′ tunnel. **Equipment:** includes a 50-ton mill, using concentrators. No production at present, as development is under way.

BROOKS HILL MINE ARKANSAS

Address: Walter Dennison, Cushman, Izard county, Ark. Mine is a maganese deposit worked by steam-shovel.

CENTRAL STATES LEAD & ZINC CO. ARKANSAS

Address: A. N. Stanfield, Flippin, Ark.; or Oklahoma City, Okla.

Property: the Monkey Hill zinc mine in Marion county. A 100-ton mill was erected in 1918.

CHARLEY BOY MINING CO. ARKANSAS

Address: Chas. Gilstrop, Tulsa, Okla.

Officers: A. K. Richards, pres.; W. T. Hines, v. p.; Chas. Gilstrop, sec.-treas.

Property: a lease on land in the Zinc district, Boone county.

CONFEDERATE MINE ARKANSAS

Address: W. E. Everhart, supt., Harrison, Ark.

Property: a zinc-lead mine in Newton county, said to have been worked in 1860. A 300-ton mill, the largest in the State, was erected late in 1917. Water is brought 9,300′ in a 6″ pipe-line. Concentrates consist of 66% zinc carbonate and 33% lead.

CONSOLIDATED ZINC MINES CO. ARKANSAS

Address: N. W. Palmer, supt., Zinc, Ark.

Property: the Howard, Churchill, and Wallace zinc mines. A 400-ton mill was to be built at last report.

CONTINENTAL ZINC CO. ARKANSAS

Address: Bear Hill mine, Georges Creek, Marion county, Ark.

One of the few mines in the northern Arkansas field developed by shafts and drifts. Main shaft is 157′ deep, and sphalerite is mined from drifts at 70 and 133′ depth.

COWAN-BANNERS DEVELOPMENT CO. ARKANSAS

A 200-ton mill and mining plant was to be erected in 1919.

CUSHMAN MANGANESE CO. ARKANSAS

Address: Batesville, Ark.

Company has a manganese mine, and in July, 1919, was one of the only two mines of this character in operation.

DEEP MINING CO. ARKANSAS

Address: W. E. Layton, Rush, Ark.

Property was optioned late in 1917, and Moore Bros. of Stone, Ark., were to drill the deep ground on Cowan barren, between Rush and Yellville. Some lean zinc ore was cut at 175′ in 1918.

DENVER MINING & MILLING CO. ARKANSAS

Letters returned unclaimed in March, 1919, from Yellville, Ark.

Property: a zinc-lead mine in northern Arkansas, said to contain $300,000 worth of ore. A new mill was started in August, 1917.

DIXIE GIRL MINING CO. ARKANSAS

Offices: 600 Wheat Bldg., Fort Worth, Texas; and Buffalo, Ark.

Officers: O. H. Haley, pres.; J. W. Haley, v. p.; H. Lederman, sec.-treas., with A. C. Barnhart and J. H. Hand, directors. L. E. Myles, mgr.; C. T. Jobes, cons. eng.

Inc. 1917, in Arkansas. **Cap.**, $300,000; $1 par; 50,000 issued.

Property: 160 acres of patented land 5 miles S. W. of Buffalo, and 5 miles N. E. of Rush.

Development: by tunnels and open-cuts. Ore is zinc carbonate. New machinery was to be erected early in 1918.

DIXIE QUEEN MINING CO. **ARKANSAS**

Property: the Can Spring mine, on Warner creek, near Buffalo, Marion county.

EDITH MINE **ARKANSAS**

Address: Charles Le Vasseur, Rush, Ark.

Property: acquired in Jan., 1919, by J. de Costa and associates of Kansas City, Mo. Ore is a carbonate of zinc, and is hauled to Yellville. A mill is in operation.

EUREKA MANGANESE CO. **ARKANSAS**

Address: Cushman, Ark.

Property: covers deposit of manganese disseminated in clay. A washing and jigging plant were to be built in 1918.

EVERTON MINING & DEVELOPMENT CO. **ARKANSAS**

Address: Everton, Ark.

Property: manganese deposit in Pugh Hollow, Lafferty Creek district, Boone county. Ore said to carry from 25 to 29% Mn. Concentration raises this grade to above 34%. A test mill was employed prior to erection of a larger plant late in 1918.

FORT SMITH SPELTER CO. **ARKANSAS**

Address: C. W. Martin, pres.; Fort Smith, Ark.

Works: zinc smelter with 2,560 retorts at Fort Smith and rolling mills for sheet zinc at Greencastle, Indiana. Ore is purchased from mines in Arkansas and the Tri-State region.

Through the sale, in July, 1919, of his interests in the American Zinc Products Co., D. W. Kerr, former president, transferred control of the above works, to the Valley Iron Co. of Youngstown, Ohio. New York office: 50 Church St., with M. L. Filley as Eastern sales manager.

FOX DEN MINING CO. **ARKANSAS**

Property: the Dry Bone zinc mine and mill, near Buffalo.

GLORIA MINING CO. **ARKANSAS**

Office: Zinc, Ark. Geo. C. Miller, mgr.-supt. Not incorporated. Reported gross earnings, 1918, $30,000, costs, $20,000.

Dividends: $10,000.

Property: 31 acres, 1 mile N. of Zinc, carries a blanket deposit of zinc ore in limestone, worked by 560′ tunnel.

Equipment: oil engine, 600′ tramway, 50-ton concentrator, consisting of jigs and tables. Concentrate shipped in 1918 averaged 44% zinc and valued at $30,000.

HARRISON MINING & MILLING CO. **ARKANSAS**

Lease sold to Krueger-Mills Mining Co., which see.

INDEPENDENCE MINING CO. **ARKANSAS**

Address: Batesville, Ark.

Company has a manganese mine, and in July, 1919, was one of the only two operators at work.

J. & C. MINING CO. **ARKANSAS**

Address: C. H. Holman, supt., Buffalo, Ark.

In 1918, company was reported developing a body of zinc carbonate ore and erecting a 75-ton mill.

KRUEGER-MILLS MINING CO. **ARKANSAS**

Address: W. O. Krueger, Harrison, and E. H. Mills, Springfield, Mo.

Property: lease acquired from Harrison M. & M. Co., Harrison, Ark. Zinc ore was developed, and a 75-ton mill operated in 1918, but was burned down in that year.

LENK PAT MINING CO. **ARKANSAS**

Former address: care P. C. Quinn, 530 Main St., Joplin, Mo., but letter returned unclaimed in 1919.

Property: at Rogers, Ark., where a mill was to have been built in 1918.

LIBERTY LEAD & ZINC CO. **ARKANSAS**

Address: Yellville, Ark.

Officers: C. G. Rogers, pres.; G. W. Caldwell, v. p.; R. R. Stone, sec.-treas.

Inc. June 17, 1971, in Arizona. **Cap.,** $100,000; $1 par.

Gross earnings in 1918 were $2,000, and expenses, $3,000.

Property: 220 acres in Marion county, 3 miles S. E. of Yellville, contains a blanket deposit in flint rock and sand. Ore carries zinc only. Development by 200′ tunnel.

Equipment: geared hoist, 850 cu. ft. compressor, 75 h. p. oil engine, and 150-ton mill, including 2 jigs.

Production: in 1917, 100 tons of ore; in 1918, 50 tons of concentrate.

MAGNOLIA LEAD & ZINC CO. **ARKANSAS**

Address: J. H. Haddock, pres., Oklahoma City, Okla.; or G. C. Millar, Zinc, Ark.

Property: 4,000 acres in Marion county, contains chamber deposits of zinc carbonate in limestone and flint.

Development: by 200′ tunnel, to depth of 200′.

Equipment: steam power, 600 cu. ft. compressor, 300′ tramway, with 150-ton mill employing jigs.

The ore assays 12% and the concentrates 42% zinc. The finished product costs $15 per ton.

MATTIE MAY MINING CO. **ARKANSAS**

Address: E. Zimmerman, supt., Rush, Ark.

A 150-ton mill to concentrate the developed zinc carbonate ore was completed in 1919.

McCURRY MINING & MILLING CO. **ARKANSAS**

Address: W. A. McCurry, Zinc, Ark.

Property: the Coker Hollow, and Rhodes-Manchester, the Haulk at Dodd City; and the Keys Gap and Canton mines, near Ponca City. The former contains zinc silicate, the latter blende and galena. At Zinc the company has a 100-ton custom mill.

MORNING STAR MINING CO. **ARKANSAS**

Property in the Rush district, yielded 160 tons of zinc ore in October, 1917.

NORTH STAR MINING CO. **ARKANSAS**

Address: F. C. Heywood, Yellville, Ark.

Property: the North Star and Lone Star mines in northern Arkansas, drilled in spring of 1918; the two mines were consolidated in November; a mill was erected with aerial tram, and in April, 1919, the daily output was 5 tons of high-grade zinc carbonate.

OKLAHOMA-KANSAS MINING CO. **ARKANSAS**

Address: Ross Blake, mgr., Batesville, Ark.

Officers: O. M. Bilharz, pres.; W. H. Gartung, sec.-treas.

Property: 585 acres in Independence county. Containing manganese ore in clay, which is worked by a steam-shovel. A 300-ton mill makes a 50% Mn. product.

ONWATTA MINING CO. **ARKANSAS**

Address: C. G. Rogers, supt., Yellville, Ark.

Officers: C. G. Rogers, pres.; G. W. Caldwell, v. p.; R. R. Stone, sec.-treas.

Property: 40 acres in Marion county, 9 miles N. of Yellville, which contains lead ore with calamine, smithsonite, with cadmium content occurring in fissures or fault breccias in limestone. The zinc ore averages better than 60% metal.

Development: by 150 and 300′ tunnels. Workings total 1,000′, blocking out 2,000 tons of ore.

Equipment: 35 h. p. oil engine, 140 cu. ft. compressor, and 50-ton mill, employing jigs.

Production: 1,000 tons of ore up to 1918.

OZARK MINING & MILLING CO. **ARKANSAS**

Address: E. E. Scofield, mgr., Rush, Ark.

Company built a 100-ton mill to concentrate lead and zinc ores, but in May, 1919, plant was reported to be dressing manganese ore from the Batesville district.

SHEPHERD MINING CO., J. C. **ARKANSAS**

Property: a zinc mine in Rush district, taken over by Tulsa, Oklahoma people, in February, 1918. In October, 1917, the mine yielded 350 tons of zinc ore.

TEMPLE MINING CO. **ARKANSAS**

Address: A. Ludlow, supt., Buffalo, Ark.

A new mill was reported producing zinc carbonate concentrate in May, 1918.

YELLOW ROSE MINING CO. **ARKANSAS**

Address: Rush, Ark.

Cap., $3,000,000.

Property: the Yellow Rose, White Eagle and Big Find zinc mines in the Rush district, Marion county; said to be one of the best properties in northern Arkansas.

Development: by shaft and tunnel. A 200-ton mill is operating.

CALIFORNIA

As the mining districts of the State are widely scattered along the Sierra front, the mining companies and mines are described alphabetically, instead of by towns or counties.

The gold output of California still constitutes the most important and valuable metallic product of the State. The total value of the output in 1918 was $17,200,000, or $3,000,000 less than in 1917. The copper, lead, silver, and zinc ores mined in 1918 aggregated $15,000,000 in value, and $5,800,000 in 1919. For 1919, the gold alone has increased, the other metals showing a decline in production.

ABBOTT QUICKSILVER CO. **CALIFORNIA**

Has lease on property of the Alpha Quicksilver Co., which see.

AFTERTHOUGHT COPPER CO. **CALIFORNIA**

Office: 1321 Pierce Bldg., St. Louis, Mo. **Mine office:** Ingot, Shasta county, Calif.

Officers: Geo. L. Porter, pres.; J. Taylor Stratton, v. p.; C. A. Crowl, sec.-treas., with S. F. Lumm, C. Cambern, C. P. Keller, F. P. Maid and John T. Milliken, directors. Robt. Milliken, mine supt.; A. H. Heller, gen. supt.

Inc. Jan., 1909, in Arizona. **Cap.,** 1,600,000 shares, $10 par; 1,544,898 shares issued. Is successor of Great Western Gold Co. A 20-year first mortgage 6% gold coupon bond issue of $800,000 authorized; $350,000 issued, Sept., 1917.

Property: 19 patented claims, 380 acres, with mill and smelter sites and timber lands giving total holdings of 1,760 acres. Lands include the Afterthought, Liberty, Last Chance, Section 15 and Bull groups, mines more or less developed being Afterthought, Copper Hill and Copper Grand. Lands are on the east side belt, which extends from Ingot to DeLamar, and is entirely distinct from the copper belt on the west side of the Sacramento river. Lands show porphyry, slates and shales, carrying contact deposits with sulphide ores, there being 5 known ore-bodies, of which 2 are under development, 1 being reported by company to be 160′x500′x35′ in size.

Company also has 160 acres located 12 miles N. of Redding, in the Flat Creek mining district, adjoining Mountain Copper Co. property.

The Afterthought mine, in the Furnaceville district, 20 miles E. of Redding, has a main shaft 900′ deep, with 7 tunnels, main tunnel being about 2,500′ long, with a total of 10,000′ of workings. Development on the 700′ level shows an entirely new ore-body, averaging 4½% copper, 3% zinc, 6 oz. silver, and 60c gold per ton. This was also cut on 9th level. Sampling of the mine and assays of 12,000 tons of ore milled during past year, show the ore to average 3.6% copper, 18% zinc, 6 oz. silver and 60c gold per ton. Ore is almost exclusively chalcopyrite and sphalerite.

Equipment: includes blast-furnaces, electric power, a 115 h. p. steam plant at the mine, with 20 h. p. and 30 h. p. hoists and a 5-drill air-compressor, also a flotation plant that is treating 300 tons daily. To separate the zinc from copper, the flotation product is put in a Wedge type furnace, lightly roasted at 400 to 500° heat, and retreated in flotation cells.

A 14-mile standard-gauge railway, known as the California, Shasta & Eastern Railway, connects Anderson, on the Southern Pacific Railway with Bella Vista. The ore is hauled 12 miles by truck from the mine to Bella Vista.

The smelter: 1 mile north of Cow creek and 1½ miles north of the mine, is connected therewith by a 30" tramline. The smelter, blown-in March 24, 1905 has water-jacket blast furnaces of 42"-96", rated at 75 tons, and 42"x150". rated at 250 tons daily capacity. A new reverberatory furnace, 19'x60' went into operation in July, 1919. Employs 100 men when running full time.

The mine was closed on account of treatment troubles on November 30, 1917. Operations were resumed in March, 1918, suspended in July to construct an electrolytic zinc plant, and a reverberatory furnace for treating copper concentrates, and again resumed in April, 1919.

The company has done considerable experimenting with its complex ore, which has been very difficult to treat satisfactorily. The Horwood process will apparently solve the difficulty. This is described on page 151, Min. & Sci. Press of August 2, 1919.

Ore is crushed to 2" diameter, ground to 48-mesh, then subjected to flotation, which produces a collective concentrate and a final tailing. The concentrate is thickened, filtered, dried and roasted lightly. After cooling, it is again subjected to flotation producing a froth called zinc concentrate, and a tailing, that is copper-iron concentrate. Ratio of concentration is about 2 to 1, giving 150 tons of collective concentrate daily; this concentrate when treated gives 60 tons copper concentrate to 90 tons zinc concentrate. Janney flotation machines are used.

ALCADE MINING CO. **CALIFORNIA**

Lloyd Root, supt., Grass Valley, Calif.

By October, 1919, company had unwatered the old 400' Kenosha shaft, 7 miles W. of Grass Valley, Nevada county, preparatory to working mine. Plans include continuing shaft to 1,000' level, as mine has produced a good grade of ore in the past. New company is composed chiefly of eastern men. Is a promotion of Geo. W. Root.

ALLISON MINING CO. **CALIFORNIA**

Address: Melones, Calaveras county, Cal.

Inc. 1917, by A. W. Cappes and John T. Murphy, at San Francisco, and Frank B. Pattee of Oakdale.

Property: quartz claims on Carson creek, adjoins the Jones, on both sides and ends; west of the Melones mine, vein shown on bodies of $5 quartz and some high grade ore.

Two 5' Huntington mills were to be installed in 1918, but whether they were no information is available.

ALLISON RANCH MINE **CALIFORNIA**

Owned by Grass Valley Cons. G. M. Co., which see.

ALPHA QUICKSILVER COMPANY **CALIFORNIA**

Main and Mine Office: Wilbur Springs, Colusa county, Cal.

Officers: R. A. Bogges, pres.; E. R. Dodge, sec.; W. H. Rablin, treas. Directors: R. A. Bogges, E. R. Dodge, T. K. Stewart, W. E. Pruett.

Inc. March 21, 1917, in Nevada.

Cap., $250,000—7% preferred and $500,000 common; $5 par; non-assessable; all issued.

Property: 555 acres, near Wilbur Springs, Colusa county, Cal. Leased to Abbott Quicksilver Co.

Development: 250' shaft and 4,000' of underground workings. Ore is said to contain 15 lbs. mercury per ton and to occur in a 15' serpentine vein in shale; course N. W.-S. E. dip 22° from perpendicular. Ore at bottom of mine said to be good. New shaft is 115' deep.

Equipment: 50 h. p. steam hoist, compressor, 2,000′ tramway, concentrator and a 50-ton furnace.

Production: total to date said to have been 30,000 flasks. From 1900 to 1904 reported to have netted $7,000 per month. Closed by litigation from 1904 to 1916. Not operated in 1918, but Abbott Quicksilver Co. is planning to re-open the mine.

AMADOR MINES CO. **CALIFORNIA**

Owners: J. W. Bullock, Seattle, Wash., and W. B. Hubbard, Amador City, Amador county, Calif.

Property: formerly operated under name of Original Amador Cons. Mines Co., 6 claims, covering 4,400′ on the lode at Amador City, is said to carry a system of parallel veins, from 12′ to 50′ wide, with diabase hanging and Mariposa slate foot-wall.

Development: by 780′ incline shaft.

Equipment: includes compressor driven by 100 h. p. motor, hoist, and a 20-stamp mill, which was romodelled in 1915. Idle in 1919.

AMERICAN DREDGING CO. **CALIFORNIA**

Office: Oro Water, Light & Power Co., Sharon Bldg., San Francisco. C. G. Leeson, mgr. of operations, Oroville, Calif.; R. L. Van der Naillen, v. p. and gen. mgr.

Inc. 1916, in California, to take over the dredging interests of the Oro Water, Light & Power Co., whose power plants were acquired by the Pacific Gas & Elecric Co.

Property: placer claims along the Mokelumne river in Calaveras county, where there are two dredges with from 5 to 9 cu. ft. buckets. Annual gold production is over $200,000. The boats dig up to 225,000 yards per month each. Gravel carries about 10c gold per yard.

AMERICAN GOLD DREDGING CO. **CALIFORNIA**

Address: R. K. Estep, supt., Redding, Shasta county, Cal.

Property: Reid Ferry farm of 800 acres on Sacramento river, across the river from Redding. A new $125,000 dredge started operating in October, 1918.

AMERICAN MINING CO. **CALIFORNIA**

Address: Redding, Shasta county, Cal.

Inc. and was controlled by Jas. Sallee.

In 1914 the company started to work the old American mine in the French Gulch district, whose holdings consist of 11 claims. Development work of the old mine includes 4 tunnels from 50′ to 1,400′ in length, and one stope 125′ long and 240′ in height. When mine shut down under former management ore is said to have assayed $20 in gold per ton. It occurs in a fissure vein, strike N. 70° W., dip S. 75° E., slate walls. Pay-shoot is 2′ wide. A 10-stamp mill is on the property.

No information since 1915.

ANDY FITZ M. & M. CO. **CALIFORNIA**

Address: Andrew Fitzgerald, supt., Downieville, Calif.

Property: the Fruitvale mine, in the Allegheny district, near Downieville, Sierra county, carries a vein of gold quartz ore. Developed by tunnel.

Company refinanced in 1914 and underground development work was to be resumed, but we have no recent information.

APP MINE **CALIFORNIA**

Owned by Pacific Coast Gold Mines Corp., which see.

ARBUCKLE MINING CO. **CALIFORNIA**

Address: Frank Green, Ono, Shasta county, Cal.

Property: the Bell Cow gold mine on Arbuckle Mountain, near Redding. Estimated reserves were 50,000 tons in October, 1919, some of which assayed from $10 to $15 per ton.

Equipment: steam power, 10-stamp mill, 4½-mile road, and buildings.

ARGONAUT CONS. MINING CO. **CALIFORNIA**

Office: 43 Cedar St., New York City. Controls Argonaut Mining Co., and is itself controlled by the White Knob Copper & Development Co., owning a majority of its capital stock.

Officers: John T. Smith, pres.; H. H. Carlisle, v. p.; E. H. Kelly, treas.; Arthur Kennedy, sec., New York.

Inc. Jan. 5, 1907, in Maine. **Cap.**, $2,000,000, par $5; $1,855,000 issued; $1,200,000 owned by White Knob Copper & Development Co.

Dividends: 30c in 1914; 40c in 1915; 40c in 1916; 25c in 1917; 20c in 1918; 5c in 1919; 5c in January, 1920. Annual meeting, first Tuesday after June 1. Security Registrar & Transfer Co., tran. agt. and registrar.

ARGONAUT MINING CO. **CALIFORNIA**

Address: 404 Humboldt Bank Bldg., San Francisco. **Mine office:** Jackson, Amador county, Calif.

Officers: E. A. Stent, sec., with John Raggio, John T. Smith and A. Carlisle, directors; N. S. Kelsey, mgr.; E. Phillips, mine foreman; Geo. W. Green, mill foreman.

Inc. in 1893. **Cap.**, $1,000,000, shares $5 par; all issued. Is the operating company of the Argonaut Cons. Mng. Co., control of which is held by the White Knob Copper & Dev. Co.

Property: one mile north of Jackson, on the Mother Lode; adjoins that of the Kennedy Extension Mng. Co. on the south.

Geology: ore is a soft shattered white gold quartz in a regular and continuous vein 8′ to 12′ wide, with strike N. 10° W. Vein outcrops in a metadiabase; above the 290′ level it passes into the Mariposa slates, where, apparently, the fissure was originally opened by a thrust fault with a throw of 120′. One wall is a soft black slate, the other is slate or a greenstone schist. Two oreshoots have been developed; the north shoot 325′ long, with average width of 10′; the south shoot 600′ long, with average width of 10′. On the 1,240′ level there is a split in the vein, a branch running off into the schist hanging wall. Ore yields in the mill about $5.50 in free gold and $1.50 in concentrates.

Development: shaft 4,650′ deep, sunk at an angle of 60°, with levels at 150′ intervals. At 290′ level shaft cuts the vein in diabase, from the 1,460′ level to present depth it is in the slate hanging-wall. Present work is being done on the four lower levels. Ground is very heavy and the square-set mining method is used. Nearly half the force employed underground are timbermen. Ore is hoisted, in 4-ton skips, by a 500 h. p. double-drum electric hoist, automatically lumped into storage bins, then fed to a 10 by 16″ Knight crusher and trammed in 2½-ton cars to the mill.

In March, 1919, fire broke out on the 4,000′ level; after burning several weeks, it was confined to sections between the 3,700′ and 4,300′ levels, doing no extensive damage. In October, north and south drifts at 4,600′ were in good ore, and extensive surface improvements were under construction.

Mill: sixty 1,000-lb. stamps, dropping 96 times per minute, with 7″ drop, and crushing 5 tons per stamp through 20-mesh wire screen, with capacity of 300 tons daily. From the amalgamating plates pulp flows to 36 Frue vanners, tailing goes to hydraulic classifiers, overflow being concentrated on 20′ Darrow rotary concentrators. A 90% extraction is made by amalgamation and concentration. Company employs 225 men.

This mine has the highest average grade ore and is one of the best gold mines along the Mother Lode of California, and normally pays good dividends.

ARPS COPPER COMPANY **CALIFORNIA**

Office: 216-217 Russ Bldg., San Francisco, Calif. **Mine address:** Copper City, Shasta county, Calif.

Officers: R. Vaun Montgomery, pres.-mgr., R. C. Montgomery, sec., with F. B. Hink, R. W. Maples, F. A. Bush, directors.

Inc. 1916, in Arizona. **Cap.**, $1,500,000; $1 par; 663,600. issued.

Property: 36 lode claims (unpatented) approximately 635 acres of mineral land in Township 34 N., Range 3 W., Shasta county, adjoins the mines of the Bully Hill Copper M. & S. Co. The Arps group of 15 claims in process of patenting.

Development: by 6 tunnels, aggregate length 2,100′. Equipped with a 3-drill oil-driven compressor. Development suspended in December, 1918, until the copper market improves. To date, the property has opened up a considerable tonnage of medium grade copper and zinc ore, carrying some silver values, though

but little ore of shipping grade has been encountered. The company attaches little importance to the large deposit of manganese ore because of high silica content.

ASSETS REALIZING MINES CORPORATION CALIFORNIA

Address: 812 Merchants Nat'l Bank Bldg., Los Angeles, Cal. (Is a subsidiary of the Dupont Copper Co. of Nevada, which holds a 51% interest.)

Officers: J. V. Priest, pres.-gen. mgr.; J. A. Brown, v. p.; F. W. Andrews, sec.-treas., with M. Brines and R. F. Howard, directors. C. L. Logue, superintendent.

General balance sheet, September 16, 1919, covering period since incorporation, shows: Net original purchase values mining properties, $596,252; total expenses applicable to development, $207,087, which includes: development and equipment, $164,187; administrative and miscellaneous expenses, $42,900. Current assets and contracts in course of collection, $24,537; treasury stock, $177. Liabilities: Paid in capital, $576,994; notes payable, $3,025, and an item, capital surplus, $269,410. Annual meeting, June 23.

Property: The Arica group of 28 claims, 560 acres, in the Ironwood mining district, Riverside county. Ore: gold-silver, in six veins between dolomite hanging and chlorite schist foot-walls: ore is found in porphyry intrusions between these walls."

Development: by 2 shafts, one 930 deep, with 9 levels from the 80′ to 900′ levels. The 138′ level said to be opened for 270′ in ore assaying $10 to $30 per ton in gold. The second shaft, 330′ deep, has levels at 165′, 230′, and 330′ depths, and ore is said to average $20 per ton.

Equipment: 150-ton plant, equipped with crusher and rolls, Hardinge mill, Dorr classifiers, thickeners, and agitators, air-compressor, pumps, assay office, boarding house and 10 buildings.

Ore reserves: reported, 50,000 tons ready for stoping.

Company said to own 51% of the stock of the Rito Seco Gold Mines, Colorado, and 60% of the Mammoth Gold, Silver and Placer Mines, Colombia, South America.

ATASCADERO COPPER CO. CALIFORNIA

Address: B. G. Lewis, Atascadero, Cal. Alfred Hanford, supt.

Property: 12 claims, 360 acres, 160 acres patented, on Greenhorn Mt., in French Gulch mining district, Shasta county; includes the Greenhorn mine, acquired from the Greenhorn Mountain Copper Co. Said to show gold-silver-copper sulphide ore, occurring as a fissure in porphyry. Vein strikes N. 61° W., dips 40°, assays said to average 4.5% copper per ton.

Development: by over 3,000′ of tunnels. Greatest depth of workings is 480′. Management claims 250,000 tons of 3% ore blocked out. There were 15 men working in 1919.

Equipment: sufficient for development by tunneling, but to include a treatment plant which will use a process devised at Oakland, Calif.

It is believed that the mine is a good one, but the success of the method of treatment is regarded doubtful.

ATOLIA MINING CO. CALIFORNIA

Address: 1404 Humboldt Sav. Bank Bldg., San Francisco. **Mine office:** at Atolia, San Bernardino county, Cal.

Officers: E. C. Voorheis, pres.; E. A. Stent, sec.; Chas. S. Taylor, supt.; B. C. Clark, cons. engr.

Inc. in California. **Cap.,** $100,000; shares $1 par.

Dividends: totaled $5,264,500 to Sept., 1918.

Property: a number of claims at Atolia on the Randsburg branch of the A. T. & Sante Fe R. R. are being worked for tungsten ores. The ore occurs as scheelite in both placer deposits and fissure veins. Also owns Saint Anthony Mines Co., Nevada.

Development: a 1,100′ shaft with electric hoist and full equipment. The loss of the concentrating mill, destroyed by fire on January 25, 1916, caused suspension of all operations for several months, but a new mill with a daily capacity of 100 tons has been built, making a concentrate containing from 50-75% scheelite.

Equipment: ore is hauled from mine to mill on 4-ton trucks which deliver 100 tons a day. From a large bin the ore is fed to a 10x18" Joshua-Hendy jaw-crusher; then passes by bucket conveyor to the hopper feeding the rolls for finer crushing. Half of the product is fed into a single mill unit, composed of two 5' Huntingtons. The discharge passes over two large Deister roughing tables, where the most of the tungsten is extracted; the residue passes on to the Frue vanners. The other half of the rolls product goes to the 8' Marcy ball-mill, whose capacity is 30 to 40 tons in 24 hours. The 30-mesh pulp is discharged onto a Deister roughing table and then passes to a Dorr classifier. The slime from both units is thickened for concentration by the use of three 8' Callow cones and then passes over three double-decked sliming tables; then to three double-decked Deister tables, whence the tailings are carried to the pond. The plant is operated by about 25 electric motors, each unit of machinery being driven by a separate motor.

Over 300 men are reported to be employed. Is the largest tungsten (scheelite) producer in America.

Shipments of concentrates in 1918 amounted to 1,200 tons.

Mine and mill closed down in April, 1919, until the tungsten market improves.

AVAWATZ CONSOLIDATED MINES — CALIFORNIA

Address: M. L. Neely, care Pacific Gas & Electric Co., Fresno, Cal.

Inc. May, 1919, in California.

Property: the old Crown mine in the Silver Lake district, San Bernardino county, 11 miles from rail. Examined in 1917 by Alvin B. Carpenter of Los Angeles.

A brecciated zone carries argentiferous galena. Considerable work has been done and at present there is some rich ore exposed. Development was re-started in July, 1919, and a hoist, air-compressor, and other machinery were erected.

BAGDAD-CHASE GOLD MINING CO. — CALIFORNIA

Address: J. N. Beckley, treas., Rochester, N. Y. Is a holding company owning all the stock of the Soulsby Consolidated Gold Mining Co., Soulsbyville, Calif., also a stock interest in the Pacific Mines Corporation, Camp Rochester, Calif., and in the Boise-Rochester Mining Co., Atlanta, Idaho.

BALAKLALA CENTRAL MG. & SMELTING CO. — CALIFORNIA

Address: Coram, Shasta county, Cal.

Inc. in Wyoming. **Cap.**, $5,000,000, shares $5 par; one-third of issue owned by Balaklala Consolidated Copper Co., the remainder by the Mammoth Copper Mining Co.

Owns 3 claims surrounded on all sides by Balaklala Consolidated Copper Co.'s holdings. Inactive for years.

BALAKLALA CONSOLIDATED COPPER CO. — CALIFORNIA

Office: 111 Broadway, New York. **Works office:** Coram, Shasta county, Calif.

Officers: Thomas W. Lawson, pres.; W. A. Kerr, v. p. and treas.; S. A. Holman, gen. mgr.; preceding officers and H. W. Hoops, directors. A. R. Buchanan, sec.

Inc. Feb. 24, 1906, in Nevada. **Cap.**, $10,000,000: reduced to $1,000,000, in 1917; shares $25 par. Bonds, $1,500,000 have been retired.

Company was a reorganization of the Balaklala Mining Co., control of which was sold simultaneously to two parties, making a snarl requiring reconstruction to untangle. Is controlled, through ownership of entire stock issue, by the First National Copper Co. Windsor Trust Co., New York, and Federal Trust Co., Boston, transfer agents; Trust Company of America, New York, and First National Bank, Boston, registrars.

Company report for fiscal year ending June 30, 1918, gives cash and accounts receivable, $250,413, and total assets, $1,605,313. Liabilities show: Profit and loss, $90,086; First National Copper Co., $515,227.

Comparative profit and loss statement, years ending June 30, shows:

Profit and loss account:	1918	1917
Net ore sales	$547,495	$837,910
Cost of operations	348,370	393,601
Net profits	199,125	444,305
Other income	3,269	9,003
Total profit	207,393	453,311
Other charges:		
Expl. and dev. other property	.....	52,975
Experiments with Hall process	.....	116,909
Dividends	330,000	150,000
Total charges	.....	319,884
Surplus	90,086	133,427
Previous surplus	212,693	79,265
Total surplus	90,086	212,693

Balance sheet of First National Copper Co., shows cash and accounts receivable on June 30, 1918, of $170,849, while Balaklala on same date had cash and accounts receivable of $250,413, in addition to Liberty bonds, $10,000.

Property: 65 claims, patented, 1,169 acres, also 800 acres of miscellaneous lands, including a smelter site, the townsite of Coram and right-of-way for tram line. Mineral holdings are at Kimberly, in the Flat Creek district, 4 miles northeast of the Iron Mountain mine, and adjoin the Trinity mine. Property reported to carry 5 orebodies, with 2 developed. Apparently 4 orebodies are portions of the same ore zone, separated by faulting. Lands carry 3,040′ of the strike of the main ore zone, developed for about 1,100′. Country rock is rhyolite, ore occurring in lenticular masses as replacement of country rock, in flat bodies, with slight dip to north, and greatest extension east and west, with a series of north and south step faults, causing displacement from a few feet to more than 100′. The two main ore-bodies are developed for lengths of 900′ and 1,100′. Ore is cupriferous pyrite, copper values being mainly in chalcopyrite, with a little chalcocite and covellite, all carrying gold and silver values, estimated by management to average about 2.65% copper, 0.9 oz. silver and 50 to 60c gold per ton. The large ore-body developing about 1,000,000 tons, gives a typical analysis of 2.7% copper, 0.95 oz. silver, 0.03 oz. gold, 21.4% silica, 31.5% iron, 4.3% lime, 3.4% alumina, 2.2% zinc and 35.2% sulphur.

Principal workings are known as the Windy Camp and Weil. The mine has large reserves of low-grade ore. Development is by a large glory hole, and by tunnels, with upraises, providing for open-cast mining, giving cheap extraction, there being about 20 tunnels, including the Weil tunnel of nearly 6,000′ length. Mining operations were resumed August, 1913, and were of a desultory nature for 2 years. The property was operated from August 13, 1915, shipping 250 tons of ore daily, increased May 13, 1916, to 300 tons, to the Kennett smelter of the U. S. Smelting Co. under a 10-year contract, but on May 13, 1919, the mine was closed down on account of metal market condition.

Ore reserves: said to be about 3,000,000 tons of 2.83% copper ore with 1.32 oz. silver and 60c. gold per ton, a year's supply (100,000 tons) being ready for stoping.

Power equipment includes a steam plant installation of about 1,000 h. p. and electric power. Machinery includes a number of hoists, 5 compound air compressors and about 40 rock drills. Buildings include an office, store, school, hospital, sawmill and about 75 dwellings, all but the necessary mine buildings located in the town site at the smelter.

The mine and smelter are connected by a Bleichert aerial tram of 16,130′ length, of 75-tons hourly capacity, operated by gravity, having 62 wooden towers, highest 85′. The 1,700-ton smelter is thoroughly modern and well equipped. Ore passes through 4x10′ revolving sizing drums, coarse material going to the blast furnaces and fines to the calciners. The 500′ bin house has bins for ore, fluxes and fuel. The roaster building has four 50-ton McDougal calciners.

The furnace building, of steel frame, no wood being used, has three 600-ton water-jacket blast furnaces, each 56″x240″, first blown in October, 1908, and a 17x96′ reverberatory furnace, of 150 tons daily capacity, for fines, burning petroleum, the waste heat generating power in 2 Stirling boilers, the power house having 3 additional Stirling boilers, burning petroleum. The converter plant has 96″x150″ shells of horizontal type, and an electric traveling crane. The product, when operating is 99% blister copper carrying 75 oz. silver and 1.5 oz. gold per ton, sent to Perth Amboy works for electrolytic refining. Power plant includes 3 Connersville blowers, each driven by a 450 h. p. tandem compound steam engine, direct-connected. The slag line has electric locomotives.

Although the smelter is about 14 miles from the nearest cultivated lands, the "smoke farmers" of northern California were busy and controversy with the Shasta County Farmers' Protective Association led to the installation of the Cottrell electrolytic flue dust precipitator, which took out the dust, but not the acid fumes, and hence was not successful. The Young process used at Campo Seco (Penn Mining Co.) and the Hall process were also unsuccessful. The Heslewood method in 1915 was the last one to be tried out, but was not satisfactory.

The smelting record is given in Vol. XI, the Copper Handbook.

Production: 1917-1918, to June 30, 82,876 tons ore, assaying 2.29% copper, $1.57 in gold and silver, compared with the previous years' production of 76,559 tons, netting $174,656.

BALAKLALA COPPER CO. **CALIFORNIA**

Reorganized at First National Copper Co., q. v.

BARBAROSSA MINING CO. **CALIFORNIA**

Address: W. E. Wessinger, Duluth, Minn., mgr.

Inc. Oct., 1917. **Cap.,** $1,000,000: shares $1 par; $650,000 in treasury.

Property: 11 claims, 140 acres, including the Barbarossa mine, near Loraine, 15 miles N. E. of Caliente, Kern county, Calif., shows 7 veins, of which the Barbarossa alone has been worked. It has a N. W.-S. E. strike, with dip 40° E., average width 4′, granite footwall, and quartz-porphyry hanging-wall.

Ore: free milling gold. **Development:** by 140′ shaft, 60′ winze and about 400′ of drifts.

Equipment: 5-stamp mill, 1½ miles from the mine, gasoline power.

Mine credited with past production of 2,000 tons of $23 ore. No recent information received.

BELGIUM-BOHEMIAN MINING CO. **CALIFORNIA**

A Belgian company, that in 1914, owned the Highland mine, Liberty mining district, 11 miles S. E. of Etna Mills in the Klamath Reserve, Siskiyou county, California.

Property: 100 acres at 640′ elevation.

Ore: free-milling gold in shoots 130 long and 2′ wide; strike N. 40° E.; dip 30° S. E. Footwall is a diorite schist and hanging-wall is quartz porphyry.

Development: tunnels with several thousand feet underground workings; main tunnel 600′ long. All work has been done near apex of mountain so that only a shallow shaft has been obtained. Supplies are packed in over a 3-mile trail.

Equipment: includes a 10-stamp mill, run by gasoline. Mine is credited with a production of $350,000. No recent returns.

BELMONT SHAWMUT MINING CO. **CALIFORNIA**

Subsidiary of Tonopah Belmont Development Co. of Nevada, which owns 750,000 of the 1,000,000 shares, and spent $498,455 on property up to the end of 1918. Property was acquired in February, 1917.

Offices: 500 Bullitt Bldg., Philadelphia, and Shawmut, Cal.

Officers: C. A. Heller, pres.; W. M. Potts, v. p.; S. D. Sinkler, v. p.; C. B. Taylor, general counsel; with H. C. Brougher, M. B. Cutter, J. C. Fraley, R. G. Park and T. W. Synnott, directors. R. G. Wilson, sec.-treas.; Frederick Bradshaw, gen. mgr.; O. McCraney, supt.; Albert Silver, mill supt.; G. H. Garrey, cons. geologist.

Inc. in Delaware. **Cap.,** $1,000,000; $1 par.

No financial statement is available, as ore treatment was only commenced in June, 1918, only to be suspended later in the year on account of abnormal conditions, and resumed in April, 1919. Gold extracted during the period was worth $128,500. New construction and development cost $161,042.

Property: the Eagle Shawmut mine in Tuolumne county; it is the southernmost property of any present importance on the "Mother Lode."

Development: during 15 years' operation a depth of 2,300′ was attained. The main ore-shoot was continuous from surface to lowest level. The future of the mine depends on the downward extension of this orebody. On No. 16 level the lowest in 1917 the main shoot consisted of a series of closely-joined or overlapping lenses of sulphide ore, 490′ long, 10′ wide, worth $7.50 gold per ton. In 1917-1918, the main shaft was sunk from 1,834 to 2,243′, measured from the adit, which is 2,800′ long. An electric hoist was installed on the adit-level, also pumps on No. 16 and 18 levels. In 1918, new openings totaled 2,133′, 85% being below level No. 16. On No. 18, the deepest level, the sulphide shoot is 400′ long, and is of better grade than above. Ore reserves are estimated at 424,733 tons.

Equipment: including mining machinery mentioned, compressor, drills, etc., there is a complete 70-stamp mill and oil-flotation plant, remodeled from the old 100-stamp amalgamation and concentrating mill. Concentrates are sent to smelter.

Production: up to 1917 the total was $4,500,000. During the broken period of 1918, there was treated 29,336 tons of ore, averaging 0.237 oz. gold per ton. The 3,229 tons of concentrate assayed 1.987 oz., a total of 6,418 oz. The recovery was 92.18%.

This mine, operated under the present efficient management and with normal conditions, should add materially to the gold output of California, and prove profitable to the stockholders.

BENDIGO MINES CO. **CALIFORNIA**

Address: Vidal, Riverside county, Cal. Lester Scott, supt., at last accounts.

Property: company purchased in Jan., 1915, the Morgan and Bradley group of claims, 7 miles from Vidal and did development work during the year. The ore is copper-gold and returns from shipment of several cars are said to be $50 per ton.

Developed: by a 150 incline shaft, with a 60′ vertical winze from lower level which is claimed to have opened up a 3′ vein of ore. $75,000 said to have been taken from the small block of ground opened by the shaft. There is also a large deposit of gypsum on the property. Company plans to sink a vertical shaft connecting with the winze. No recent information.

BEVERIDGE CONS. MINES CO. **CALIFORNIA**

Officers: Albert J. Padjan, pres.; Sydney R. Brough, sec., 518 S. Van Ness Ave., Los Angeles, Calif.

Inc. in Arizona.

Property: 5 claims in Beveridge canyon, Inyo county, adjoins the old Keynote mine on the S.

Development: by 180′ tunnel at an elevation of 7,500′ on the War Eagle Vein, claimed to be 3′ wide and to give assays of $45 per ton. The orebody has a N. 70° E. course and dips slightly S.

Management seems to base expectations on the past production of the adjoining Keynote property.

BIG CLIFF MINING CO. **CALIFORNIA**

Idle. Does not reply to letters. See Vol. XII. Mine in Salmon River district, 18 miles from Etna Mills, Siskiyou county, Calif.

BIG FIFTY MINE **CALIFORNIA**

Owned by Fifty Associates Securities Co., 814 San Fernando Bldg., Los Angeles, Calif.

Officers: Dr. V. M. Pierce, pres.; A. E. Nichols, v. p.; directors, T. J. Benkendorf, W. H. Kennedy, Dr. J. E. Cowles, A. E. Nichols, H. E. Miller and L. E. Hauser. F. W. Remy, mng. engr.

Cap., $1,000,000.

Mine, 15 miles from Caliente, Kern county, is reported to show a 50′ vein, in porphyry, carrying 30% stibnite. Company claims to have shipped 350 tons ore per month during 1917 and 1918, with earnings of $1,700 on royalty, from January to November, 1918.

BISHOP CREEK GOLD MINE **CALIFORNIA**

Owned by Cons. Wilshire Mining Co., which see.

BLACK BEAR MINING CO. **CALIFORNIA**

Office: David L. Killen & Co., 716 Copper Bldg., Denver, Colo.

Cap., $375,000; $1 par; 210,986 shares issued.

Property: 400 acres in Grass Valley district, Nevada county, Cal., said to show several veins carrying gold. Has 10-stamp mill, hoist and water power.

Denver office's advertising matter was not favorably regarded, and no late news obtainable.

BLACK HAWK MINE **CALIFORNIA**

Owned and operated by D. A. Blue, Randsburg, Calif.

Property: 7 claims, in the Stringer district, near Randsburg, Kern county, Cal. **Ore:** quartz in 6″ vein shows coarse gold veins, assaying $20 per ton. Mill test of 50 tons of gravel from the placer claims said to have assayed $6 gold and 3 oz. of 60% tungsten per yd. Developed by 125′ shaft. Equipped with 5-stamp mill and water power. Developing at last accounts.

BLACK HAWK TUNGSTEN MINING CORP. **CALIFORNIA**

Office: Atolia, Cal.

Officers: T. M. Gaffey, v. p.; A. G. Sepulveda, treas.; E. V. Seward, sec., with W. C. Barlow, V. A. Goodrich, C. R. Miller, W. M. Rich, Charles Driefus and D. W. McLennan, directors.

Inc. 1917, in California. **Cap.,** $200,000; $1 par; issued 176,209. Claimed in November, 1918, to have $10,000 in cash and no debts. Stock is listed on Los Angeles Stock Exchange.

Property: 16 claims, 200 acres, 2 claims patented, adjoins property of Atolia Mining Co., San Bernardino county. $200,000 is said to have been spent in exploration, development and equipment.

Development by 500′ shaft with 2,000′ of workings. Equipped with electric hoist and compressor.

The property is a prospect.

BLACK OAK MINES & MILLING CO. **CALIFORNIA**

Office: First Nat'l Bank Bldg., San Francisco. **Mine office:** Soulsbyville, Tuolumne county, Calif. Chas. E. Knox, gen. mgr., Tonopah, Nev.; R. C. Knox, supt.; F. N. Watts, mill supt.

Property: several claims 1 mile west of Soulsbyville, Tuolumne county.

Geology: ore is quartz, containing pyrrhotite, sphalerite, marcasite, and galena, in a vein in granodiorite. Vein has strike of N. 15° E., with dip 60° to 70° W., varying in width from 1′ to 25′, and has several branches coming in from the hanging-wall side. The ore occurs in lenses at the intersections of diorite dike crossings and also near faults. Diorite dikes have a strike of N. 55° E., vertical dip, and 1 to 2′ in width.

Development: by a 70° incline shaft sunk in the foot-wall and levels at intervals of 100′. Lowest workings are on the 1,800′ level. Two ore-shoots have been developed, one north of the shaft, 500′ long, average width 4′, the other south of the shaft, 300′ long and average width of 20′. Ore milled averages $20 per ton.

Equipment: 100 h. p. single-drum electric hoist, Ingersoll-Rand air-compressor, and pumps, also a mill consisting of 20 1,250 lb. stamps, crushing 3.5 tons per stamp through 10-mesh screens. Ore is crushed in 1.85% cyanide solution. Remainder of equipment includes a Dorr classifier, a 5x18′ tube mill, treatment tanks, and Oliver filter, capacity 100 tons per day. Lime is added to batteries and agitators, and 24 lb. lead oxide to the tube mill and agitators. Mill makes an extraction of 96%, consuming 1.5 lb. cyanide and 3 lb. lime per ton of ore. Daily capacity of mill is 75 to 100 tons. Costs per ton are: Development, $1.63; mining, $2.22; treatment, $1.59; general and misc., $0.56; material in mill, $0.96; labor in mill, $0.62; total, $7.59. Employs 85 men. See Mineralogist's Report, Mines & Min. Res. of Tuolumne county, p. 138.

Diamond-drilling disclosed some ore on 700′ level, and new work in 1916 showed 4′ of high grade ore on 1,800′ level.

No information procurable since 1917: company, like several others, operating along the Mother Lode, being very secretive about operations, but in January, 1920, the 18th level had opened 30″ of rich ore on which mill tests were to be made.

BLUE LEDGE MINE **CALIFORNIA**

Office: 82 Beaver St., New York City. Mine near Hutton, Siskiyou county, Calif. Property is held by the Mexican S. & R. Company, a subsidiary of the Compania Metalurgica Mexicana.

Property: 27 claims, patented, about 440 acres in the Elliott mining district on Upper Appelgate river, 4 miles south of the Oregon line, also a large smelter site at Seattle Bar. Property located 1889, but only slightly developed until 1909. Company has spent over $700,000 in work since that time.

Geology: the vein, with strike of N. 10° S., and almost vertical dip, slightly inclined west, traceable some 3,000′ by prominent outcrops of 50 to 250′ width, lies between a footwall of gray to black, slightly micaceous schist, and a hanging wall of soft white mica-schist, the wall not always being clearly defined, and with mineralization extending into the hanging wall. Orebodies are lenticular deposits, with clay gouge, said, by several authorities, to be in huge laminations in the schist formation, but ore apparently is persistent to depth. Ore is mainly chalcopyrite, associated with a little sphalerite and occasional native copper, average value being 6% copper and $5 gold per ton.

Development: 9 tunnels, with upwards of 2 miles of workings and nearly 7,000′ of diamond-drilling.

Vein averages 5′ in width and the mine workings block out 110,000 tons of 6% ore with 70,000 tons more probable. Main working tunnel is connected with others, by raises to surface 500′ above. A winze opens a 600′ drift on ore, 300′ below the main tunnel. The mineralized wall-rock carries commercial value and contains lenses of high-grade ore, but above estimate refers to the quartz vein only.

Equipment: includes a hydro-electric power plant, taking water from Elliott creek under a head of about 150′, at pressure of 85 lb. Buildings include an office, assay office, boarding house, dwelling and sawmill. The company has improved the townsite with waterworks, sewers and a school house, and has built a good road between Hutton and Yreka. A 40-mile railway to connect with the Southern Pacific at Medford, Ore., has been projected.

BLUE MOUNTAIN MINING CO. **CALIFORNIA**

Office: 431 Security Bldg., Los Angeles, Cal.

Officers: Chas. K. Barnes, pres., mgr., White River, Cal.; H. H. Koons, v. p.; R. B. Chapman, sec.; J. F. Kent, treas.; preceding with S. E. Yount, directors.

Inc., in California. **Cap.,** $30,000; shares $1 par; assessable, 29,038 issued. Annual meeting in July.

Gross earnings, 1916, $37,539; operating expenses, $15,233. Dividends paid to date, $14,519.

Property: 9 claims, 170 acres, unpatented, in the White River Mining district, Kern county, Calif.

Ore: quartz carrying gold and silver values occurs in shoots in a fissure vein in granite. Ore said to be 2′ wide and over 800′ long, carries 2% iron and some lead and zinc. Average assay $13.60.

Development: by 300′ incline shaft with 3,000 of workings. Company claims ore reserves of 20,000 tons with 5,000 blocked out.

Equipment: includes gas hoist, compressor, pump, etc., and a 5-stamp mill treating 12 tons daily.

Recent information not available.

BOBS FARM MINING CO. **CALIFORNIA**

Mail returned undelivered from Sacramento, Cal., J. H. Byers, pres.; W. H. Montgomery, sec.

Property: 100 acres, in Sec. 5, T. 37 N., R. 12 W., in Trinity Reserve, at an elevation of 5,000′, was located in 1883. Said to be the best producer in the

New River mining district, Trinity county, but is very expensive to operate, as supplies must be packed over a trail from North Fork, a distance of 40 miles from the latter town.

Ore: gold in vein with diabase hanging wall and quartz-porphyry footwall; strikes E.; dips 45° N.; width of ore-body 2′, and length 260′; maximum depth of workings, 700′.

Development: tunnels; longest, 1,300 ; 6 levels from 60′ to 700′ long; 2 crosscut tunnels, 300′ and 600′ in length; several thousand feet of workings.

Equipment: includes 3-stamp mill and one 3′ Huntington mill, run by steam and water power. Twelve men employed in 1914. Said to have produced $350,000.

BOREALIS CONSOLIDATED MINES CO. CALIFORNIA

Address: Letters returned from office of president, Dr. G. W. Hillegass, Bacon Bldg., Oakland, Calif., in 1917.

Property: 40 acres, including the Eureka mine, in Ophir district, 4 miles from Auburn, Placer county, Calif.

Ore: quartz, exposed in shoots, averaging $12 per ton.

Development: by 3-compartment shaft.

Ore reserves: estimated in1915, by company, at 17,000 tons of $12 ore in sight on Eureka ground.

Equipment: 20-stamp mill, electric hoist, good for 1,500′, and air compressor. Regular shipments of concentrates to custom smelter were made in 1915. No later returns.

BROOKLYN MINING CO. CALIFORNIA

Mail returned marked, "out of business." Formerly operated at Dale, California.

BROWN BEAR MINING CO. CALIFORNIA

Address: Redding, Shasta Co., and Deadwood, Trinity Co., Cal.; Thos. McDonald, pres.; B. McDonald, supt.

Property: 586 acres, of mineral land, 200 patented, and 671 acres of timber land, includes the Brown Bear mine, on north side of Deadwood Gulch at Deadwood, discovered in 1875, and worked ever since. The property is a consolidation of several mines and as whole has been the largest producer in the Weaverville Quadrangle and most famous mine in Trinity county. It is credited with a production of $7,000,000 to $10,000,000.

Geology: there are 2 main veins, the Monte Cristo and the Last Chance 200′ south of the former, which lie for the most part in Bragdon slate formation, but also cut an intrusive soda granite porphyry. Veins are parallel, and strike N. 80° E. The Monte Cristo dips steeply to the north; the Last Chance dips south 60° to 80°. Width as a rule is not over 2′, more commonly about 6″, but stopes have been mined to a width of 22′. Ore-shoots are several hundred feet in length; those of the Last Chance vein pitch at a flat angle to the East. The veins show clay slips along both walls, so it is rare that the ore is frozen to the wall. Quartz is the principal gangue mineral; the ore contains pyrite, galena, sphalerite and arsenopyrite. Pyrite being the most common, rich ore is usually found, where galena and sphalerite are present. The best ore mined runs about $100 per ton, but the average grade is between $20 and $50.

Development: 7 crosscut tunnels ranging in length from 100 to 2,400′, the lowest being 1,080′ below the outcrop. There are several miles of underground workings.

Equipment: includes a 10-stamp mill, 2 Wilfley tables and water power obtained from Deadwood Creek through a 3-mile ditch.

Lessees have been working the mine.

See Mines & Min. Res. of Trinity county, State Mineralogist's Rept., p. 141; U. S. G. S. Bull, 540, p. 70.

BRUNSWICK CONSOLIDATED GOLD MINING CO. CALIFORNIA

Address: Grass Valley, Nevada County, Cal. Eastern office: 74 Cortland St., New York.

Officers: W. H. Oscanyan, pres.; R. Chester Turner, v. p.-gen. mgr.; J. C. Nilon, sec.-treas., with J. A. Beckwith, Theo. C. Camp, C. H. Mallen, directors. J. J. Halpin, asst. sec.-treas.; C. H. Mallen, supt.

Inc. Jan. 11, 1890. **Cap.**, $500,000; shares $1 par; 395,287 shares issued. J. J. Halpin, 136 Liberty St., New York, transfer agent; Farmers Loan and Trust Co., New York, registrar. Listed on San Francisco Exchange.

Financial statement: for fiscal year ending Jan. 25, 1918, shows balance total receipts, $239,185; disbursements, $207,729.

Dividends: in 1906, 3c; in 1913, 6c; in 1914, 24c; in 1915, 18c per share; none since. Total dividends to date, 51c; total assessments, $1.22 per share.

Property: located on the Mother Lode, at Grass Valley, has gold quartz veins in schist and slates. For geology see Lindgren's Gold-Quartz veins in Nevada City and Grass Valley districts, Calif.; U. S. Geol. Survey 17th Ann. Rept. pt. 2, 1896, pp. 1-262.

Development: by incline shaft to 1,100′ level, and by 1,350′ vertical shaft, being sunk to the 1,400 level. Underground work in 1917 totaled 1,896′.

Ore reserves: estimated at 10,000 tons Jan. 24, 1918.

Equipment: includes two 20-stamp mills.

Production:

		Costs Per Ton			Value Ore	%	Bullion Prod.	
	Tons	Mng.	Mlg.	Total	Per Ton	Ext.	Oz. Au.	Oz. Ag.
1917.....	30,805	$4.32	$0.91	$6.26	$6.55	90.5	....	....
1916.....	34,091	3.87	0.83	5.90	6.44	89.5	7,998	1,856
1915.....	22,004	4.97	0.84	8.59	11.11	90.8	9,486	2,069
1914.....	16,237	6.05	.93	10.22	....	93.9	12,992	2,622

Production: 1917, $182,867; total production, 1893-1918, $1,765,361.

Mine has been closed temporarily on account of abnormal conditions.

BUCKEYE MINING CO. OF CALIFORNIA **CALIFORNIA**

Office: 135 Broadway, New York. **Mine office:** Vernalis, Calif.

Officers: J. F. Grugan, pres.; C. L. Ball, v. p.; H. E. Bishop, sec.-treas. Directors: J. F. Grugan, H. E. Bishop, W. E. Roberts, T. F. Donnelly, mgr.; J. E. Masters, supt.

Inc. Dec. 27, 1918, in Delaware. **Cap.**, $200,000; $100 par; all issued.

Property: 639 acres, including the Buckeye mine, in Sect. 3, Twp. 5 S., R. 5 E., Mount Diablo Meridian. The mine was opened by M. A. Wright of Berkeley, in May, 1917, and taken over by E. S. Suffern in July, 1918. The present company acquired the property January 1, 1919.

Ore: manganese oxide and carbonate, occurs as a chamber deposit in chert. Reserves estimated at 20,000 to 30,000 tons of 40% manganese.

Development: 120′ incline shaft, tunnels, and open cuts.

Equipment: gasoline hoist, 10 h. p. compressor, 3,000′ aerial tram.

Production: 15,000 tons in 1918, value, $45 per ton. Ore is sold under contract to the Western Ore Purchasing Co.

BULLY CAVE CO. **CALIFORNIA**

Address: c/o Hatch & Clute, 100 Broadway, New York. Mine at Winthrop, Shasta Co., Cal.

Officers: E. S. Hatch, pres.; Vincent P. Donihee, v. p.; Frank M. Clute, treas. and directors; Frank F. Gearn, sec.; E. J. McLaggan, supt. **Cap.**, $5,000.

Property: owns the McClure group and has an option on the Michigan group on Bully Hill adjoining and west of the Bully Hill Copper Co.'s mine. Claims show two mineralized shear zones with clay gouge walls and about 40 "ore channels" 1½′ to 6′ wide. The ore carries iron pyrite with chalcopyrite and zinc sulphide.

Development: by Hawkeye tunnel, 1,050′ with 74 and 150′ drifts; Ydalpom II tunnel, 1,115′ and 3 drifts; North Star tunnel, 1,050′ and 2 drifts; Recorder 1,600′ drift and winze; Recorder II, 400′ tunnel; Ydalpom I, 150′ tunnel.

Equipment: includes all necessary machinery, houses, etc. Company also owns a gold mine at Cave Creek, Maricopa county, Ariz.

Nothing new is known of either property.

BULLY HILL COPPER MINING & SMELTING CO. CALIFORNIA

Office: 30 Church St., New York. Mine P. O.; Winthrop, Shasta county, Cal.

Officers: D. M. Riordan, 525 Market St., San Francisco, Cal., pres. and mgr.; L. B. Judson, v. p.; M. F. Westover, sec; preceding officers, A. H. Jackson, A. W. Burchard and J. B. Keating, directors.

Inc. 1900, in New Jersey. **Cap.,** $2,500,000; shares $25 par, reduced 1905 to $1,000,000. Bonds, $400,000, issued for construction of Sacramento Valley & Eastern railroad, stock of which is owned by the Bully Hill. Is controlled, through practically entire stock ownership, by the General Electric Co., Schenectady, N. Y.

Property: 450 acres, 320 patented near Delamar, Shasta county, includes the Bully Hill, Rising Star, Rising Sun, and old Winthrop & Baxter groups, all in the eastern end of the copper belt. Owns 14-mile railway (Sacramento & Eastern), connecting with S. P. R. R. at Pitt station.

Geology: ore occurs in nearly vertical N. E.-S. W. shear zones, or veins, in meta-rhyolite, varying from 4′ to 400′ and averaging 30′. Definite walls, if present, are post-mineral gouges; basalt forms the east wall. The ore forms irregular lenticular bodies that average 45′ wide by 200′ long and are connected by narrow seams of ore. Ore is a complex mixture of sulphide carrying chalcopyrite with zinc and antimony and low gold-silver values.

Development: several tunnels, lowest No. 3, crosscutting the vein at 1,100′ and 600′ below the outcrop. A 950′ shaft was sunk at this point with levels 100′ apart, and all necessary connections for work and air.

Work since 1918 has been in the Rising Star mine.

The 400-ton smelter has one blast furnace, two calcining furnaces, five converters and all necessary machinery, etc. It has been idle since 1910.

Company built a small experimental plant at Delamar, Cal., to try electric smelting and recovery of zinc. This plant, remodeled in 1915, produced 300 to 400 lb. metallic zinc per day, using direct electrolysis of zinc sulphate solution with regeneration of acid. (See Met. & Chemical Engr'g, Feb. 1, 1916, p. 120.) ore has also been tested by the Minerals Separation Co.'s flotation process with favorable results, and a flotation plant was built in 1918 when the group was being operated under bond by Walter Arnstein and associates.

BUNKER HILL CONS. MINING CO. CALIFORNIA

Office: Humboldt Bldg., San Francisco. **Mine office:** Amador City, Amador county, Cal. W. F. Detert, pres.; C. E. Bunker, supt.

Inc. 1907. **Cap.,** $200,000, shares $1 par. The mine has paid dividends for several years; in first half of 1915 six monthly dividends were paid, totaling $30,000. Owing to heavy construction and new equipment expense the dividend rate was reduced from 5 to 2½ cts. per share.

Property: 3 claims, the Bunker Hill, Mayflower and Nevada, 1½ miles north of Amador City, 2,587′ on the lode.

Geology: the gold-bearing ore occurs in the Bunker Hill vein, which strikes N. 25° W., dip 58° E., with average width of 6′. From surface to 200′ level the vein occurs on the contact between Mariposa slate on the west and metadiabase on the east; from the 200′ to the 1,400′ level, the vein is in slate; from the 1,500′ to the 2,400′ level the vein has a greenstone footwall and slate hanging-wall. On the 1,400′ level an orebody has been opened 40′ west of the Bunker Hill vein, and running parallel with it. This orebody is 860′ long, average width 30′, and at a point 860′ N. of the shaft, joins the Bunker Hill vein; in places it forms the footwall of the Bunker Hill vein. Ore occurs in the form of lenses, the schist being cut by numerous stringers of quartz; the rock is highly impregnated with pyrite, as high as 4 to 5%. The gray orebody has been developed on the 1,400′, 1,500′, 1,750′ and 1,950′ levels. Three oreshoots have been developed on the property; the north and south shoots on the Bunker Hill vein have an average length of 500′, average width of 6′, while the gray orebody is 600′ long, average width of 15′.

Development: by shafts; main shaft is double-compartment, 2,587′ deep, and sunk on an incline of 58°. From the 1,950′ to 2,400′ level it is sunk in

metadiabase. On the 2,400′ level the distance from the shaft to the Bunker Hill vein is 280′.

Equipment: includes a double-drum hoist, driven by a 300-h. p. motor, Ingersoll-Rand compressor, driven by 100-h. p. motor, pumps, a 40-stamp mill and a cyanide plant. Ore is hoisted in 2½-ton skips, and is crushed by a Knight crusher, before being trammed 550′ to the mill. Stamps, weighing 1,150 lbs. each, drop 6½″, 96 drops per min., crush 5 tons per stamp daily through No. 4 punched screen. Pulp flows over double-compartment amalgamating plates to 24 6′ Frue vanners; tailings from the vanners go to the cyanide plant, where sands are treated in eight 100-ton leaching vats, treatment taking 8 days. Concentrates are first agitated with lime in Pachuca tanks, 50 lbs. lime for 11 tons ore, then agitated 8 hours with strong KCN solution; treatment lasting 3 to 4 days.

Mill tailing runs 99c. per ton; a 45% extraction is made. Tailing is treated on a royalty basis by W. E. Darrow, V. R. Fitzsimmons and others of Sutter Creek. The Bunker Hill Company employs 155 men. See U. S. G. S. Folio 63; and M. & M. Res. of Amador county, p. 20, Cal. State Mng. Bureau.

In Sept., 1917, company built a flume to carry tailing from the mill to the concrete dam on Rancheria creek.

In the first six months of 1915, 42,087 tons of ore was mined and milled, producing $151,591, an average value of $3.60 per ton; aggregate total expenses, $109,792. No profit has been made for several years as costs have been over $4 per ton.

CACTUS CONSOLIDATED MINING CO. **CALIFORNIA**

Office: 808 Lonsdale Bldg., Duluth, Minn. A. F. Becker, pres.; R. B. Harrington, sec.; W. E. Wessinger, supt.

Inc. 1914, in Delaware. **Cap.,** $1,000,000; shares $1 par. Is a reorganization of the Cactus Copper Co., which was a reconstruction of the Cactus Development Co. Both companies fully described in former issues of this book.

Stockholders in the old company were given until June 10, 1915, to exchange their holdings for shares in the Cactus Cons. at the rate of 2½ for 1 and a payment of 6 cts. per share. In March, 1915, the Mammoth group, consisting of 22 quartz claims; 440 acres, in Kern county, Calif., was acquired.

Development: by several tunnels, said to show 32′ of ore, assaying $10.40 per ton in silver, and a vein on claim No. 8 is claimed to assay 64-74% pure antimony and to be the richest ore in the district. Company also owned and operated the Leona gold mine, developed to depth of 150′ and said to have several veins, 3-4′ wide, averaging from $12-$30 per ton.

No news for years, presumably defunct.

CALAVADA COPPER CO. **CALIFORNIA**

See Calavada Copper Co., Nevada.

CALAVERAS CONSOLIDATED SYNDICATE **CALIFORNIA**

Absorbed by Carson Hill Gold Mines, Inc., which see.

CALAVERAS COPPER CO. **CALIFORNIA**

Office: 94 Ames Bldg., Boston, Mass. **Mine office:** Copperopolis, Calaveras county, Cal.

Officers: Chas. M. Hayden, pres.; Herbert Goff, sec.-treas.; preceding with Oliver Ames, F. Lothrop Ames, Samuel Carr, Gilmer Clapp, Wm. J. Maloney, John S. Ames, Ross F. Robertson, directors. S. M. Levy, mgr.

Inc. Aug. 31, 1909, in Del. **Cap.,** $5,000,000; shares $5 par; reduced Aug. 24, 1910, to $2,500,000, common shares $5 par; issued $1,868,750; $300,000 preferred shares $5 par, none issued. Bonds (first mortgage, 6%) principal amount $450,000; interest accrued to Dec. 31, 1915, $147,510; under refinancing plan adopted by stockholders in January, 1916, the principal of said bonds and said accrued interest to Dec. 31, 1915, were extended so as to fall due in nine equal installments, beginning Jan. 1, 1920, viz., $50,000 of principal and $16,390 of said accrued interest each year; each of said payments bearing interest at 6% from Jan. 1, 1916. Under the same plan $99,000 face value of debenture notes were issued, payable at the rate of $5,000 per month, beginning April 1, 1917. Of these notes $50,000 have already been paid. $75,000 of two year 6%

convertible notes which were due March 1, 1917, were either converted before, or paid on that date. All the bonds are held by the Ames Estate of Boston, which formerly owned the property. State Street Trust Co., Boston, registrar; Federal Trust Co., transfer agent. Stock is listed on the Boston Curb. Annual meeting, 2nd Monday in February.

Property: 2,833 acres, including the Union, Keystone and Empire mines, and also including ranch and water power lands, bought Aug. 31, 1909, of Union Copper Mining Co., 16 miles from Milton, the nearest rail point on the Southern Pacific. Mines opened 1861, were considerable producers and were worked intermittently until 1907.

Engineers employed by the Calaveras company reported substantially as follows:

Geology: the country rock is a basic igneous rock schistose in character. The general strike of the schistosity is N. 30° W. The dip is 65° Northeasterly. This formation is traversed by a shear zone about 125′ wide, the strike and dip of which conform with the strike and dip of the general schistosity. The holdings of the Calaveras Copper Co, cover approximately 19,000′ along the strike of this shear zone. For the most part, the shear zone in which the orebodies occur is a distributive fault, in which the ore occurs as lenticular bodies within the crushed material (half fissile schist) resulting from movements parallel with the schistosity.

In several new places a cross break cuts across that portion of the shear zone containing one of these lenticular orebodies. From this cross fault the ore makes out on either side for 20 or 30′, but within the fissile material of the shear-zone. Thus, there is a lenticular orebody parallel with the schistosity and another orebody which really runs across the schistosity. The ore averages about 3% copper.

Development: the strike of the vein is proven for about 8,000′. The principal development is at the Union and Keystone mines.

Equipment: includes a 1,000-h. p. steam plant at the Union mine, with 3 hoists, 15-drill Nordberg and 5-drill Leyner air compressors; company also reports 500 electric h. p. at the mill and same at the smelter.

The company owns about 60 buildings, including office building, boarding houses, bunk houses, 3 warehouses, machine shop, smithy, 3 barns, and about 40 dwellings. The 600-ton mill equipped with three ball-mills is operating with oil flotation, and is connected with the mines by a 4,000′ electric tram. A dam, impounding water for the mill has 90,000 gals. storage capacity.

At the southerly end of the property a dam has been built. This arrangement to impound the tailings and a pump installed gives an additional water for the concentrator.

The 300-ton smelter, now inoperative, had 2 McDougall calciners, a 150-blast-furnace and a 150-ton reverberatory furnace. The converter has 2 Allis-Chalmers stands. Smelter fuel was petroleum and coke.

While the property was closed it was investigated by several engineers on behalf of various persons, contemplating the purchase of the property or its operation under a lease. As a result it was determined, October, 1914, to operate the property, with S. M. Levy, as manager. Under Frank W. Royer, as consulting engineer, the mine has since been operated and careful experiments were made for the purpose of treating the ore by the oil flotation process. It has been determined that the average grade of the ore is approximately 3% and that under oil flotation a concentrate of at least 16% can be made, the recovery averaging approximately 92%. Ore now in sight ready to mine amounts to 300,000 tons.

In March, 1916, new milling machinery was installed capable of treating about 250 tons of ore a day by oil flotation process; subsequently another milling unit was installed and the mill is now treating about 500 tons a day. A still further unit was installed, 1917, making total milling capacity 700 tons a day. From March 1, 1916, to March 31, 1917, the mill treated over 90,000 tons of ore. The concentrates are shipped to Tacoma for treatment, but tests are being made reducing them to 40% copper matte in a blast-furnace, following D.-L. sintering machines.

Mine and works closed for several months in 1919, but in December the mill was treating 300 tons daily.

CALIFORNIA GOLD MINING & DEV. CO. CALIFORNIA

Office: 147 Prospect Ave., San Francisco. O. A. Ellis, sec.

Inc. 1915, California. **Cap.**, $50,000; outstanding 40,280; par $1. Annual meeting September 20.

Property: the Lincoln mine adjoining the Buchanon. A quartz vein in schist has been developed at a depth of 300 ft. by tunnels and drifts, exposing gold milling ore.

Equipment: compressor, oil engine, small concentrator.

CALIF. & MASS. COPPER MINES CO. CALIFORNIA

Inactive. Described Vol. VIII. Property at Red Bluff, Tehama county, Cal., is leased for 99 years to Chicago Copper Refining Co., which see.

CALIFORNIA METAL AND MIN. PROD'S ASSN. CALIFORNIA

Address: Robert L. Kerr, sec., Merchants National Bank Bldg., 625 Market Street, San Francisco. G. W. Starr, Empire mine, pres.; E. C. Hutchinson, Kennedy mine, v. p.

This is not an operating company, but a merger of the California Metal Producers Association and the State Chapter of the American Mining Congress, whose business is one of mining politics or to aid and protect the mining and oil industry of California.

CALIFORNIA RAND MINES CO. CALIFORNIA

Formerly the Rand Divide Mining Co.

Address: J. M. Jamieson, or Alfred Harrell, or L. V. Olecase, Bakersfield, Cal., or Hamp Williams, Randsburg, Cal.

Inc. Aug., 1919, in California.

Property: silver mine 1½ miles from Randsburg, San Bernardino county, discovered by two prospectors—Hamp Williams and John Nosser—in June, 1919. A shaft at last accounts was down 100′, and everything extracted has been sent to the Selby smelter, totaling 28 carloads from June to August. At first there was an 18″ shoot of ore, which widened to 15′, averaging 150 oz. per ton. Parts of the claims are being leased on royalty. An engine and compressor were erected in August. Mine is known as the Kelly, is described by J. A. Carpenter in the "Eng. & Min. Journal" of Dec. 27, 1919. 1,180 tons ore yielded 405 oz. gold, and 174,722 oz. of silver.

CALIFORNIA TREADWELL GOLD MINING CO. CALIFORNIA

Office: 32 Broadway, New York.

Officers: L. M. Heminway, pres.; Simon Eisendrath, v. p. L. J. L. Rich, sec.-treas.

Inc. Aug., 1916, in Arizona. **Cap.**, $1,000,000; $1 par; non-assessable; 655,000 issued; 51,000 shares deposited in escrow for 1 year with Laidlaw & Co. Security Transfer & Registrar Co., transfer and registrar. Shares were stricken from the listing of the New York Curb in April, 1918.

Property: gold claims at Plymouth, Amador county. Is a prospect.

CALUMET & CALIFORNIA MINING CO. CALIFORNIA

Probably dead. See Mines Handbook, Vol. XIII, for description.

CANYON MINES CORPORATION CALIFORNIA

Office: 33 State St., Boston, Mass.

Officers: Frank B. Keever, pres.-gen. mgr.; Geo. H. Morrill, v. p.; H. A. Makay, sec.-treas.; Jas. J. McCarthy, and Frank G. Hobbs, directors.

Inc. in Maine. **Cap.**, 1,000,000 shares, $1 par. Company owns the shares of an operating company of same name.

Property: 500 acres, 2½ miles from Gorge, Nevada County, Cal., on the S. P. R. R., 35 miles west of the Nevada-California line, and 172 miles east of San Francisco. Holdings cover a lode with hanging-wall country of gray Calaveras slate and a diorite dike footwall. The lode, said to vary from 5′ to 10′ in width at north end to 140′ across at south end, consists of a stockwerk of quartz stringers and seams.

Development: aggregates 6,188′, mostly tunnels, the 1,137′ uppermost being 400′ deep at face, the 1,862′ No. 2 tunnel, 110′ lower, while No. 3, 186′

below No. 2, is 2,349′ long, with a 112′ winze below its floor; the 840′ Mill tunnel is 700′ lower. The superintendent figures reserves to average $4.91 per ton. Mill runs averaged $5.15 when mine was worked. No information for several years.

CARSON HILL GOLD MINES, INC. **CALIFORNIA**

Addresses: 55 Congress St., Boston, Mass. W. J. Loring, pres. and mgr., 614 Crocker Bldg., San Francisco. Mine office: Melones, Calaveras Co., California.

Officers: W. J. Loring, pres. and mgr.; E. A. Clark, v. p.; W. A. Donovan, sec.-treas.; directors, E. A. Clark, W. J. Loring, W. H. Coolidge, Galen L. Stone, and W. A. Ogg. A. D. Stewart, supt.

Inc. Nov. 22, 1917 in Maine. **Cap.,** $1,000,000; $1 par; non-assessable; issued 700,004. Bonds: $450,000, 7% 4-year convertible notes, sold late in Sept., 1919, to a private syndicate, to pay off $450,000, balance of the loan obtained from Amer. Zinc, Lead & Sm. Co. Notes convertible into stock at $25 per share and callable at 110, privileges not operative until after one year from date of issue. First Natl. Bank, Boston, transfer agent; Natl. Shawmut Bank, Boston, registrar Annual meeting, third Wednesday in November. Stock listed on Boston Stock Exchange. The company is the operating company of the Carson Hill Gold Mining Co.; it absorbed the Calaveras Consolidated Syndicate, described in Vol. XIII.

Property: a tract of 500 acres, covering 9,576′ along the strike of the Mother Lode of the California gold belt, and including the Morgan and Calaveras mines.

The **Morgan mine,** in which a bonanza ore shoot was opened in 1919, is on a branch vein of the Mother Lode. It is opened by a 600′ tunnel connecting with 300′ level, and a winze and shaft with levels at 125′ apart, below the tunnel. On the 550′ level the lode was 16½′ thick and for 150′ averaged $30.10 per ton. On the 675′ level the oreshoot is 20′ wide for 150′ along the drift and averaged $31.90 per ton. On the 865′ level, ore averaged $55.77 gold per ton for 200′.

Reserves: 210,000 tons of $28 ore; 500,000 of lower-grade ore, or a total of $9,380,000 worth of ore, above present bottom of mine.

The **Calaveras mine** being on the main Mother Lode will eventually be the mainstay of the company. It is opened to a depth of 700′ on the dip, by a 1,200′ tunnel and by winze 375′ deeper. The vein averages 18′ wide and for a length of 500′ averages $3.75 in the tunnel but at 1,375′ level (at bottom of winze) runs $5 to $7 per ton.

Equipment: includes a 20-stamp mill, Hardinge mill, 2 Deister sand tables and 4 Overstrom tables for fine concentrates, 1 Wilfley table for re-treating middlings. Sand and slimes are elevated by centrifugal pumps to a 1,200′ launder and conveyed to the cyanide plant of the Melones Mining Co. This plant is leased by Symons & Latham who treat Carson Hill sands and slimes by contract.

Production: 1917, 14,943 tons; 1918, 55,794.

From Jan. 1 to Dec. 31, 1919, the mine output was 72,387 tons of ore that averaged $13.96 per ton actually recovered, mainly from development work. Current production is over 8,000 tons monthly. Costs are $5.45 per ton.

The remarkable results obtained in a year's work justifies the belief that company will soon be a steady and large dividend payer.

CARSON HILL GOLD MINING CO. **CALIFORNIA**

Holding company of Carson Hill Gold Mines, Inc.

CENTRAL CONSOLIDATED MINES CO. **CALIFORNIA**

Address: John Nicol, mgr.; Paul W. Smith, supt., or W. J. Webster, pres., Nevada City, Cal.

Property: the Banner, North Banner, and Central claims, old gold producers, largely controlled by Honolulu capital, on Greenhorn creek, 3 miles S. of Nevada City, Nevada county. In August, 1919, shaft was being unwatered, preparatory to resuming development. The mine was operated up to a couple of years ago with a 20-stamp mill, compressor, and electric hoist. Every part

of the plant was removed after closing down. Property is developed by a 1,200′ winze from a tunnel. A 150-ton mill is proposed.

CENTRAL EUREKA MINING CO. **CALIFORNIA**

Office: 519 California St., San Francisco, and Sutter Creek, Amador county, Cal.

Officers: W. P. Henry, pres., J. Stadtfeld, sec.-treas. Albion S. Howe, supt.; H. Warrington, asst. supt.

Inc. in California. **Cap.,** 400,000 shares, assessable. A total of 38 assessments called to July, 1919, when one of 3 cents was levied. Annual meeting fourth Tuesday in April.

In Nov., 1919, cash amounted to $50,000.

Dividends: $926,323 from 1901 to 1908; 2c per share in Feb., 1915, and No. 67, of 3c., on Dec. 16, 1919. A total of about $940,000.

Property: adjoining the South Eureka on the north, ½ mile south of Sutter Creek, shows 3 parallel veins which have been developed. The veins are in the form of stringers, with strike N. 20° W., dip 55° to 70° E., and an average width of 6′. The east vein is 20′ from the west vein, while the hanging-wall vein is 200′ east of the west vein. East and west veins have slate walls; hanging-wall vein has a slate footwall and greenstone hanging-wall. Two series of ore-shoots have been developed, the north shoots being 60′, the south shoots 200′ long.

Development: 3-compartment shaft, 3,720′ deep, sunk on 57° incline. Shaft cuts the hanging-wall vein on the 500′ level and is sunk on the hanging-wall side to the 1,900′ level, at which point it is deflected to the west and passes into a slate formation. Below 3,425′ the shaft is in greenstone. In May, 1918, there was not enough ore blocked out to supply 20 stamps for two weeks. Added to this, the company had to keep water down as the South Eureka had stopped work. The position was decidedly unfavorable. Sinking was continued, and by August, 1919, the shaft was 3,720′ deep. A winze below 3,500′ opened good ore, while a good shoot was developed at 3,700′, and reserves are now sufficient to keep the full plant in operation.

Equipment: purchased electric power, steam power, hoist, compressor, crushing station, 40 stamps, vanners, and complete surface plant.

Production: no recent figures are available, but the total to Oct., 1919, was gold worth $3,292,284.

CENTRAL SOUTH YUBA COPPER MINE **CALIFORNIA**

Owners: J. A. Coley, J. L. Craig of Stockton, Luke W. Williams, supt., Grass Valley, Cal.

Property: 320 acres, 5 miles N. W. of Grass Valley, Nevada county and contains a contact vein between porphyry and slate containing gold, silver, copper and zinc sulphides. Vein 2′ to 8 ′wide, course N. W.-S. E., dip 75°, said to assay gold-silver, $6; copper, 3½%, zinc 6% per ton.

Development: 90′ incline shaft with 127′ of drifts; 800 tons ore blocked out. Shipped 140 tons during last 3 years, total to date 500 tons.

Equipment: gasoline hoist and 4″ pump. It is planned to treat the ore by flotation.

CERISE GOLD MINING CO. **CALIFORNIA**

Offices: Willows, Glenn County, Cal. Incorporators: Z. E. Simpson, F. Freeman, sec., H. E. Simpson, C. L. Austin and J. Schribner.

Property: in Sulphur Creek, Colusa County, Cal. Company organized to carry on a general mining and milling business.

CERRO GORDO MINES CO. **CALIFORNIA**

Office: 1011 First Natl. Bank Bldg., San Francisco, Cal. **Mine address:** Keeler, Cal.

Officers: Frank J. Hambly, pres.; A. L. Dornberger, sec.; F. J. Hagenbarth, treas.; preceding officers and J. E. Richards, directors; J. Wilson Reno, asst. treas.-purch. agt.; J. C. Climo, supt.

Inc. July 16, 1914, in Arizona. **Cap.,** $1,000,000; shares $1 par; non-assessable; 975,000 issued.

Report ending Dec. 31, 1917, showed a balance of $79,699. Cash receipts

totaled $609,554, including $112,377 brought forward from 1916. Four dividends absorbed $225,000. In 1918, receipts totaled $263,188, including balance brought forward from 1917. No. 6 dividend, $50,000 was paid. Cash balance, Dec. 31, was $1,840.

Property: the Cerro Gordo mines, 46 claims, 8 miles from Keeler, including the Union mine on Cerro Gordo hill and a water power on Lone Pine creek, Inyo county, formerly belonged to the Four Metals Sm. & Mng. Co.

The Union mine is an antigua worked by Mexicans in early days and opened to a depth of 1,200′. The principal ores produced are silver-lead mostly carbonates, with some galena and lead sulphide; also zinc carbonate. The zinc ore occurs from the surface to the 900′ level, and the silver-lead ore from the surface to the 1,150′ level. Ores also contain gold and copper values. See U. S. G. S. Bull. 540, pp. 97-105.

Development: by the 900′ Belshaw shaft, with a winze to the 1,150′ level, and tunnels. The Troeger tunnel is now in over 6,000′ and cuts the vein system 1,200′ below the workings of the Union mine. Underground workings are said to aggregate 20 miles. New work in 1918 amounted to 4,603′; orebody was cut off by a fault above the 900′ level and 500′ of exploration has thus far failed to find it.

Equipment: includes a Joshua Hendy 100 h. p. electric hoist; an Imperial type 10 Ingersoll-Rand compressor, capacity 1,200 cu. ft. free air per min., driven by a 150-h. p. constant speed motor. The former steam plant is intact and consists of 70-h. p. steam hoist, 350 cu. ft. Ingersoll-Rand air compressor and 130-h. p. boiler. Electric power, voltage 400, is obtained from the Southern Sierras Power Co.

The Swansea smelter has a 50-ton furnace that was operated for a few months in 1909.

Production:

	Tons Ore	Oz. Gold	Oz. Silver	Lbs. Lead	Lbs. Copper	Lbs. Zinc
1915.....	8,926	126	112,541	748,952	121,510	4,544,666
1914.....	4,367	312	303,085	1,195,006	283,086	58,736

Ore produced in 1916 reported as 1,497 tons lead-silver ore, net value, $44.723 per ton; 11,265 of zinc ore, $23.759; 27 tons of copper ore, $17.722 per ton, and 9,431 tons slag valued at $40,383. Net cost of all ore mined was given as $11.08, giving a net profit of $17.64 per ton. In 1917, production was 6,088 tons lead-silver ore, net value $45.665 per ton; 5,417 tons of zinc ore, $20.384; 14,034 tons of slag, net value $7.558 per ton. Net cost of all ore mined was $15.026. Production in 1918 was 619 tons zinc ore, 24.3 to 40.1% zinc; 2,166 tons lead-silver ore, 23.1 oz. silver, 21.4% lead; 9,389 tons slag, 2.9 oz. silver, 12.3% lead.

CHICAGO COPPER REFINING CO. **CALIFORNIA**

Dead. See Vol. XIII of this work for description of Co.

CHIPPS CREEK MINING CO. **CALIFORNIA**

Address: Letson Balliet, Tonopah, Nev.

This is a private unincorporated company, driving a 1,300′ tunnel in order to drain and work an ancient river channel about 6 miles S. of Belden, Plumas county, consisting of 500 acres.

CHRISTINA COPPER CO. **CALIFORNIA**

Address: F. C. Fox, supt., Placerville, Cal.

Owns Seven Bells mine, an old copper producer, now reopened.

CLIPPER MOUNTAIN GOLD MINING CO. **CALIFORNIA**

Office: 600-1 Hellman Bldg., Los Angeles, Cal.

Officers: B. J. Doak, pres.; E. Petersen, sec.; preceding with A. H. Hayes, C. J. Gardner and J. C. Meadows, directors.

Inc. Sept. 12, 1916, in California. **Cap.,** 1,000,000 shares, 10c par; 625,646 shares outstanding.

Property: 4 claims, 80 acres, in Clipper Mtns., near Danby, San Bernardino county. A 50′ dike is said to traverse the property. In 1918, a two-compartment shaft had been sunk to the 300′ level and crosscutting started, but no further information on operations is available.

Equipment includes 32 h. p. engine, hoist, compressor, pump, etc. Manage-

ment plans sinking to 500′ level, crosscutting and drifting at 100′ intervals, also installing necessary machinery.

COCOPAH COPPER CO. **CALIFORNIA**

Idle. No recent information.

Mine and works office: Ivanpah, San Bernardino county, Cal. At last accounts: Dan. Murphy, pres.; Dr. L. D. Godshall, v. p. and gen. mgr.; G. Holterhoff, Jr., sec.-treas.

See Vol. XIII for description of property.

COLUMBIA CONSOLIDATED MINES CO. **CALIFORNIA**

John Phelan, pres., Bridgeport, Conn.; E. C. Klinker, mgr.; J. A. Brown, supt., Hotel Golden, Reno, Nev. Mine address: Sweetwater, Mineral county, Nevada.

Property: 8 claims, unpatented, 160 acres, at Mt. Patterson, Mono county, 3 miles west of Nevada-California State line.

Ore: gold, silver in fissure vein in porphyry. In 1917 acquired 160 acres, patented, at Ormonde. Vein has strike of N. 10° E. with 45° dip and average width of 28″, of which ⅓ is workable and said to average .05 oz. gold and 40 oz. silver per ton.

Development: by tunnels; No. 1 has about 850′ of workings; No. 2 is in 410′ with 700′ of drifting. Underground workings total 4,500′, and are said to block out 4,000 tons ore. Shaft sinking progressing 1917.

Equipment: includes 30-stamp mill and an aerial tram to carry ore from German and Ocean Star mines to the mill. No recent returns.

COLUMBIA MINES CO. **CALIFORNIA**

Mine at Angels Camp, Calaveras county, Cal.

Officers: J. S. Rear, pres.; N. N. Merriman, v. p.; A. Caminetti, treas.; preceding with W. C. Tupper, W. P. Smith, F. M. Woods and J. G. Ferraris, directors.

Inc. Jan., 1915, in California. **Cap.,** 750,000 shares, $1 par value, all issued; no bonds.

Property: 2 claims of low-grade gold ore. Shaft reported to be down 250′ with some drifting. Has 100-ton stamp mill. Stock was stricken from listing on New York Curb in June, 1918.

CONFIDENCE GOLD MINES CORP'N. **CALIFORNIA**

Address: Sonora, Tuolumne County, Cal.

Directors: W. B. Hunting, New York; E. S. Bolen and W. A. Stratta of Richmond, Va.; Edmund Juessen, mgr.

Inc. 1917, in Virginia. **Cap.,** $600,000; shares $10 par; 1,000 preferred shares and 5,000 common. Listed on San Francisco Stock Exchange.

Property: Confidence group of claims and mill site, 12 miles E. of Sonora, opened by 33° shaft to depth of 1,100′ with good ore opened on 800′ level. Mine idle for 10 years past, has produced $5,000,000 gold.

Equipment: new hoist and air compressor installed 1917, and in 1918 was adding a small cyanide plant.

CONSOLIDATED AMADOR MINING CO. **CALIFORNIA**

See Old Eureka Mining Co. Company dissolved.

CONSOLIDATED MINES CO. **CALIFORNIA**

Office: 710 H. W. Hellman Bldg., Los Angeles, and Randsburg, Kern county, Cal. Seth J. Tyler, supt.

Property: at Randsburg, carries a vein containing gold and tungsten ore, developed by a 350′ and by a 500′ shaft. Idle in 1918—too low grade.

Equipment: includes 5-stamp mill, pumps, compressor and air-drills. Listed in Los Angeles.

CONSOLIDATED WILSHIRE MINING CO. **CALIFORNIA**

Address: Bishop:, Inyo County, Calif.

Officers: Gaylord Wilshire, pres.; 800 Elizabeth St., Pasadena; Mrs. Mary Wilshire, v. p.; H. R. Kearns, sec.-treas.; Cooper Shapley, supt.

Inc. in Ariz. **Cap.,** 1,000,000 shares; $5 par; in treasury, $500,000. An assessment of 1c. per share was due August 19, 1918, and another one of 2c. was due in November.

Property: referred to under various names, Bishop Creek Gold Mine, Bishop Creek Milling Co., Wilshire Bishop Creek Gold mine and, more recently, Rocky Point Cons. Mines Co. Consists of 99 claims, 12 patented, located on hearwaters of Bishop Creek, 16 miles from Bishop, Cal.

Geology: claims are said to show a silicified shear-zone 800′ wide in granite; strike N. 50° W., dip 60° S. The vein is in the center of this zone, running N. 76° W., with no definite walls. It contains dense, banded quartz carrying very fine gold with some arsenopyrite and pyrrhotite.

Development: the mine, idle for several years, was unwatered in April, 1915, and operations resumed; 300′ shaft with 2 levels, 1,000′ of workings in all, claimed to disclose an orebody 20′ wide and opened up for over 100′ with face still in ore. Ore reserves estimated at 13,138 tons.

Equipment: includes a 70-h. p. electric hoist; Sullivan 12-drill compressor, pumps, Bleichert tramway and a 10-stamp cyanide mill. An 80-ton flotation plant was added in 1918.

Production: for 1915 reported as 6,196 tons of $11.34 ore. The ore carries 86.3% insol., 4.67% iron, 1.80% alumina, 2.60% lime, 1.70% sulphur, and 1% arsenic. Recovery was 85%.

In a suit brought by a stockholder to get access to the company's books, and secure the names and addresses of 6,000 stockholders, it was claimed that Wilshire held control of the stock; that there had been no stockholders' meeting since 1913 in London, when no quorum was present; that no financial statement had been furnished or had been accessible to the stockholders since Nov., 1913, and that an assessment of 5c. was levied in order to pay indebtedness less than the amount secured by assessment. Wilshire is reported to have answered that the books were available for examination, and that the actual purpose of the investigation was to secure a list of stockholders for the purpose of inducing them to pay to the investigators a fee of 2 cts. per share for adjusting the affairs of the company and winding up the corporation. A stockholders' meeting was called for March 12, 1919.

The company frequently appears in print, and the stockholders appear to have a long wait before their officers get down to actual mining and an attempt to pay dividends. In July, 1919, there were 60 men employed and concentrates were being shipped.

CONTACT MINING & MILLING CO. **CALIFORNIA**

Mail returned from Trimmer, Fresno county, Cal.

Officers: J. K. Apperson, pres.; C. C. Overstreet, sec. Present owners have operated the property since 1894, incorporating in 1914.

Property: 3 claims, unpatented, 9 miles from Trimmer, shows ore containing free gold, galena and pyrite, in a flat pitching deposit in granite, said to average $21.25 per ton, including a little silver. The gold occurs mostly in the ochre on the footwall; pay shoot varies from 4″ to 2′ in width. Another vein on the property, 3′ wide, said to assay $11.60 gold per ton.

Development: 110′ adit and two 60′ drifts on the vein. Ore was sledded ½ mile to the mill.

Equipment: includes a Straub patent stamp-mill which has ten 175-lb. stamps operating in a circular mortar, 115 drops per minute, 5½″ drop, driven by a 6-h. p. distillate engine; capacity 4 tons per day. Five men were employed. See M. & M. Res. of Fresno Co., p. 15, California State Mineralogist's Report, 1915. Probably defunct.

CONTINENTAL MINES DEVELOPMENT CO. **CALIFORNIA**

Office: 301 First National Bank Bldg., Riverside, Cal. Harwood Robbins, pres.

Inc. 1911 as a holding company. **Cap.,** $500,000; shares $1 par.

No recent information.

COPPER KING MINING CO. **CALIFORNIA**

General offices: Union National Bank Bldg., Houston, Tex. **Mine office:** Academy, Fresno County, Calif.

Officers: B. N. Garrett, pres.; J. R. Sims, v. p.; H. C. Bocchio, sec.; C. A. Lewis, treas.; D. C. Demorest, eng.; Wm. Stewart, trustee.

Joint stock association. **Cap.**, 100,000 shares, $10 par, fully paid and non-assessable, 50,000 shares issued.

Property: 11 claims, 220 acres, 10 of these claims are owned in fee and the other is under lease and option to purchase, 5 miles northeast of Letcher and 16 miles to shipping point at Clovis.

Geology: The vein runs N. E.-S. W. and is a belt 100′ wide of mineralized schist and metadiabase containing lenses of iron and copper ore. Granodiorite bounds the belt to the east and diorite to the west.

Development: by 3 shafts, one working and two for ventilation, sunk on the dip of the vein. Main shaft has been sunk to the 8th level about 800′ and has about 3,000′ of drifts.

History: owned originally by the Copper King, Ltd., a London company, of which W. H. Daily was gen. mgr. Company is said to have spent $1,250,000 on mine, palatial residences and surface equipment, and to have produced 4,159,672 lbs. of copper. Company went into hands of receiver in 1903, said to be caused by mismanagement. In 1907 property was sold for $44,000 to the Hart Mining Co., who produced an amount equal to the purchase price and was forced to close because of the low price of copper at that time. The property was idle thereafter till operated by the present company.

Production: to 1917, was reported to be 50,000 tons of 8% copper.

It is too early to say what this company will do, as the only reports available are those of investment brokers, but its directors are well known, and the property promising. Stock was offered at $7.50 in newspaper advertisements in 1917. Company ignores repeated requests for information.

COPPER MOUNTAIN CONS. MINING CO. **CALIFORNIA**

Address: Harry K. White, 53 State St., Boston, Mass.

Supposedly dead. Former mine near Redding, Shasta Co., Cal. See Vol. XII, 1916.

COPPER QUEEN MINE **CALIFORNIA**

Mine at Portola, Plumas county, now owned by the Walker Mining Co., which see.

CORONA MINING & MILLING CO. **CALIFORNIA**

Office: 770 E. 4th St., Salt Lake City, Utah.

Officers: J. A. Headlund, pres.; J. S. Ryan, v. p.; J. A. Stanley, sec.; W. G. Romney, treas.; with Thos. W. Bell, J. P. Moss, J. H. Hurd, directors. Thos W. Bell, supt.; C. E. Merwin, Spokane, Wash., and Moscow, Utah, fiscal agent.

Inc. 1915, in Arizona. **Cap.**, $3,000,000; shares $1 par; issued $1,600,000, non-assessable. Farmers & Stockgrowers Bank, Salt Lake City, registrar. Annual meeting in June.

Property: the Confidence mine, known as the Mormon Gold mine, 12 claims, 2 patented, 240 acres, in Funeral Range, Death Valley, Inyo county, Cal., 12 miles from Shoshone, a station on the Tonopah & Tidewater R. R. The mine was worked in early days by a small syndicate of Mormons.

Ore: free milling gold and a little silver in fissure vein in granite; said to assay $20 per ton. Outcrop of vein said to be 1,200′ long and from 4′ to 70′ wide.

Development: tunnels and several shafts, deepest 140′. Present management claims there are 117,000 tons of $20 ore in place, which can be mined for less than $1 per ton. This cost figure is too low.

Company planned to erect a 100-ton stamp mill in 1917. No recent information available.

COWBOY MINE **CALIFORNIA**

See Old Cowboy Mining Co.

CRESCENT GOLD MINE **CALIFORNIA**

Crescent Mills, Plumas county, Cal., being developed by Philadelphia Exploration Co. (which see), Crocker Bldg., San Francisco; Albert Burch, mgr. The mine was closed down in August, 1918, but reopened in May, 1919. A. McDonald is supt.

CROESUS MINING CO. **CALIFORNIA**

Office: 734 Fifth Ave., New York. D. F. Sheehan, supt., Chas. W. Smith, mill supt.

Property: the old Plumbago mine at Allegheny, Sierra County, Cal.

Ore: gold quartz in veins in granite and amphibolite schist. Veins strike N. W.; dip N. to N. E. Ore usually occurs as small masses of high-grade in nearly barren quartz. See U. S. G. S. Bull. 580, pp. 176, 178.

Development: by tunnels, the longest over 4,000′.

Equipment: 15-stamp mill at Plumbago mine, put into commission July 5, 1915. Employed about 50 men at last accounts.

CURTZ CONSOLIDATED MINES CO. **CALIFORNIA**

Probably dead; no response to letters. See Vol. XII. Mine near Markleville, Alpine county, Cal.

DAIRY FARM MINING CO. **CALIFORNIA**

Property operated by Van Trent Mining Co., was practically worked out and to be abandoned in 1917. See Vol. XII for description.

DAKIN MINE **CALIFORNIA**

See Mason Valley Mines Co., Nev. Mine is also known as the Gray Eagle.

DARWIN LEAD & SILVER MINES DEVELOP. CO. **CALIFORNIA**

On Nov. 11, 1919, it was stated that the "stockholders' agreement for the reorganization of the finances of the corporation has become effective by the deposit with the undersigned of the necessary stock. In order that the non-depositing stockholders may share in the provisions of the agreement, their stock should be deposited with the Committee on or before the 15th day of Dec., 1919." Henry W. Becker, sec. for Trustees, 33 New St., New York.

Address: Darwin, Calif. J. E. Rea, mine supt.; H. Stone, mill supt.

Property: a group of mines at Darwin, Inyo county, 20 miles south of Keeler, includes the Lane, Lucky Jim, Promontory, Columbia and Defiance mines, all silver-lead properties. The company was developing and securing options on new properties at last accounts.

DEFENDER MINE **CALIFORNIA**

F. B. Joyce, owner, Volcano, Amador county, Cal. Mine office: Defender, via Volcano, Amador county, Cal.

Property: 3 claims, unpatented, 5 miles S. E. of Volcano, Calif.

Ore: free milling by fine grinding, carries gold and some silver (parting value) in an ore with chalcopyrite, galena and sphalerite, in a vein in granodiorite. The lode has a strike of N. 15° W., dip 85° W., and an average width of 3′ 6″.

Development: 360′ vertical shaft, with 1,500′ underground workings. At 130′ south shaft on 200′ level the vein is cut by a diorite dike 22′ thick; other smaller diorite dikes cut the main shoot and seem to be associated with the ore occurrence.

Equipment: includes steam hoist, compressor and a 10-stamp mill. Eight men are employed.

Production: to date said to be 12,000 tons, yielding $140,000. Recent work has consisted of development work only.

DELHI MINES CO. **CALIFORNIA**

Address: Box 703, Reno, Nevada.

Officers: A. A. Codd, pres.-gen. mgr.; B. F. Boerner, sec.-treas.; H. Eddie, supt.

Inc. May, 1917, in Nevada. **Cap.,** $3,000,000; shares $1 par. Is a successor of an old and successful company of similar name that has been inactive for many years.

Dividends: forty-five of 10c each and two of 25c each were paid by the company.

Property: 11 claims, 5 patented, about 200 acres, in Columbia Hill mining district, 19 miles N. of Nevada City and Grass Valley, Nevada county, Cal. Claims contain two known vein systems, the Delhi and St. Gothard, the Delhi vein being the only one worked extensively. Mines are credited with production

of $1,544,435 from 1890 to 1914. Examined by Hamilton Eddie in May, 1917. Ore is free milling gold, with 1% pyrite.

Development: by 4 tunnels, about 200′ apart, No. 4, the lowest, being 1,700′ long; also by 400′ vertical shaft. Vein at this depth said to be 3′ to 8′ wide and 360′ long. Shaft is to be sunk 100′ below No. 4 tunnel. Flow of water was 350 gal. per min. in 1914, when work was stopped.

Equipment: surface tramway connecting tunnels, pumps, one 900 and one 1,600 cu. ft. compressor, twenty 1,000 lb. stamps, concentrators, ditches for water, power and buildings.

This is a project to reopen an old Californian mine, and if estimated costs of $2 to $2.50 per ton are realized, a fair profit should be made, as property is well equipped.

On Sept. 15, the Delhi mine was sold at sheriff's sale to satisfy a judgment of $39,289, and was bought by Louis Nomenmann for $20,000. Mr. Codd had a bond on the property.

DELTA CONSOLIDATED GOLD MINES CO. (THE) CALIFORNIA

Office: Redding, Shasta County, Calif. Mine on Dog Creek, near Delta, Calif.

Officers: Dr. Sherman T. White, pres.; C. Tracie, v. p.; S. D. Furber, sec.; A. Bystle, treas.

Inc. Sept. 3, 1903, in So. Dakota. **Cap.,** $2,000,000; shares $1 par; outstanding 1,150,000 shares, assessable. Last assessment ½c. due Sept. 15, 1917.

Property: the Pioneer group of 11 patented claims, 115 acres, and 80 acres timber land, on Dog creek, 6 miles west of Delta, shows quartz veins in andesite, and ores contain gold, silver, and a little copper. Ore shoots average 2′ in width, with length of 300′ and are said to have average assay of $22.40.

Development: by tunnels with 3,500′ of workings. Management claims to have 20,000 tons ore blocked out. Idle since 1915, but intends building a 50-ton stamp mill and cyanide plant.

Company has built a narrow-gauge railway connecting with the Southern Pacific tracks at Delta. No recent information.

DIADEM MINING CO. CALIFORNIA

Address: 208 Peters Bldg., Reno, Nev. **Mine office:** Forest City, Sierra county, Calif.

Officers: G. de Bretteville, pres.; 1064 Francisco St., San Francisco; D. S. Williamson, v. p., with G. Lozano, directors. Lee J. Davis, sec.; R. N. Scheller, treas.; J. E. Ossel, supt.

Inc. March 17, 1919, in Nevada. **Cap.,** $1,000,000; $1 par; non-assessable; all issued. Annual meeting, first Monday in March. Security Transfer & Registrar Co., transfer agent and registrar.

Property: 6 unpatented claims at Forest City, Sierra county adjoins Tightner property on north.

Ore: carries gold in a quartz vein in much altered amphibolite schist.

Development: 1,200′ tunnel and 200′ shaft with 125′ drifting from shaft. Company claims $60,000 worth of ore blocked out and that shaft will be sunk to 500′ level. At present the property is a prospect.

DUTCH-SWEENEY MINING CO. CALIFORNIA

Company ceased operations, Dec., 1917, and property formerly operated by them is now being operated by the Pacific Coast Gold Mines Corp., which see.

EAGLE COPPER CO. CALIFORNIA

Taylorville, Plumas county, Cal. Owns groups of claims covering low-grade pyrite deposit with limited development. Company built small smelter, 1912. Idle and probably out of business.

EAGLE HILL MINE CALIFORNIA

Address: G. H. Goodhue, mgr., Indian Falls, Calif.

Property: 23 claims, 460 acres, ½ mile east of Genesee, Plumas County, Cal. Claims are reported to show chalcopyrite ore occurring in contact and fissure veins in porphyry and carrying 2% copper, $1.10 gold and 2 oz. silver.

Development: by 48′ vertical shaft and 560′ tunnel. Is a prospect.

EAGLE SHAWMUT MINE **CALIFORNIA**

Owned by Belmont Shawmut Mining Co., which see.

EARLY MINE **CALIFORNIA**

Geo. H. Hook, supt.; W. H. Washburn, mill supt., Jerseydale, Mariposa county, Cal. Is a gold mine in southern section of auriferous belt of state. Ore medium grade and somewhat refractory. Mine unwatered 1917, after 1½ years litigation, and new oreshoot found at a vein intersection on 200′ level.

The property has been under a working bond to J. H. Robertson of San Francisco, at a price of $22,500, on which $14,000 has been paid. Mill has 50-h. p. gas engine, 10 stamps. Employs 30 men.

EASTERN MINING CO. **CALIFORNIA**

Moses Ginsberg, pres., 25 Broad St., New York. P. L. Papish, treas. and supt., Yreka, Siskiyou county, Cal.

Property: 16 claims near Gottville, from which small shipments of chrome ore were being made in the fall of 1918.

ELDORADO EXPLORATION CO. **CALIFORNIA**

John W. Cover, supt.; Burr Evans, cons. engr., Placerville, Cal.

Property: the Teddy Bear claims on the Mother Lode, about 8 miles south of Placerville, is said to show 2 veins. Some $60 ore reported found in 150′ adit, at 160′ depth, 1917. Plans building 50-ton mill and sinking 500′ shaft.

EMPIRE MINES **CALIFORNIA**

Address: George W. Starr, pres., Grass Valley, Calif.

A close corporation, controlled by the Bourne family. No reports are issued or information is ever given. Dividends total several millions.

Property: the Empire and Pennsylvania mines. The latter, about ¼ mile distant, was owned by the Pennsylvania Cons. Mine Co., and was bought for about $500,000 in 1911. The property is the largest deep-mine gold producer in California, being followed by the North Star. Ore is a free-milling quartz and averages $13 per ton.

Company had a great deal of costly litigation in 1915-16 with the North Star Mines Co., over extra-lateral rights. The case was finally compromised in 1916, and both companies mined part of the disputed orebody.

Development: by 2,600′ and 4,600′ incline shafts. About 13,000′ of work is done annually. The mine has extensive drifts, one level being 5,300′ long.

Equipment: modern electrically-driven machinery, power being purchased. At main shafts are electric hoists, another being put in at 4,600′ depth in August, 1919; also compressors, machine-shops, tramway from Pennsylvania mine, and 80-stamp mill and cyanide plant, treating ore from both mines. An extraction of 97% is made. About 10,000 tons is treated monthly.

EMPIRE MINING & MILLING CO. **CALIFORNIA**

Address: 1101 American Bank Bldg., Seattle, Wash. **Mine office:** Yreka, Cal.

Officers and directors: H. B. Ernst, pres.-treas.; A. S. Abernathy, v. p.; L. A. Ernst, sec.; J. C. Hubart, supt., Yreka, Cal.

Inc. 1916 in Washington. **Cap.,** $500,000; $1 par; 400,000 issued. Annual meeting first Tuesday in January.

Property: 26 claims, 12 patented, 2 miles from Yreka, Siskiyou county, shows a gold vein in diorite, assays said to run from $2 to $15 in gold.

Development: several short incline shafts, deepest 125′ and several tunnels, the longest 390′. Company claims to have 50,000 tons of ore blocked out.

Equipment: electric hoist, small compressor, and a 5-ton mill. Operating expense for 1918 said to have been $5,980.

ENCINITAS COPPER CO. **CALIFORNIA**

Office: 715 Timken Bldg., San Diego, Calif. C. A. McGee, pres. Mail returned from mine address, Encinitas, San Diego, county, Cal.

Property: 8 miles east of Encinitas shows a vein in diabase and porphyry, said to carry 4% copper, 5 oz. silver and $4 gold.

Tests have shown the ore amenable to flotation and a 50-ton plant was to be installed, 1917, but nothing more has been reported.

ENGELS COPPER MINING CO. CALIFORNIA

Office: 393 Mills Bldg., San Francisco. **Mine office:** Engelmine, Plumas county, California.

Officers: Henry Engels, pres.; F. Klamp, v. p.; Landon A. Bell, sec.; E. E. Paxton, treas.-gen. mgr., above with Richard Spreckels, I. J. Truman, Jr., J. F. Humburg, and O. G. Traphagen, directors. R. A. Kinzie, in charge of mining operations.

Inc. 1901 in California. **Cap.**, $2,000,000; shares $1 par; non-assessable. Increased August 5, 1919, to $5,000,000; 2,808,621 issued. Stock listed on Honolulu Exchange.

Financial Statement, years ending Dec. 31:

Assets.

Year	Property	Plant and Equipment	Investments	Current	Deferred Charges	Sundry	Total
1919*...	$1,015,336	$1,112,637	$432,500	$395,309	$115,600	$205,500	$3,276,882
1918....	1,026,838	996,919	432,500	531,681	164,778	33,112	3,185,830
1917....	812,256	1,172,217	359,000	518,647	197,616	.....	3,059,736
1916....	809,532	1,100,772	180,000	807,879	352,432	225,500	2,659,583

Liabilities.

	Capital	Reserves	Current	Undivided Profits	Total
1919*.....	$1,996,494	$867,224	$202,174	$210,990	$3,276,882
1918.....	1,808,621	872,741	324,585	179,882	3,185,830
1917.....	2,000,000	443,492	132,235	400,210	3,059,736
1916.....	2,000,000	172,716	108,951	377,915	2,659,583

Profit and Loss.

	Sales of Products, Etc.	Operating Charges	Profit	Deductions for Reserves	Balance from Previous Year	Dividends	Undivided Profits
1919*..	$563,039	$598,401	$35,362†	.....	.....	.....	.....
1918...	1,781,637	1,302,464	479,173	$429,249	$400,210	$270,253	$179,882
1917...	1,307,124	717,116	590,007	272,459	377,915	295,253	400,210
1916...	1,039,516	487,947	551,569	135,703	115,501	133,451	377,915

* Half year. † Loss.

Dividends: paid 1½% per share monthly from July 20, 1916, to Oct. 20, 1918. Dividends suspended 1919 until copper market and cost conditions improve.

Property: 154 claims, about 3,175 acres, 23 of which, or about 475 acres, are patented. The claims are well watered and timbered, and consist of 2 groups—Engels and Superior. The former, at 5,000′ elevation, is in sections 3, 4, and 9 of T. 27 N. R. 11 E.

Geology: the copper belt is 1,800′ wide on the Engels group, runs N. E. S. W., with a westerly dip, and has been developed for over 3,000′ and well adapted for development by tunnels. Orebodies consist of large lenses in porphyry, alongside of diorite dikes. Orebodies are pronounced by geologists to be of magmatic origin. Ore contains bornite, with some chalcocite and chalcopyrite, and averages 2¾% copper. A carbonate capping overlies a portion of the orebody, with sulphide ore at shallow depth.

Development: at Engels mine, mostly done within the past five years, amounts to five miles of drifts, crosscuts, and raises. One tunnel is 4,000′ long, attaining a vertical depth of 700′.

The Superior mine, opened in the summer of 1916, has a 1,400′ main tunnel, crosscutting the general strike of the ore zone. About 5,000′ of tunnels has been driven. Orebody averages 2% copper, with large lenses of ore running from 15 to 20%.

Ore reserves: company claims 400,000 tons of broken ore in stopes and 3,000,000 tons blocked out above the stopes in between levels. Probable reserves disclosed by diamond-drilling and drifting are not less than 10,000,000 tons of 2½% copper ore.

Three-compartment shafts are being sunk at both Engels and Superior mines, to reach orebodies at lower levels already proved by drilling.

Equipment: includes 500-ton Minerals Separation oil-flotation plant, at

Engels mine; new mill of 1,000 tons capacity at the Superior mine; 2½ miles of aerial tramways; 400-h. p. hydro-electric plant; 6 air-compressors with total capacity of 6,000 feet per minute; two large double-drum hoists; trolley and storage battery locomotive; sawmills, complete shops; up-to-date stores; recreation hall; 150 residences for employees; lodging houses, hotel, etc.

Company owns 22 miles of standard-gauge railroad running from its property to Paxton on main line of the Western Pacific, in Feather River cañon. This cost about $500,000, is well equipped, and is clear of bonded and other indebtedness.

Power used is hydro-electric, partly from the company's own plant, but mainly from the Great Western Power Co.'s Las Plumas plant, from which transmission line costing $200,000 was built to the Engels property in 1917. The monthly demand is 1,000,000 k. w. hr., at a cost of $14,600. The new rate is 0.7 cents per k. w. hr. for over 500,000 k. w. hr. per month.

Company is completing a second unit in the Superior mill, and plans to add a third unit during 1919, bringing the capacity up to 1,500 tons, which, with the Engels mill, will make a total of 2,000 tons ore capacity per day.

Production and costs:

Year	Ore Milled, tons	Copper, %	Recovery %	Copper, lb.	Silver, oz.	Gold, oz.	Cost per lb., cents
1919*....	158,301	2.06	70.75	4,551,694†	62,817	574	17.47
1918.....	265,888	2.23	77.94	9,419,957	119,708	1,108	19.58
1917.....	155,433	2.31	.....	5,940,741	.....	...	.....
1916.....	138,712	2.28	71.63	4,312,408	.....	...	14.84
1915.....	59,714	....	.....	2,893,133	.....	...	.....

* Half year. † Includes metal from crude ore smelted.

From 450 to 500 men are employed.

Indian Valley Railroad Co.

Results of this subsidiary, which hauls ore, supplies, and passengers for the Engels company, and for the public, show:

	Receipts	Operating Charges	Profit	Current Assets	Current Liabilities	Profit and Loss Account
1918..	$151,292	$114,587	$36,704	$55,172	$28,250	$58,942
1917..	48,258	25,420	22,838	.....	.....	.....

This is one of the leading copper companies in California, and one of the promising mines in the country. Everything is favorable for low costs, with a management that issues detailed reports and is not afraid of spending money when adequate benefits are to be derived therefrom.

ENTERPRISE GOLD MINING CO. CALIFORNIA

Property: the Enterprise mine, 160 acres, in East Fork mining district, 7½ miles north of North Fork, in the Trinity Forest Reserve, Trinity county, Cal. The first claim, Lone Jack, was located in 1882, and mine has been operated more or less continuously since.

Ore: free milling gold occurs in vein in diorite. Vein has N. E.-S. W. strike and dip of 10° to 45° N. W. Ore occurs in 3 shoots, 900′, 300′ and 300′ long, with average width of 14″.

Development: by tunnels longest 1,400′, has 3,000′ of workings, with 3 stopes from 300′ to 900′ long, 50′ to 240′ high, and average width of 5′. Greatest vertical depth of development is 500′. At last accounts considerable ore was said to be blocked out.

Equipment: includes compressor plant, small electric plant and 10-stamp mill. Employs 12 men. Production to date said to be over $350,000. Cost of operating was over $7 per ton several years ago. No data available since then.

ESTABROOK DREDGING CO. CALIFORNIA

Address: Trinity Center, Trinity county, Calif.

Company has a 20 cu. ft. dredge working on the Trinity river.

ESTELLE MINING CO. CALIFORNIA

Office: Keeler, Inyo county, Calif.

Officers: R. C. Troeger, pres.-gen.-mgr.; Alfred H. McAdoo, sec.; Adolph Ramish, treas.; Roy C. Troeger, supt.

Inc. 1902, in California. Family and close corporation. 100,000 shares.

Property: 41 claims, over 700 acres, including the Morning Star, Rochelle, Shamrock and Southern Cross groups in the Cerro Gordo mining district. Property adjoins, and is the S. extension of the famous Cerro Gordo mine.

Ore: occurs in fissure veins and replacements in limestone, carrying silver-lead, also gold, copper and zinc in some of the veins.

Development: by a 520′ shaft and the 7,300′ Troeger tunnel. Seven veins are reported to have been cut, carrying both shipping and concentrating ore. Veins have stoping backs in virgin ground of from 2,000′ to 3,100′ above the Troeger tunnel.

Electric power has been installed, and is available for any requirement. Property is four miles east of Keeler and reported advantageously situated for a gravity tram system.

The property has been inoperative since October, 1917, owing to war conditions. Plan to resume operations soon.

ETNA QUICKSILVER MINE **CALIFORNIA**

Address: E. de Golla, mgr., and E. B. Frost, supt., Calistoga, Napa county, Cal.

Property: is situated 9 miles N. E. of Calistoga, and 20 miles from St. Helena, the shipping point. Cinnabar was first found there in 1854, and production of quicksilver is over 40,000 flasks.

Development: by long tunnels and extensive workings.

Equipment: includes a concentrating plant and retorts.

Property was producing in 1917, no information since.

FAIRVIEW MINING CO. **CALIFORNIA**

Washington, Nevada county, Cal.

Reorganized in 1914 as Calumet & California Mining Co., which see.

FEATHER RIVER COPPER CO. **CALIFORNIA**

Address: George W. Long, Phoenix, Ariz.

Inc. 1919 in Arizona. **Cap.,** $1,000,000.

Property: formerly known as the Snowstorm mine in Plumas county, said to be close to the Engels copper mine near Taylorsville. Tunnel was 250′ long Nov., 1919. The new owners propose spending $100,000 on further development.

FIRST NATIONAL COPPER CO. **CALIFORNIA**

See Balaklala Cons. C. Co.

Office: 111 Broadway, New York. **Mine and works office:** Coram, Shasta county, Cal.

Officers: Thos. W. Lawson, pres.; Wm. A. Kerr, v. p. and treas.; A. R. Buchanan, sec.; preceding, with H. W. Hoops, E. H. Whiting, John A. Young and E. M. Buchanan, directors. S. A. Holman, gen. mgr.

Inc. Jan. 20, 1908, in Nevada. **Cap.,** $3,000,000; shares $5 par, assessable; paid in $3.75; 600,000 shares outstanding. Cash and accounts receivable, June 30, 1918, $170,849.

Is said to have 4,000 shareholders, including American Smelters Securities Co., owning 80,000 shares. Stock is listed on the New York and Boston Curbs. Empire Trust Co., New York and State Street Trust Co., Boston, registrars; Registrar & Transfer Co., New York, and International Trust Co., Boston, transfer agent. Annual meeting last Thursday in October, at Carson City, Nev.

Is a holding company, owning the entire capital stock of the Balaklala Consolidated Copper Co., which in turn owns the entire capital stock of the Coram Water Co., and other subsidiaries, and a third interest in the Balaklala Central Mining & Smelter Co. Dividends 25 cts., Aug., 1916; 40 cts. Aug., 1917; 30 cts. in 1918; 15 cts. in Feb., 1919; total, $660,000.

The mining property and smelter are described under the above titles. The smelter was shut down in 1909 by fume litigation in the California courts, and cannot resume operations until some device is successful in eliminating the damage done by smelter fumes. Mine closed Aug. 21, 1914, on account of low price of copper, and resumed operations Aug. 25, 1915. Shipping 300 tons of

2.8% ore daily to the Mammoth smelter of the U. S. Smelting Co. at Kennett, Cal. The mine was closed down May 13, 1919, on account of the unfavorable metal market. Company entered into a 10-year contract with the U. S. Sm. Co., by which company claims it can earn about $2.25 per ton on 19c. copper.

The Balaklala Consolidated Copper Co. had a bond issue of $1,500,000, which was paid by the First National, in 4 annual installments of $375,000 each. The First National authorized, 1909, a $1,000,000 bond issue, flotation of which was a failure, but pledged some of these bonds for a loan of $375,000, which loan presumably was paid by the proceeds of the last assessment. The stock was manipulated to $10 per share by Boston interests in 1915. Property fully described under Balaklala Consolidated Copper Co.

FIVE BEARS MINING CO. **CALIFORNIA**

Office: 838 National Life Bldg., Chicago, Ill. **Mine office:** Genesee, Plumas county, Cal.

Officers: F. A. Meidinger, pres.; A. Vermaas, sec.; J. D. Meidinger, treas.; preceding, with G. H. Goodhue, directors.

Inc. April 10, 1903, in South Dakota. **Cap.,** $2,500,000; shares $1 par, non-assessable; issued, $2,428,174.

Property: 10 claims, patented, 200 acres, well timbered. 28 miles from the Indian Valley railway, shows fissure veins in talcose schist, and contact replacement deposits between schist and porphyry. The gossan was worked, 1876-93, for gold. Main vein, of 14′ estimated average width, carries chalcopyrite, associated with pyrite, estimated by management to average 6% copper, 1.5 oz. silver and $1.40 gold per ton.

Development: 2 tunnels, of 380′ and 1,540′, latter a drift tunnel, following the vein fault-fissure, showing low-grade chalcopyrite for an average of about 12′ width. Mine has 3,774′ of workings, estimated to show 80,000 tons of ore, with 9,500 tons blocked out for stoping.

Equipment: includes a 50-h. p. water plant, a 3-drill air compressor, 50-ton mill with ten 850-lb. stamps, and electric light plant. There are 11 buildings. Operated under a bond and lease with 25 to 30 men employed in 1917. Idle in 1918, and probably in 1919.

FIVE PINES MINING CO. **CALIFORNIA**

Address: Five Pines, Trinity County, Calif. H. J. Van Ness, pres.; L. Van Ness, mgr.

Property: located in 1896, is on the N. E. side of Van Ness creek, about 1½ miles above its mouth and 2 miles N. W. of Minersville. Mine is said to have produced to 1915 almost $300,000, and to be the best producer of the district.

Ore: free milling gold quartz with calcite, occurs in a series of pockets in a contact vein between meta-andesite and overlying slate and sandstone.

Development: 225′ incline shaft with a level at 125′.

Equipment: includes a small hoist and 2-stamp mill. Coarse gold and 80% of total value is recovered in hand mortar. Water power is used. Employs 4 men. See U. S. G. S. Bull. 540, p. 73, and Mines & Min. Res. of Trinity Co., State Mineralogist's Report, 1915.

FORKS OF SALMON RIVER MINING CO. **CALIFORNIA**

Address: J. D. Hubbard, supt., Sawyers Bar, Siskiyou county, Cal.

Officers: F. Salvage, pres.; V. G. Bonaly, sec,, 405 Fair Oaks St., San Francisco.

Inc. Nov. 1, 1909, in California. **Cap.,** $200,000; $1 par; all issued.

Property: two mines, one a hydraulic mine, located on the North Fork of the Salmon river, 14 miles from Sawyer's Bar, Siskiyou county, and the other an old quartz mine near Sierra City, Cal.

Development: at the quartz mine is by 3 tunnels 1,700′, 1,300′, and 2,500′ long, one with backs of 1,500′. Ore occurs in a shoot 6′ wide and 600′ long, that averaged nearly $20. Development was being done at last accounts.

The gravel mine is the largest in America, since the Lagrange was closed in 1918. It comprises 520 acres of old placer locations, which were rich diggings in early days, with control of 4 miles of old channels and bars along the

north fork of Salmon river. Bedrock is schist, covered by 20 to 60′ of gravel. Water is brought 4 miles. The main flume carries 3,000 miner's inches of water, and the lower flume 2,000 inches. In June, 1919, there were 3 No. 5 giants, with 6-in. nozzles, under a 235-ft. head, at work. During May, 30,000 cu. yd. was put through the main sluice. Nine men were at work. An 18-in. elevator was erected, and a water-power derrick handles rocks up to 7 tons.

Production: $200,000 since 1908, and over $60,000 in 1911 and 1912. No recent production figures available.

FOSTER GOLD MINING CO. **CALIFORNIA**

Office: 209 Post St., San Francisco. **Mine office:** Carryville, Trinity county, Cal.

Officers: C. T. Foster, pres.; E. E. Tway, v. p.; E. N. Harmon, sec.-treas. Directors, above and C. T. Foster, D. W. Rason, A. E. Gillespie. O. A. Kish, supt.

Inc. Nov., 1912. **Cap.,** not stated. Is a close corporation with four principal stockholders. No bonded debt or chattel mortgage.

Property: 147 unpatented claims in Trinity Center mining district, Trinity county, Cal., as follows: 116 mining claims, 28 mill sites, and 3 placer claims. The mining claims comprise two groups, the Bonanza King, and the Bonanza Queen; they carry a vein in gabbro, with course N. 53° W., and dip 60° N. E., which carries free gold. Length of vein within property stated to be 24,000′. High-grade ore occurs where the vein is crossed by a basic dike now serpentinized.

Development: entirely by tunnels, giving backs of 1,200′.

Equipment: includes 100 h. p. compressor and a 20-stamp mill. Through a subsidiary, the company owns a hydro-electric power plant of 1,000 h. p., concrete dam, flume, ditches, etc.

Production: company reports that ore worth $600,000 has been taken out of No. 2 tunnel and states that ore reserves blocked out aggregate 92,300 tons.

FRANCES COPPER MINING CO. OF CALIFORNIA **CALIF.**

Address: Thos. Allison, pres., 216 Wright & Callender Bldg., Los Angeles, Cal.

Inc. Nov., 1915, in California. **Cap.,** $100,000; 10c par; assessable; all outstanding.

Property: 2 unpatented claims in Kelso mining district, San Bernardino county.

Company does not reply to requests for information.

FRANCO CONTENTION MINING CO. **CALIFORNIA**

Mine address: Stent, Cal.

Officers: W. D. Waldman, pres.; H. C. Brentschneider, sec.; Casper, Wyo.; C. W. Burdick, v. p.; L. S. Grant, mgr.

Property: 180 acres on Knight creek, Tuolumne County, Calif., closed down for duration of the war, and no later returns.

FREMONT CONSOLIDATED MINING CO. **CALIFORNIA**

Officers: 24 Market St., San Francisco, and Dry Town, Amador County, Cal. Arthur Goodall, gen. mgr.; W. L. Palmer, supt.

Inc. 1899 in California. **Cap.,** $500,000; shares $2.50 par. Reported to have paid $316,000 in dividends.

Property: 4 claims, 4,200′ on the Mother Lode, 1½ miles north of Amador City, shows gold ore occurring on contact of black slate on the west, and metadiabase on the east. Vein strikes N. 25° W., dip 50° E., and has an average width of 6′. West of the main vein ore has been developed in schist. Orebodies occur as lenses, the ore being in the form of quartz stringers, cutting the schist. The rock is highly mineralized with pyrite.

Development: by the Fremont shaft, 2,950′ deep, sunk on a 51° incline, and a 1,500′ incline shaft north of the Fremont shaft. There are several miles of underground workings.

Equipment: includes a steam hoist at each shaft and a 40-stamp mill. Oil is used as fuel.

Mine was closed down in winter of 1918 due to high costs of gold mining, and had not been reopened up to late in 1919.

FRIDAY COPPER MINES CO. **CALIFORNIA**

Care Beecher Sterne, 1169 22nd St., San Diego, Calif. **Mine address:** Julian, San Diego County, Calif. Is a close corporation. **Inc.** in California.

Owns a nickel property, 4 miles S. of Julian and 64 miles from San Diego. Ore is closely similar to that of Sudbury, Ontario, and carries 6% nickel, with but 1% copper. Ore is 35% sulphide. Described in U. S. G. S. Bull. 640, p. 77, 1917.

Development: work in progress, blocking out tonnage by 250′ shaft.

FRIDAY-LOWDEN COPPER CO. **CALIFORNIA**

Dead. See description in Vol. XIII. Property of former company now owned by Mammoth Co., which see.

GARDELLA DREDGING CO. **CALIFORNIA**

Lawrence Gardella, who operated gold dredges at Oroville for several years, is manager of this company. Two boats worked on Clear creek, near Redding, Shasta county, for some time. A new dredge started operating in 1918. No returns are published.

GENESEE VALLEY COPPER CO. **CALIFORNIA**

Last address, Genesee, Plumas county, Cal.

Officers: A. L. Beardsley, pres.; Henry Metz, v. p.; Mel. J. Smith, sec.-treas.; A. B. Clark and J. E. Baum, directors.

Inc. Nov. 1, 1909, in Nevada. **Cap.,** $2,000,000; shares $1 par, non-assessable; issued $1,000,000. Annual meeting, August 1. Properties have been transferred to Mel. J. Smith, trustee, to satisfy creditors' demands.

Property: 15 claims, unpatented, 300 acres, in 3 groups, and a 120-acre mill site, showing porphyry dike in meta-andesite, with bornite disseminated through the porphyry. Dike runs N. 20° W., dips 54° S. W. Orebody reported as 80 to 300′ wide, 3,000′ long and proven for 150′ depth, assaying 3% copper, 2 oz. silver and $0.50 gold per ton. Company reported, 1913, about 100,000 tons. No recent development except drilling to determine tonnage and value. Ore shows 90% recovery by Minerals Separation flotation process, concentrates carrying 35% copper, 10 oz. silver and 1 oz. gold per ton.

Property considered promising, but is idle and will probably remain so for some time.

GEORGIA SLIDE MINING CO. **CALIFORNIA**

Property at Georgetown, Eldorado county, Cal., Robert Cranston, mgr. The Bebee, Mulby Point, and Eureka mines were taken over. Considerable exploration done on the Georgia Slide. Possibilities fair. Idle in 1919.

GIANT LEDGE GOLD & COPPER CO. **CALIFORNIA**

Office: 500 Frost Bldg., Los Angeles, Cal. **Mine office:** Barnwell, San Bernardino county, Cal. A. Glassell, pres. and gen. mgr.; H. G. Stoddard, v. p.; Mrs. L. Stone, sec.

Inc. July, 1901, in Arizona. **Cap.,** $1,000,000, increased, 1910, to $1,500,000; shares $1 par. Company has kept out of debt.

Property: 30 claims, a 40-acre mill site and miscellaneous holdings, about 800 acres, in the New York district, 5 miles from Barnwell, closed down for eight years. Fully described Vol. XII.

GIBRALTAR CONSOLIDATED GOLD MINING CO. **CALIFORNIA**

Address: Jacob Kiefer, pres., Downieville, Sierra county. Tunnel driving was under way in this old producer in August, 1919. C. D. McGonigal was said to have taken a bond on it at that time.

GLOBE CONSOLIDATED LEASE, INC. **CALIFORNIA**

Subsidiary of Crown-Reserve Mining Co., Ltd., Cobalt, Ont. Held option on Globe mine, Trinity county, Cal., but according to gen. mgr., S. W. Cohen, anticipations were not realized, and the option allowed to lapse.

GLOBE CONSOLIDATED MINING CO. **CALIFORNIA**

Address: Dedrick, Trinity county, Calif. H. M. Hall, of 112 Market Street, San Francisco, was the principal owner.

Property: Bailey, Chloride, Globe groups, 200 acres, at an elevation of 6,100′, in Canyon Creek mining district, 4 miles north of Dedrick, in Trinity Reserve, Trinity Co. Claims said to have 4 veins in hornblende schist, of

which the Globe and Bailey are the main veins; the Globe is 6′ wide, with a known oreshoot of 1,500′ length; the Bailey can be seen 500′ below this. Ore is free milling, assaying $9 per ton.

Development: to date, by 6 tunnels, from 250′ to 1,700′ long, greatest depth on vein 620′ with several thousand feet of underground workings. A large body of fair grade ore is said to be blocked out. The mine is 27 miles from a railroad; transportation is by auto.

Equipment: includes a 5,600′ gravity tram from mine to mill, compressor, electrical plant, sawmill and dwellings. There is a 20-stamp mill and 125-ton cyanide plant. Water power is obtained from Canyon Creek. Plant said to have cost over $300,000.

Production: said to have produced $750,000 in gold under previous owners, who had insufficient ore blocked out to operate at a profit. See U. S. G. S. Bull. 540, p. 76-76; Mines & Min. Res. Trinity Co., Cal.; State Mineralogists Report, 1915, pp. 145-7.

Mine was reported sold to Bulkeley Wells and others in Oct., 1919. There were 8 men employed then with Roy H. Elliott in charge. Several years ago the Crown Reserve Mining Co of Ontario held an option on the Globe, but dropped it.

GOLD BAR MINING CO. **CALIFORNIA**

Office: 255 California St., San Francisco, Calif.

Officers: J. J. McIntire, pres. and gen. mgr.; W. N. Lamb, v. p.; H. Easom, sec.; with W. P. Madill and Floyd Seger, directors.

Inc. Aug., 1915, in California. **Cap.,** 75,000 shares, $1 par; authorized to sell 35,000 shares for development purposes August, 1917.

Property: 30 miles from Valley Springs, Calaveras county, Calif. Proposed to develop a lava-capped drift-gravel channel, and wash gravel by improved method, the drop system. Expected to start operations in August, 1919. A sketch in prospectus indicates great optimism.

GOLD POINT CONSOLIDATED MINES, INC. **CALIFORNIA**

Company disincorporated and property taken over by Idaho Maryland Mines Co.

GOLD STATE MINING CO. **CALIFORNIA**

Address: P. O. Box 595, Bakersfield, Calif.

Not incorporated. Organized in 1918. F. G. Brassell, D. Bordagaray and C. P. de Sastlemolino, trustees. G. D. Aldrich, sec.; M. J. Errecart, mgr., Tehachapi, Cal.

Property: 5 unpatented claims in Green Mountain district, Kern county, showing gold ore in vein with granite walls.

Development: 545′ of tunnelling. Plans to build 3-stamp mill.

GOLDEN CENTER MINING CO. **CALIFORNIA**

Mine office: Grass Valley, Cal.

Officers: Rodney McCormick, pres.; J. W. Howard, sec.; with Albert Bellania and G. H. Alltucker, directors. C. A. Brockington, supt.

Cap., 300,000 shares, $1 par; 285,000 issued.

Bullion from 3 years' operation, $312,291, of which $152,000 was spent for property, $90,000 for improvements, $21,990 in dividends.

Property: 130 acres, including Golden Center Peabody workings under the town of Grass Valley. During 1919 an interesting suit was heard concerning the right to certain property within the city limits. The city authorities did not wish to obtain the ground, but wanted to protect the townsite patent. The case had not been decided finally by Oct. 1919.

Development: over 6,000′ to date; main shaft, 1,860′ deep. In July, 1917, ore extraction and milling were suspended to allow extensive exploration on which $200,000 was to be spent.

Equipment: includes hoist, compressor, 20-stamp mill, etc. Cyanide plant to be erected.

Production: good yields were made for a time, enabling a dividend to be paid, and many improvements to be made; but in 1918 the $5.80 ore being mined did not pay operating expenses and assessments were levied to pay for

further development. In May, 1919, work was confined to upper levels on account of insufficient pumping facilities to keep lower workings unwatered. In August, it was decided to suspend operations until financial arrangements could be made for putting in an adequate pumping system. Property in good hands.

GOLDEN GATE EXPLORATION CO. **CALIFORNIA**

Offices: 120 Broadway, New York; Hobart Bldg., San Francisco; Sheep-ranch, Calaveras county, Calif.

Officers: H. R. Plate, pres.; C. S. Jennison, v. p.; with R. F. Bacon, and Joseph B. Cotton, directors. E. R. Grochau, sec.-treas.

Inc. 1917 in Delaware. Cap., $3,000,000; $5 par; non-assessable; outstanding 300,000 shares. Transfer agent, Registrar & Transfer Co., New York. Registrar, Mercantile Trust Co., New York.

Company was organized to operate the Sheep Ranch mine and to acquire other gold properties.

Property: the Sheep Ranch mine, about 132 acres, extending 9,000′ along the strike of the Sheep Ranch vein, on the east belt of the Mother Lode, 17 miles N. E. of Angels, at an elevation of 2,200′; also not far from Murphys. In past years the mine was opened by shaft to the 1,300′ level, and by winze from that level to a depth of 1,550′, and is said to have produced $4,000,000 in gold.

Ore: free gold occurs in a well defined fissure vein, the pay ore having width of 5′ and a 72° dip. The hanging wall is gray schist and slate forms the foot-wall. Ores average $10 to $15 per ton.

Development: present management after unwatering the mine has been working on the lower levels and started sinking to the 1,700′ level. In the past little stoping was done between the 1,300′ and 1,500′ levels, and on west side of shaft no stoping has been done between the 300 and 1,000′ levels. A large block of ore was reported opened by Sept., 1919.

Equipment: pump, hoist, and an old 20-stamp mill which is reported to have been overhauled. Power is purchased from the Utica Mining Co., whose hydro-electric plant is near Murphys.

GOLDEN WEST MINING CO. **CALIFORNIA**

Address: Needles, Calif. **Officers:** Chas. P. Blanton, pres., Oatman, Ariz.; A. Rossiter, gen. mgr., sec.-treas.; Jos. Onetta, supt. Company issued 100,000 shares each to T. A. Dumont and H. C. Adams for 17 patented claims in Ibex district, San Bernardino county, Cal.; also selling 50,000 shares at 50c. for development and plant. The property is in the Ibex mining district, at north end of Manchester Mt., 26 miles from Needles.

GOLDSTONE MINING CO. **CALIFORNIA**

Address: Goldstone, San Bernardino County, Calif.

Officers: C. C. Rumrill, pres.; F. A. Shorey, v. p.; G. M. Leonard, sec.; W. S. Hubbard, treas.; all of Springfield, Mass. A. A. Turner, cons. engr.

Cap. $2,000,000; shares $1 par.

Property: 14 claims in new Goldstone district, 35 miles from Barstow, Cal., developed by shafts and pits. Ore occurs at limestone-diorite contact.

Company well known at Springfield, Mass., on account of queer share dealings by certain firms. No recent news, as property is mostly leased.

GOLINSKY COPPER CO. **CALIFORNIA**

Property: 14 claims, adjoining the Mammoth mine on the east and 4 miles west of Kennett, shows an ore shoot 30′ wide carrying low-grade copper ore with gold values. Equipment includes electric power. Idle since 1917.

GOLINSKY MINING CO. **CALIFORNIA**

Mine near Kennett, Shasta county, Cal. George Bayha, pres.; W. D. Tillotson, v. p. Sold to the Golinsky Copper Co. in 1911.

GOOD WILL COPPER CO. **CALIFORNIA**

Address: M. B. Ayars, pres., Paso Robles, Cal.; Geo. F. Root, v. p.; C. A. Iversen, sec.-treas.; B. F. Mason, supt., and J. A. Peterson, directors.

Inc. Jan., 1918, in Cal. **Cap.,** $250,000; $5 par; outstanding 30,000 shares; assessable.

Property: 500 acres, 10 miles N. W. of San Luis Obispo has copper ore said to average 3%.

Development: 625′ of tunneling, with total of 1,450′ underground workings. There is a 4″x6″ compressor on the property.

Management gives receipts from ore sales as $15,050 for past year, and ore reserves at 125,000 tons of 3½% ore.

GRASS VALLEY BULLION EXPLORATION CO. CALIFORNIA

Address: G. E. Mainhart, Grass Valley, Calif.

Inc. 1919, in California. **Cap.,** $1,000,000; $1 par.

Property: the Bullion group of claims in the southern part of the Grass Valley district, Nevada county, said to have yielded gold worth $1,000,000, and shut down for 15 years. Development is by an incline shaft, 1,500′ deep. Unwatering in progress in August, 1919.

GRASS VALLEY CONS. GOLD MINES CO. CALIFORNIA

Mine office: 605 J. St., Sacramento, Calif.

Officers: E. E. McMichael, pres.; Scott Ennis, v. p.; H. A. Heilbron, Jr., sec.-treas., with F. H. Buck, A. E. Nelson, P. Huth, H. Kleinsorge, and S. Jones, directors.

Cap., 900,000 shares, $1 par; 615,709 issued.

Financial: cost of property, $88,000; improvement acct., $175,000.

Property: Allison Ranch mine, south of Grass Valley, which produced gold worth $2,300,000 from 1856 to 1866. In July, 1917, the adjoining Benoit tract of 168 acres was bought.

Development: by 9,000′ of underground work to depth of 1,662′. Fair milling ore is coming from several upper levels and considerable prospecting is being done.

Equipment: twenty 1,575-lb. stamps, cyanide plant, etc. Mill started July, 1917.

An old mine with good record and possibilities.

GRAY EAGLE COPPER CO. CALIFORNIA

Property: 14 patented claims, about 256 acres, at Happy Camp, Siskiyou county, owned by the Mason Valley Mines Co (which see) of Thompson, Nev., said to show a blanket copper sulphide deposit in mica-schist, with dip of 15° N. E. and N. W. strike.

Development: by tunnels. The mine has 1,000,000 tons of chalcopyrite ore in reserve.

GREENBACK COPPER CO. CALIFORNIA

Address: Woody, Kern County, Calif. Joseph Weringer, owner.

Property: 1,520 acres, 18 miles east of Jasmin, on the Porterville branch of the Southern Pacific railroad. County rock is granodiorite, showing an ore zone carrying lenses of 20′ maximum width, with granite walls irregularly impregnated with chalcopyrite.

Development: by a 185′ incline shaft, with 3 levels opened. Carbonate ores stoped from the upper levels have averaged 19.4% copper and 5.7 oz. silver per ton. Work resumed in 1913, after several years, but no recent returns.

GREENBLOWER MINING CO. CALIFORNIA

Address: H. J. Greenblower, Meadow Valley, Plumas county, Calif.

Property: a placer mine near Mt. Ararat in Plumas county. Gravel available for hydraulicking is estimated at 500,000 yards. A concrete restraining dam, ditch, pipe-line, and wagon-road were decided upon in Oct., 1919.

GREEN HORN MOUNTAIN COPPER CO. CALIFORNIA

Property acquired by Atascadero Copper Co., which see.

GRIZZLY FLATS GOLD MINING CO. CALIFORNIA

Office: 638 Sacramento St., San Francisco, Calif.

Officers: F. C. Van Schaick, pres.; F. M. Hall, v. p.; W. H. Blanchard, sec.; R. H. Wilson, treas.

Inc. May 22, 1916, in Nev. **Cap.,** $250,000; $1 par; non-assessable; $106,064 issued. Registrar & Transfer Co., New York, transfer agent and registrar. Listed on New York Curb.

Property: gold claims at Grizzly Flats, Eldorado county.

GRIZZLY MINING CO. **CALIFORNIA**

Manager: O. F. Heizer, Tuolumne, Calif.

Inc. 1918, in California. **Cap.,** $150,000; all issued; par $1.

Property: 8 claims, Tuolumne county. Quartz vein in slate, reported to be 8′ wide, carrying free milling gold, assaying $8 per ton.

Development: by 3,000′ tunnel with 20,000′ of underground workings.

Equipment: includes a 100-ton cyanide plant. Reported extent of openings seems excessive as we have found no reference to this company in State Mineral Bureau reports.

Planning to re-open Eureka and Dead Horse mines. Operating expenses for 1918 given as $5,000; no production reported.

GRUSS MINING CO. **CALIFORNIA**

Address: W. J. Gruss, Portola, Plumas county, Calif.

Property: the old Gruss mine, said to have yielded $1,000,000 in gold and silver, now to be worked for copper. Mine is 3 miles from the Walker copper mine, and has been examined by H. W. Turner and J. M. Nicol.

The vein is mainly on a slate-metaandesite contact. Minerals are chalcocite and massive sulphides. Work is under way below the 400′ level, and the stamp-mill will have a tube-mill and flotation added.

GWIN MINE & DEVELOPMENT CO. **CALIFORNIA**

Address: F. B. Moors, 128 Sutter St., San Francisco, Calif.

Officers: Ansel M. Easton, pres.; J. J. Hachman, sec.

Property: the well-known Gwin gold mine, near Jackson, Amador county, Cal., which, up to the time of closing, 10 years ago, had paid large dividends. Shut down on account of power conditions and want of modern machinery.

Development: reported (see letter M. & S. Press, July 5, 1919), that there was more developed ore, of better grade, and the mine looked more promising than it had for many years previous to closing down. According to Moors, the bottom of the 2,400′ vertical shaft and 450′ winze below that level of the mine show ore-shoots of a combined length of over 450 ft., averaging $10 per ton; also hundreds of feet of $5 ore. These orebodies are practically intact. In addition, there is a very large tonnage of ore available in the upper levels of the south shaft. Two-thirds of the mine has not been prospected. The contact with the greenstone was never reached on either the east or west side. All of the ore encountered was found in the slate. One chimney was over 1,600 ft. of continuous pay-ore from 4 to 8 ft. thick. In other places the ore was over 20 ft. thick for many hundreds of feet." According to the California State Mining Bureau, 14th Report for 1913-14, on page 84, is said: "The ore-shoots of the main vein are of great length, varying in width from a few inches to 20 ft. The vein is usually of a banded structure and exhibits a branching tendency, with many spurs running into the hanging-wall."

Equipment: was complete with hoists, compressor, 100-stamp mill, which has mostly been sold.

Production: about 1,000,000 tons of ore yielding $5,000,000 in gold.

If these statements are correct, and verified by an examination, the Gwin should be another Plymouth or Old Eureka, and should not be left idle with so much ore available.

HARDENBERG MINING SYNDICATE **CALIFORNIA**

Operated the Hardenberg gold mine at Jackson, Amador county, Cal. Developed by 1,500′ shaft and equipped with 20-stamp amalgamation-concentration mill.

Syndicate suspended operations in October, 1917, owing to unsatisfactory results. In 1918 equipment was dismantled and the mine sold at trustees' sale for $10,000 to John Dohmann. Proceeds of sale netted creditors only about 18% on their claims.

HARVARD MINE, INC. **CALIFORNIA**

James E. Simpson, pres., 70 Kilby St., Boston; H. E. Buckminster, gen. mgr., same address.

Property: 4 claims, and a mill site, 80 acres, on the S. E. slope of Whiskey Hill, one mile S. W. of Jamestown, Tuolumne county, Cal. Claims cover 5,000′ along the strike of the veins.

Ore: 3 veins, the east, central and west, with strike N. 37° W., dip 60° N. E. and average width 10′, have been explored. Central vein consists of solid quartz 6′ to 12′ wide, but values are, as a rule, too low to mine. The east and west veins consist of a mass of quartz stringers cutting the schist and containing free gold. Main footwall is serpentine with hanging-wall of Calaveras slates. Ore occurs W. of the central vein. There are 7 distinct ore-shoots developed on the property, average length 200′, width 6′. Veins are faulted on S. end of orebody between the 1,200 and 1,400′ levels, and on the N. end between the 1,100′ and 1,200′ levels; they are faulted 8′ to 25′ to the S. W.

Development: 3-compartment shaft, 1,650′ deep, with levels at 200′, 500′ 700′, 800′ and below this at 150′ intervals; lowest level is at 1,400′. Total underground workings about 4 miles. Ore pockets, 100 to 200 tons capacity. are in hanging wall of shaft.

HAZEL GOLD MINING CO. **CALIFORNIA**

Address: French Gulch, Shasta County, Calif. J. O. Jillson, pres.; E. Young, supt., at last accounts.

Property: 178 acres patented and 485 acres, unpatented, at 2,300′ elevation, on N. side of Cline Gulch, 5 miles N. E. of French Gulch, includes the Gladstone mine, the largest gold quartz producer in Shasta county. Claims were originally located by T. Cummings in 1896. After exhaustion of oxidized ore the mine changed hands several times until acquired by present company in 1901.

Ore: free milling gold. Two fissure veins with E. W. strike and dip of 60° S. have been mined from adit level to 7th level; below 7th the dip changes to steep N.; average width 2½′ to 3′; walls are slate. Ore shoot is 300′ long. Milling ore averages about $10 per ton.

Development: the upper 1,000′ of vein has been mined by tunnels, while lower portion is worked from a winze on the main adit (Ohio) level. On the lowest or 1,300′ level, a 700′ crosscut opened the vein in Nov., 1915. Mine makes about 70 gal. water per minute.

Equipment: includes a 375-h. p. double-drum electric hoist, compressor plant, electric haulage from mine to mill, 9 miles of power and 5 miles of telephone lines. An electrically driven 30-stamp mill is equipped with concentrating tables and electroplating plant. Stamps weigh 1,050 lbs., drop 106 times per min., from height of 6″; capacity, 100 tons in 24 hours, through a 40-mesh screen; 92% extraction. Power-house destroyed by fire in 1918; loss $30,000. Company employs 140 men.

Production: previous to 1901, said to be $85,000; 1901-1914 said to be $3,000,000; yearly production about $360,000.

See U. S. G. S. Bull. No. 540, pp. 35, 37, 46, 57-60; Mines & Min. Res. of Shasta Co., State Mineral Report 1915, pp. 43-44.

HERNANDEZ QUICKSILVER CO. **CALIFORNIA**

Address: L. B. Ulrey, mgr., King City, Calif.

Officers: M. G. Ramires, pres.; P. Morasci, v. p.; A. E. Reynolds, sec.; First Nat'l Bank, King City, treas.

Inc. Dec., 1912, in California. **Cap.,** $500,000; $1 par; outstanding $247,421.

Property: 4 claims in New Idria mining district, San Benito county. For 4 years, prior to 1916, a small yearly production was made, from ore mined from the outcrop or from the surface. There are 3 inclined shafts, one 160′ deep and two of 50′ depth. Mine was idle in 1918. See p. 105, Bull. 78, Quicksilver Res. of Cal. published by Cal. State Mng. Bureau.

HESS MINING CO. **CALIFORNIA**

Address: C. N. Miller & Co., fiscal agents, Tonopah, Nevada.

Cap., 1,000,000 shares; 40,000 offered at 12½c each in Nov., 1919.

Property: at Alturas in the Winters district, Modoc county, Calif.

Operated in desultory manner by amateurs that extracted $200,000 from above the 200′ level.

Geology: Vein is a replacement of the andesite hanging wall, and is from 3 to 10′ wide, carrying silver and gold in about equal proportion. The footwall is diorite.

Development: by 300′ and 120′ shafts, the former an incline being main opening. All ore above 150′ and some down to 200′ has been extracted. The ore is said to have assayed $15.40 per ton on the 150′ level, $12 on the 200′, $20 at 250′, and rich ore is shown at bottom of main shaft. The 120′ vertical shaft is to be sunk deeper and connected with the old workings. Reserves said to be worth $200,000 above 300′ level.

Equipment: includes steam power, hoist, compressor, stamp-mill and cyanide plant, suitable for present operations. Mine is near a farming district.

Judging by past performance the Hess seems to be a fair speculation as to whether the values in the vein persist or not. The fiscal agents say that the physical character of the deposit and the geology indicate a deep-seated deposition, while the large silver content also indicates persistence, a statement which is not a particularly good argument. It appears, however, that further work is warranted.

HIDDEN TREASURE MINING CO. **CALIFORNIA**

Address: Harold T. Power, mgr., Call Bldg., San Franciso, Calif.

Owns gold-bearing gravel mine, 1,545 acres, five miles north of Michigan Bluff, in Damascus mining district, Placer county, but no information as to operations.

HILDA GOLD MINING CO. **CALIFORNIA**

Address: Sierra City, Calif. Samuel H. Dolbear, cons. engr., 625 Market St. San Francisco.

Officers: C. P. Doelger, pres.; L. J. Baumer, v. p.; Carl Ambrosey, sec.-treas.; Alex. Schloesser, supt.

Inc. Oct. 20, 1919, in Delaware. **Cap.,** $1,000,000; $1 par; 500,000 issued.

Property: a section of the Tertiary river channel, 5 miles from Sierra City, Sierra county. The mine has been worked in a desultory fashion by lessees since 1869. It has been explored by 2 hydraulic pits, a 100′ surface tunnel, and a bedrock tunnel, 700′ long, with raises and drifts in the gravel-channel, covering several hundred feet of laterals. Some gravel has been found, as high as $20 per yard. Ground includes the confluence of the Milton-Alleghany channel with the ancient Jura river, at which point there is expected to be a concentration of high-grade gravel.

HOPE MINES DEVELOPMENT CO. **CALIFORNIA**

Address: P. O. Box 154, Salt Lake City, Utah. **Mine address:** Sonora, Tuolumne county, Cal.

Officers: T. W. Whiteley, pres.; M. Reedal, v. p.; T. L. Mitchell, v. p.; C. W. Johnson, treas.; F. O. Horn, sec.; Geo. Weston, mgr.; preceding with G. M. Stenhouse, L. A. Jeffs and G O. Quackenbush, directors.

Inc. 1913, in Utah. **Cap.,** $500,000; $1 par; issued 370,000 shares; assessable.

Gross earnings for 1918 were $10,626, with operating expenses of $13,379.

Property: an old one, is on the Bonanza lead, ½-mile E. of Sonora, and is said to show free milling gold ore. Vein strikes N. 85° E. with dip of 23° W. and 2′ average width. Has mica schist footwall and porphyry hanging. Bought 3 adjoining fractions, 1916.

Development: by tunnels, main tunnel is in 1,200′. New work in 1916 totaled 1,860′.

Equipment: includes a 25-h. p. gasoline engine and a 5-stamp mill. Eight men are employed.

Production: 400 tons in 1916. Average returns, 1917 amount to $1,500 gross per month.

With new equipment and additional claims, operations should show a profit, but no data is at hand concerning results.

HORNITOS GOLD MINING CO. **CALIFORNIA**

Offices: 127 Montgomery St., San Farncisco, and Hornitos, Mariposa county, Cal. H. W. Morris, pres. In May, 1913, company took over and in 1915 began operating the Ruth Pierce gold mine, consisting of 2 claims, located 4 miles from Hornitos. Mine had been idle for some time. Vein averages 3′ in width; developed by a 550′ shaft, part vertical and part incline, with about 2,500′ underground workings.

Equipment: includes a hoist, driven by 105-h. p. motor, 4-drill compressor, and a 10-stamp mill. No recent information.

HORSE MOUNTAIN COPPER CO. **CALIFORNIA**

Eureka, Humboldt county, Cal. David Wilson, pres.; George Wilson, mgr., Eureka, Cal; D. W. Stapp, supt.

Inc. Nov., 1910. **Cap.,** $1,000,000.

Property: 70 claims, unpatented, in vicinity of the Humboldt Copper Co., with which this corporation apparently is connected in ownership and management. Owns the Ruby copper mine on Horse mountain in the Hoopa range, Horse River district, on the watershed between Redwood creek and Trinity river, in T. 6 N. R. 1 E. For miles copper occurs along a serpentine-gabbro contact; claims show native copper in a vein 30′ thick having 2′ of high-grade ore.

Development: by 6 tunnels, No. 6 of 900′, another of 450′, 3,000′ in all.

Equipment: includes engines, boilers, 35 buildings and a $12,000, 50-ton concentrator with Huntington mill, installed in 1912. Concentrates shipped to the Tacoma smelters, averaging 20% copper and $4 gold per ton.

In 1918 company shipped 350 tons of chrome ore. In May, 1919, property was under option to Pittsburgh people.

HUDSON CONS. MINING CO. **CALIFORNIA**

Address: C. Dorr, Jr., pres.-mgr., Syracuse, N. Y.

Property: the Owasco mine, near Oroville, Butte county, said to show several well-defined mineralized ledges. No reliable record of operations.

HUMBOLDT COPPER MINING CO. **CALIFORNIA**

Address: Eureka, Humboldt Co., Cal. T. L. Loofbourrow, pres.; W. L. Perrott, sec.

Property: 24 claims, unpatented, well watered and timbered, in Secs. 28-29, 32-33, T. 6 N., R. 4 E., said to show strong veins with a good showing of copper ore, also some gold.

Development: by 1,750′ of drifts, 210′ raise, 30′ winze, and 700′ of diamond drilling.

Equipment: consists of 3 surface buildings only. Shipped chrome ore in 1918.

IDAHO-MARYLAND MINES CO. **CALIFORNIA**

Office: 1213 Hobart Bldg., San Francisco. **Mine office:** Grass Valley, Nevada county, Cal.

Officers: Bulkeley Wells, pres.; Roy H. Elliott, v. p.; A. D. Snodgrass, sec.-treas.; with Errol MacBoyle, F. W. McNear, Rufus Thayer and Robt. Anderson, directors. John A. Fulton, mgr., Grass Valley.

Inc. in Nev., 1919. **Cap.,** $3,000,000; par $1, non-assessable. **Bonds:** authorized, $1,000,000; outstanding $413,000.

Property: about 540 acres, includes all the holdings of the Gold Point Cons. Mines, Inc., and the Union Hill Mines, which companies have been disincorporated. Claims are just E. of Grass Valley and cover about 2 miles along the strike of the Union Hill and several other important quartz veins; the properties operated are the Eureka, Roannaise, Idaho-Maryland, South Idaho, Union Hill, and Tracy.

Development: several shafts, deepest, an incline shaft, 2,180′ deep and over 40,000′ of workings.

Ore carries gold in quartz, the vein ore having a diabase hanging wall and serpentine foot-wall. Total output to time present management ac-

quired property said to be about $23,000,000 in gold. Company will reopen mine to 1,000′ depth and do further development.

Equipment: includes a 20-stamp mill.

INDIAN SPRINGS MINE — **CALIFORNIA**

Address: J. Woodruff, Magalia, Butte county, Calif.

Property: an old drift-gravel mine in the Magalia district north of Oroville, which has produced $4,000,000 of gold. The adjoining Hupp mine has also been acquired, and both mines will be operated from the Indian Springs tunnel, 4,000′ long. Los Angeles capital is interested.

INYO COPPER MINES CORPORATION — **CALIFORNIA**

Mail returned from 215 Balboa Bldg., San Francisco, Cal. **Mine address:** Keeler, Inyo county, Cal. R. G. Paddock, pres. and gen. mgr.; F. J. O'Dea, secretary.

Inc. Nov. 19, 1910, in California. **Cap.,** $1,000,000, shares $1 par, assessable; issued, $550,000.

Company is a reorganization of the Inyo Copper Mines & Smelters Co. The president stated, 1918, that it is free of debt but waiting for better financial conditions before attempting to raise money and only a small amount of work is being done.

Property: 19 claims in Ubehebe district, covering a contact zone between limestone and granite porphyry. For a mile this contact is said to show places where there is a 1′ to 20′ of ore carrying 8% to 40% copper. The steep mountain side permits development by tunnel and future work will be of this character.

Development: amounting to 650′, includes 6 shallow prospects shafts and as many short tunnels, the longest 120′, together with 100′ of trenching. Ores carry appreciable value in gold and silver, as well as copper.

Probably out of business.

INYO GOLD MINING CO. — **CALIFORNIA**

Cap., $1,000,000; shares $1 par; assessable. Stock listed on Salt Lake Exchange.

Property: 17 claims, patented, at Elko, Inyo county, Calif., developed by 350′ of shafts, 700′ of tunnels and 75′ of crosscuts. Company officials estimate $650,000 worth of gold-silver ore in sight.

Letters returned from Elko, Cal., in May, 1917, and no news since, so probably defunct.

IRON MOUNTAIN COPPER CO. — **CALIFORNIA**

Office: 301 First National Bank Bldg., Riverside, Cal. Mine near Blythe City, Riverside county, Cal.

Officers: Harwood Robbins, pres.; E. W. Tucker, v. p.; Holton Webb, sec.-treas.

Inc. about July, 1911, in California. **Cap.,** $10,000; shares $1 par; issued, 5,000 shares.

Property: 35 claims, about 700 acres, known as the Crescent group, in Ironwood mining district, Riverside county, Cal., 26 miles S. of Blythe Junction on the Parker cut-off of the Santa Fe railroad. Claims show fissure veins in granite and porphyry, the main ledge being traceable 2 miles.

Development: includes 120′ shaft with a level at 100′ depth that is 70′ long and shows high-grade copper ore containing visible gold. Ore shipments by former owners averaged $100 per ton. Outcrop shows high-grade ore at several places. Mr. Robbins, who is said to have furnished all the money thus far, planned on putting in a small smelter. No recent returns.

ISABELLA COPPER MINING CO. — **CALIFORNIA**

Directors at last accounts: K. E. Rader, M. A. Fesler, Howard W. Williford, of Berkeley; E. J. Rader, Sacramento, and E. E. Rader, of Barzilla, San Mateo county, Cal.

Inc. 1911. **Cap.,** $500,000. Property in the Etna Mills district, Siskiyou county. A 100′ tunnel was being driven when last heard from. Probably idle.

ISLAND COPPER CO. **CALIFORNIA**

Office: 704 Union Savings Bank Bldg., Oakland, Cal. Frank A. Leach, pres.; C. H. Wilcox, v. p.; E. R. Leach, mgr.

Property: 4 patented mining claims and other property aggregating 265 acres, in the S. W. corner of Trinity county, within 500 yards of the Northwestern Pacific R. R., operating from San Francisco to Humboldt bay. The postoffice is Island Mountain, Trinity county, Cal.

Geology: a lenticular body of copper-iron sulphide occurs in metamorphosed sedimentary rocks, outcropping at several places. Development is said to indicate that these various outcrops are part of one mass, whose estimated dimensions are 90′ to 100′ in width, 450′ in length and a proven depth of from 60 to 145′. Ores carry 3½% copper, 1½ oz. silver, and $2 in gold per ton.

Development: over 2,500′ of underground workings, opening 275,000 tons of ore. Up to Jan. 1, 1919, 30,000 tons had been shipped.

JAMESTOWN EXPLORATION CO. **CALIFORNIA**

Probably idle.

Property: 1 claim, patented, 20 acres, ¾ mile W. of Jamestown, Tuolumne county. Work stopped since 1915, owing to lack of funds. Described in Vol. XIII.

JESSIE BELLE M., M. & SM. CO. **CALIFORNIA**

Letters returned unclaimed from Madera, Cal. Probably closed down. Described in Vol. XIII.

JOE CREEK COPPER CO. **CALIFORNIA**

Mail returned from Hutton, Siskiyou county, Cal. Is one of the many prospects of the copper belt of northern California, whose owners believed a copper outcrop could be made to pay cost of development and equipment from ore mined from shallow workings.

Property: apparently owned formerly by Copper King Mining Co., lying between the Blomfield group and the Blue Ledge mine, has opencuts and crosscuts developing the mine to a depth of 400′. Mine is said to carry several large orebodies, ranging 5 to 8% in copper tenor and $8 per ton in gold and silver, an estimate considered excessive.

Idle for several years.

JUMPER CALIFORNIAN GOLD MINES CO. **CALIFORNIA**

Stent, Cal., P. E. de Caplane, pres.; W. D. Waltman, v. p.; Lester S. Grant, mgr.

Property: 120 acres at Stent, Tuolumne County, Calif., on the Mother Lode, is developed to depth of 1,800′ by an incline shaft.

Equipment: includes a 60-ton 20-stamp mill. Operated for nearly 3 years by lessees. Annual yield about $100,000. Company receives 25% royalty and charges $1 a ton for milling ore extracted.

KATE HARDY MINES CO. **CALIFORNIA**

Address: W. M. Cooper, pres., San Jose, Calif.

In 1918 issued 250,000 shares for a lease and option to purchase the property.

Property: the Kate Hardy mine and mill at Forest, Sierra County, Calif., has been operated intermittently since 1860 and is credited with a production of over $225,000 in gold. Six veins have been cut on the property from 6 to 10′ wide, carrying mainly oxides, but some sulphides. The main vein runs N. 20° W. and dips about 80° W. Pay-ore occurs in patches of free gold and auriferous arsenopyrite. Developed by several tunnels, longest 600′.

Geology: fully described in U. S. G. S. Bull. 580, pp. 181.

Equipment: includes a 3-stamp mill, 1 classifier, and Wilfley tables.

In Aug., 1919, company was rebuilding its power line and enlarging its mill.

KELLY MINING CORPORATION **CALIFORNIA**

Office: H. H. Kelly, 636 No. Van Ness Ave., Santa Ana, Calif.

Officers and directors: H. H. Kelly, pres.; L. M. Kelly, v. p.; W. 1. Stewart, sec.-treas.-supt.

Inc. July 19, 1917, Calif. **Cap.,** $200,000; par $1; outstanding 159,150 shares.

Property: 9 unpatented claims near Quincy, Plumas county, shows a quartz vein in serpentine.

Development: 200′ tunnel and a 460′ tunnel with 350′ opened underground. Company claims to have about 20,000 tons gold ore averaging $8 per ton.

Not producing. Putting up a 50-ton concentrator. Estimated expenditures, 1919, $15,000 to $20,000.

KELLY SILVER MINE — CALIFORNIA

See under California Rand Mines Co.

KENNEDY MINING & MILLING CO. — CALIFORNIA

Office: E. C. Hutchinson, pres., 409 Montgomery St., San Francisco, Cal. Webb Smith, supt.

Cap., $100,000; shares $100 par.

Dividends: a large sum has been paid, but no figures are obtainable.

Property: 9 claims, covering 3,100′ on the Mother Lode, includes the Kennedy mine adjoining the Argonaut, 1 mile north of Jackson, Amador county, Cal. The Kennedy vein, one of three veins in the Lode, outcrops in andesite passing downward into Mariposa slate, following roughly the contact between the two rocks. The vein dips 57° E. and the payshoots rake to the north. The best ore occurs near the footwall over a black gouge 1 to 2′ thick. Company purchased the Zeila mine and 40-stamp mill at Jackson, about 1½ miles S. of the Kennedy, in 1915, for $35,000. The Zeila is worked out down to the 450′ level, but new orebodies averaging $4 per ton are said to have been disclosed below the old workings.

Development: by 3 shafts; the vertical south shaft, 2,300′ deep, north shaft, 2,500′ deep and the 3-compartment east shaft sunk to vertical depth of 4,200′ with crosscuts and drifts, run N. and S. on the veins. Shaft being sunk with the object of reaching junction of two orebodies. Ore in the lower levels is generally of better grade than above.

Equipment: includes air-drills, 15″x30″ Murry compressor, 25″x30″ Fulton compressor, nine 80-h. p. boilers, oil-fired steam power, electric power is purchased, 800-h. p. double-drum hoist and 100-stamp mill, making an extraction of 83%. Monthly capacity is 15,000 tons. Concentrates assay $100 per ton and tailings run about 60c per ton. Concentrates are treated at the mine in a 10-ton chlorination plant with 2 roasting furnaces. Employs 300 men.

Production: figures are unobtainable, but probably around $60,000 a month under normal conditions.

KEYSTONE MINING CO. — CALIFORNIA

Address: Carlton R. Downs, Amador City, Calif., mgr.

Property: the Keystone mine at Amador City, Amador County, covering 4,000′ along the Mother Lode, has been operated continuously since its discovery in 1851.

The Keystone is a quartz vein, 12 to 200′ wide, occurring on the contact between black clay slate footwall and meta-andesite hanging-wall. Two other veins, the Spring Hill and east veins, have been developed; the latter is now furnishing the ore. The contact vein was mined above the 900′ level. See M. & M. Res. of Amador Co., State Mineralogist's Report, p. 34-36.

Development: by 3-compartment Patton shaft, 2,680′ deep and 1,118′ south shaft on 60° incline, with crosscuts and drifts E. and N. on the 100′, 900′, 1,000′, 1,200′ and 1,400′ levels. Development work now being done on the 1,800′. Most of the 1916 output came from the 900′, 1,000′, 1,200′ and 1,400′ levels.

Equipment: includes 40-stamp amalgamation and concentration mill, making an extraction of 90%; electric hoist, 300-h. p. motor, air compressor

and drills. Concentrates run $50 per ton; the tailings 30c per ton. About 80 men employed.

Production: for last 6 months of 1918, was 44,322 tons of $2.52 gold ore, producing $4,652 in bullion and $106,860 in concentrates; the total was reduced to $85,516 by freight and smelter charges.

In spite of abnormal conditions and low-grade ore this company continues its work, and issues regular reports.

KING SOLOMON MINE **CALIFORNIA**

Owned by C. B. Cottrell, Westerly, R. I. W. H. Young, supt., Cecilville, Siskiyou county, Cal.

Property: 40 acres in Secs. 6 and 7, T. 38 N., R. 11 W., near Randsburg, in the Liberty Mining district, Siskiyou county, Cal., shows a 5′ vein of free milling ore, with quartz porphyry foot and slate hanging-wall. The vein runs N. S. and dips 60° E. Developed by 460′ tunnel, 130′ shaft and drifts.

Equipment: includes an 8-stamp mill, hoist, boiler and buildings.

In 1917 ore was being produced from 450′ level, no later returns.

KINGS QUICKSILVER MINING CO., LTD. **CALIFORNIA**

Office: 502 King St., London, Ont., Canada.

Officers: Wm. Gray, pres.; W. P. Darsh, sec.; A. A. Lewis, supt.

Property: a group of claims, in Sec. 20, T. 23 S., R. 16 E., Kings County, 14 miles E. of Parkfield, Monterey county, Cal. Leased by Patriquin brothers in 1918.

Ore: native mercury, cinnabar and calcite, occurs in a crushed zone, 35′ wide, running S. E. with dip 45° S. W. Country rock is serpentine, shale and metamorphic sandstone.

Development: to depth of 200′ by 700′ upper and 850′ lower tunnels, with raises and winze.

Equipment: includes 10-ton Scott fine ore furnace with brick condensers and 25-h. p. oil engine. Mine worked intermittently since 1902. In Nov., 1918, a 6′ x 6′ shaft was being sunk.

KLEINSORGE MINE **CALIFORNIA**

Address: W. E. Kleinsorge, Sacramento, Cal.

Property: an extensive area 30 miles by road S. W. of Red Bluff, Tehama county, on the S. P. R. R., in rough and bare country.

Geology: the hills, which are steep, consist mainly of serpentine, in places much shattered. In this rock chrome occurs as veins, pockets and disseminations. The last type of deposit covers a considerable area, and will only be commercial by concentrating.

Equipment: 7-mile road, two camps, 3 aerial trams, 10-stamp mill, loading bins, etc.

Production: started about mid-year, 1917, and amounted to several carloads monthly of ore assaying 45% Cr_2O_3 and low in silica.

Mine is closed on account of the unsettled market for chromite.

LA GRANGE GOLD CO. **CALIFORNIA**

Address: La Grange, Tuolumne county, Calif.

Company has been operating a dredge on the Tuolumne river some years.

LA GRANGE MINING CO. **CALIFORNIA**

A subsidiary of Gold Fields Am. Dev. Co., which see. Operations were stopped during 1918, and part of the equipment sold. See Vol. XIII.

LEVIATHAN COPPER MINE **CALIFORNIA**

Address: Markleeville, Calif.

Property: the Leviathan group, 16 claims, located in Alpine county, 22 miles from Markleeville. The Leviathan claim was first located in 1863, and the upper tunnel driven to almost its present length, 460′; in all there are about 700′ of workings. In 1869, a second tunnel, 175′ lower, was driven over 900′. About 500 tons of 30% copper was shipped. A small blast-furnace was built, and operated for a short time. Examined by W. H. Weed in 1918.

LIGHTNER GOLD MINING CO. **CALIFORNIA**

Office: 301 N. Eldorado St., Stockton, Calif.

Officers: C. M. Jackson, pres.; Alex. Chalmers, v. p.-mgr.; B. F. Williams, Jr., sec.-treas., with A. D. Schindler and L. J. Wagner, directors.

Inc. Oct. 26, 1896, in California. **Cap.,** $125,000; shares $1 par; assessable; 62,287 shares outstanding. Dividends paid to date, $550,000. Assets, Feb., 1916, amounted to $224,281 and liabilities to $85,186. Annual meeting last Thursday in Oct.

Property: 1 patented claim, 4⅓ acres, in Angels Camp, Calaveras County, between the Utica and Angels quartz mines, shows a quartz fissure vein said to be 80′ wide, running N. W.-S. E., with dip of 70° and assaying $5 per ton. The mine is credited with a total production to date of $2,000,000. Property was closed down in 1910, owing to caving of the old shaft sunk on the orebody.

Equipment: includes hoist, drills, electric power, compressor and 60-stamp amalgamation and concentration mill. When working employs about 70 men and maintains daily output of 150 tons. Management estimates ore reserves at 200,000 tons above the 300′ level, Feb., 1916.

LINCOLN CONSOLIDATED **CALIFORNIA**

Address: Sutter Creek, Amador county, Calif.

Property reported sold October, 1917, to Jas. Hoatson, et al., of Houghton, Michigan, and 10% dividends paid shareholders from proceeds. Planned to reopen and develop.

LITTLE BULLY HILL MINING & SMELTING CO. **CALIFORNIA**

Probably dead. See description in Vol. XIII.

LITTLE NELLIE MINING CO. **CALIFORNIA**

Address: Redding, Shasta county, Cal.

Operations resumed Oct., 1917, after two years' shut-down, during which time 30 diamond-drill holes were put down to an average depth of 800′, defining lenses of 2 to 7% copper ore. In 1917, 15 stamps were crushing gold ore; copper ore was to be shipped to Mammoth. No news since.

LORETTO COPPER MINING CO. **CALIFORNIA**

Main office: Tonopah, Nev. **Mine office:** Big Pine, Inyo County, Calif. John G. Kirchen, mgr.; John Cole, supt. Is controlled through stock ownership by Chas. M. Schwab, and the Gail Borden estate.

Property: about 750 acres, east of Bishop, has a 40′ vein, carrying ore said to average 4% copper, and about $3 gold per ton.

Development: by 1,700′ main shaft, said to be in commercial ore, and 2 crosscut tunnels to the N. E., 1 of 90′ length said to have cut a 74′ vein. Improvements include a smithy and several small mine buildings. Developing and planning to install a 100-h. p. electric hoist and build a railroad to Coaldale, the nearest R. R. point.

Reported early in 1917, that mine was to be reopened and that a process had been found to treat the highly-silicious ore, but nothing known of operations since.

LOUISIANA DEVELOPMENT CO. **CALIFORNIA**

Letters returned. Probably idle. See description in Vol. XIII.

LUCILE GOLD & COPPER MINING CO. **CALIFORNIA**

Letters returned. Probably dead. Mine near Kelso, San Bernardino county, Calif.

MADERA ENTERPRISE MINES & LAND CO. **CALIFORNIA**

Address: Grub Gulch, Madera County, Calif.

Officers: Lou K. Johnson, pres.-gen. mgr.; A. L. Emberson, sec.-treas.; S. R. Johnson, mgr.

Inc. in 1914. **Cap.,** $500,000; shares $1 par. A close corporation.

Property: 550 acres patented, including the John W. Cates mine, 3 miles N. E. of Grub Gulch.

Ore: gold quartz in fissure vein in schist and slate. Vein runs N. 35° E.; dip 80° N. E. It was discovered in 1881 and worked for a short time,

during which it is said to have yielded over $108,000 from ore averaging $13.13 per ton. It was then idle until April, 1913.

Development: by 4 tunnels, longest 365′, drifts and winzes, totaling 1,500′ of underground workings.

Equipment: 10-stamp, 25-ton mill, built by present owners, air compressor and engine. Water from the Fresno river furnishes power, except in the dry season, when a gasoline engine is used; there are 1½ miles of ditch and flume. No returns since 1916.

MADERA GOLD MINING CO. **CALIFORNIA**

Has gone out of business. Described in Vol. XIII.

MAD MULE MINING CO. **CALIFORNIA**

Owns the Mad Mule mine, formerly known as the Banghart, 5 miles N. W. of Stella, in the Shasta mining district.

Mine is fully described in U. S. G. S. Bull. 540, pp. 40, 42, 52-54. See also Cal. State Mineralogist's Report 1915, Mines & Min. Res. of Shasta Co., p. 47. No information is available; probably closed, as mine was pockety.

MAMMOTH CONS. MINING CO. **CALIFORNIA**

Probably dead, as no data is obtainable.

Mine near Bakersfield, Kern Co., Calif.

Inc. June 9, 1910, in Minnesota. **Cap.**, $800,000; $1 par; non-assessable; 465,000 issued. Annual meeting, 2nd Tuesday in January.

Property: 22 claims, 100 acres, 20 miles from the railroad, is said to show silver-gold ore in quartz.

MAMMOTH COPPER MINING CO. OF MAINE. **CALIFORNIA**

Formerly a subsidiary of U. S. Smelting, Ref. & Mng., stopped doing business Dec. 31, 1917. The properties which it formerly operated were taken over on Jan. 1, 1918, by the U. S. S. R. & M. Co., which see.

MANZANATA MINE. **CALIFORNIA**

Address: E. N. Fissier, gen. mgr., Placerville, Eldorado county, Calif.

Property: a gold mine in the Kelsey district, 3½ miles north of Placerville, said to have an ore shoot 700′ long and 20′ wide, with a 5′ ore band averaging $9.17 per ton. Vein has a diabase hanging and slate footwall. Developed by tunnel. Equipped with 10-ton Bryant mill and a small concentrator.

Owner plans incorporating a company and operating on a larger scale.

MARIPOSA COMMERCIAL & MINING CO. **CALIFORNIA**

Office: 1043 Mills Bldg., San Francisco, Cal. Owns several mining properties near Mariposa, Mariposa county, Calif.

Property: the Green Gulch quartz mine, 1 patented claim, in Secs. 12 and 13, on the Mariposa Grant, 12 miles from Bagby; shows a 3′ quartz vein in slate, with gold ore.

Development: 300′ shaft, and 550′ tunnel, total underground workings about 2,500′. Equipped with hoist and compressor. At last accounts was being worked by lessees.

The Guadaloupe quartz mine, Sec. 32, Mariposa Grant, 17 miles from Bagby, shows an 18″ vein in granite; worked by lessees.

The Mariposa quartz mine, 1 patented claim, in Sec. 23, 16 miles from Bagby, formerly a large producer, is idle. In 1914 a roasting furnace and cyanide plant was being built to treat concentrates at the mine.

In Dec., 1915, suit was brought against the company by G. W. Langan for $1,500,000, involving title to Mt. Bullion property, the Mariposa mine, and the town site of Ophir, alleging that company failed to fulfill contract to sell the properties after agreements to this effect had been arranged and the first payment made.

MARYSVILLE DREDGING CO. **CALIFORNIA**

Address: F. L. Ames, pres., 14 Ashburton Place, Boston, Mass.

The company operates 3 dredges on the Yuba river, Cal. Paid no dividends to 1918, but reduced a bonded indebtedness from $600,000 to $150,000.

Late in 1919 it was reported that the State Debris Commission had enjoined company from working on the Yuba river on account of the silt accumulating.

McALPINE MINES CO. **CALIFORNIA**

Address: Coulterville, Mariposa county, Calif.

Officers: Frank R. Whitcomb, pres, and gen. mgr.; C. L. La Rue, and F. S. Ewer, v. p.; Fannie W. McLean, sec.-treas.; with M. C. Hassett, directors. W. A. Irwin, supt.

Cap., $1,500,000; shares $1 par; fully paid and non-assessable.

Company was formed by California people to reopen the old McAlpine mine on the Mother Lode, Tuolumne county, near the line between Tuolumne and Mariposa counties. The mine was a well-known producer in the 60's.

Property: 120 acres, covers 2,100′ on the strike of the Mother Lode, including the water rights of Moccasin Creek.

Development: a 650′ shaft with 2,000′ underground workings, is said to block out 350,000 tons of $7 ore.

Equipment: includes a 5-drill air compressor. A 200-ton mill was to be erected, using flotation.

MELONES MINING CO. **CALIFORNIA**

Office: 131 State St., Boston, Mass. **Mine office:** W. G. Devereux, mgr., Melones, Calif.

Officers: W. E. Eustis, pres., Boston; A. H. Eustis, sec-treas.; with James Parker, Frank Lyman, W. B. Devereux, T. H. Watkins, W. Rodman Peabody and Richard Austin, directors.

Inc. in West Virginia. **Cap.,** $400,000; shares $1 par; nonassessable; 275,000 issued. Bonds authorized $500,000, $400,000 outstanding. State St. Trust Co., Boston, Mass., transfer agent. Annual meeting, 3rd Wednesday in March.

Property: 16 claims, 152 acres, on Carson Hill, has been steadily operated since 1898.

Ore: gold, occurs in a quartz vein in schist with N. W.-S. E. strike and a dip of 70° N. E.

Development: by tunnel 5,000′ long on 1,100′ level. At this point a 3-compartment shaft has been sunk in the footwall to 2,550′ level. Ore above 1,100′ has mostly been extracted. Shrinkage stoping is in vogue where the vein is not too flat. Ore is trammed from mine to mill in 8-ton cars hauled by a d. c. 500-volt locomotive.

Equipment: includes double-drum electric hoist, driven by 250-h. p., 2,000-volt induction motor, hoisting at 1,000′ per minute; 600-cu. ft. Imperial compressor driven by 100-h. p. motor; 1,200-cu. ft. Laidlaw-Dunn-Gordon compressor; and a 100-h. p. trolley generator in power-house at river. Two Knight water-wheels partly drive these helped by a 250-h. p. G. E. 2,000-volt motor. Mill and other plant driven by water-power, 1,200 h. p. being available. Flume and ditch line is 4 miles long.

Mill: 100 stamps, weight 1,050 lbs. each, dropping 7″, 102 drops per minute, crushing 5 tons ore per stamp through 20-mesh screen; outside amalgamation is used; battery pulp concentrated on Wilfley tables; middlings elevated, reclassified and reconcentrated; concentrates to cyanide plant, capacity 600 to 700 tons per month. Concentrates assay $30 to $50 per ton. All tailings on tables are treated by cyanide. Classification takes place on the tables. Sand is treated by percolation (cyanide), and slime in a Dorr counter-current (C. C. D.) plant. Total recovery averages 85%. Mine is shut-down at present owing to high cost of operation.

See Mines & Mining Resources of Calaveras Co., Cal. State Mineralogist's Report, 1915, pp. 93-96.

METALS EXPLORATION CO. **CALIFORNIA**

Office: 120 Broadway, New York, and Hobart Bldg., San Francisco.

Is a closely held corporation, controlled by Harry Payne Whitney,

Bulkeley Wells, v. p. Reported that company acquired the Globe mine, Trinity county, also control of the Gold Point Cons. Mines, Inc., Calif., succeeded by Idaho-Maryland Mines Co., operating at Grass Valley.

MERCHANTS FINANCE CO. (Western Metals Co.) **CALIFORNIA**

Address: Bankers Security Bldg., Los Angeles, Calif. Company in 1915, built an antimony smelter at Industrial Harbor, Los Angeles, operated antimony mines in California and Nevada and bought ores from the Western States, Alaska and foreign countries. The largest production was made from deposits of antimony ochre and stibnite near Wild Rose Spring, on the N. W. slope of Telescope Peak in the Panamint range, Cal. These deposits known for many years, were too far from transportation to be profitably worked until the high price of antimony in 1915 and the completion of a railroad to Trona on Searles Lake, 25 miles from the property made their exploitation possible. The company also worked deposits 30 miles N. E. of Mojave, Kern county, Calif.

MEXICAN SMELTING & REFINING CO. **CALIFORNIA**

Office: 82 Beaver St., New York. A subsidiary of the Compania Metalurgica Mexicana and holds title to the Blue Ledge mine in Siskiyou county, Cal., which see.

MODOC MINES CO. **CALIFORNIA**

Address: Highgrade, Modoc Co., Cal.

Officers: Wm. Wrigley, Jr., pres.; Jas. C. Cox, sec.-treas., Kesner Bldg., Chicago; N. E. Guyot, v. p. and mgr., Kingman, Ariz., directors.

Inc. May 1, 1909, in Arizona. **Cap.,** $1,000,000; all outstanding; shares $1 par. Annual meeting July 1. Is a close corporation.

Property: 259 acres, patented in High Grade mining district, in the extreme N. E. corner of Modoc county.

Ore: gold, in a vertical quartz vein in rhyolite, with average width of 10″, and proved for 150′ in length downward to the 200′ level. The ore in 25-ton lots returned $23 per ton gross.

Development: by 210 vertical shaft, with 1,800′ of underground workings.

Equipment: includes 6x10″ hoist. Steam power is used. In 1915 about 100 tons of $23 ore was shipped. Working conditions are bad, due to the heavy snowfall and opposition of ranchers and others. District has merits, but will doubtless remain undeveloped until better feelings prevails at New Pine Creek, Oregon, the railroad station for the district, according to officials of the Modoc company.

For geology of the district, see U. S. G. S. Bull 594, pp. 38-48. Probably dormant like the rest of the High Grade district.

MOHAVE UNITED MINING & MILLING CO. **CALIFORNIA**

Address: 14 Central Bldg., Phoenix, Ariz., and Copper King Camp, Crucero, P. O. Baxter, Cal.

Officers: P. H. Lietzow, pres. and mgr.; John Hoeft, v. p. and supt.; O. E. Lietzow, sec.-treas., also directors with A. A. Hoeft and R. Muehlmann.

Inc. July 5, 1916, in Arizona. **Cap.,** originally $100,000; shares 10c par; nonassessable, increased to $1,000,000, April, 1918; shares, $1 par; 560,000 issued.

Property: 142 claims, 2,840 acres, in San Bernardino county, Cal. Gold-silver-copper ore occurs in granite schist.

Development: reported to depth of 360′, by tunnels and shaft.

Company also owns the Gold Star group of claims, 5 miles distant.

MOJAVE ANNEX TUNGSTEN MINING CO. **CALIFORNIA**

Office: 411-12 I. W. Hellman Bldg., Los Angeles, Cal.

Officers: J. B. Evans, pres.; H. G. Parsons, sec.-treas.; with C. M. Dunwoody, directors; P. H. O'Connor, supt.

Inc. Sept 26, 1916. in Nevada. **Cap.,** $250,000; shares $1 par.

Property: about 140 acres in the Clark Mountain district, San Bernardino county, Calif., 12 miles from Roach, Nev., on the Salt Lake Route.

Claims are adjacent to the Mojave Tungsten Co. Wolfram veins said to carry 5% tungstic trioxide (WO_3).

Equipment: includes 20-ton mill.

MOJAVE TUNGSTEN CO. **CALIFORNIA**

Office: 74 Broadway, New York.

Officers: G. F. Stringer, pres.; J. T. Smith, v. p.; M. A. Fitch, sec.; J. T. Anyon, treas., with W. W. Cohen, and A. H. Carlisle, directors. F. S. Naething, supt., in California; N. H. Brown, supt. in Colorado.

Inc. Nov. 23, 1915, in Del. **Cap.**, $1,000,000; par value $2; non-assessable; all outstanding. Traded on New York and Boston Curbs. Transfer offices: The Corporation Trust Co., Jersey City; American Trust Co., Boston. Registrars: Empire Trust Co., New York; State Street Trust Co., Boston.

Statement issued Aug. 31, 1916 showed a profit of $34,888 for 8 months.

Property: (California) 32 unpatented claims in the Clarke mining district, San Bernardino county, Calif., 20 miles from Jean, Nev., the shipping point. Tungsten occurs chiefly as wolframite in a quartz vein in gneissoid granite. The vein is practically vertical with N. W.-S. E. course.

Development: by 2 main and 5 prospecting shafts, disclosing numerous small bodies of high grade wolframite ore. The longest oreshoot so far encountered was about 125′ long on the 100′ level in No. 1 shaft.

Colorado Property: the Bracken group of 6 patented claims, at Boulder Falls, Boulder, Colo., containing the well-known Good Friday vein with the usual ferberite ore.

Development: by 3 shafts, the Burdette main shaft 350′ deep, connecting with No. 1 tunnel. There are 3 tunnels in the face of the mountain. Ore in No. 2 has been continuous for a distance of nearly 1,000′. On January 1, 1917, the consulting engineer estimated ore containing 330,000 lbs. of tungstic acid opened up.

Equipment: includes a small mill on the California property. At the Colorado property the Degge-Clarke mill was acquired in May, 1917; this was the leading custom mill of the district with a capacity of 1,000 tons of tungsten ore monthly.

The Colorado property of its subsidiary the Mohave Boulder Tungsten Mining Co., was sold at public auction, June 28, 1918.

In June, 1919, a suit was filed by one of the shareholders against the promoters of the stock, claiming that $2,000,000 should be put into the treasury of the company by the defendants. The complaint alleges that about three-fourths of the entire stock of the company was issued to the promoters as "promotion stock" at the time of its organization in 1915, and that they listed it on the New York and Boston Curbs, boosting it as high as $7.50, also that when the promotion stock was disposed of the brokers withdrew their support and the price dropped to 4 cts. a share.

A "war baby," the result of the boom in tungsten mining.

MONTEZUMA MINING & REDUCTION CORP. **CALIFORNIA**

Address: F. W. Nash, 752 State St., San Diego, Cal.

Officers: F. G. Webb, pres.; F. E. Wallace and F. W. Nash, v. p.'s.; R. H. Halstead, sec.; W. C. Harlow, treas.; also directors.

Inc. 1917, in Delaware. **Cap.**, $1,000,000; shares $1 par, fully paid and issued.

Property: 13 claims, 260 acres, in Grapevine district, Hot Springs mountain, San Diego county, Calif. Said to show a vein in granite, carrying gold values.

Development: by about 5,000′ of workings to depth of 200′.

Equipment: includes 40 h. p. hoist, 120 h. p. compressor and 100-ton mill.

MORNING STAR MINE **CALIFORNIA**

Owned by Curtz Consolidated Mines Co.

MOUNT GAINES GOLD MINING CO. **CALIFORNIA**

Address: Hornitos, Mariposa county, Cal. Said to be financed by Los Angeles and Chicago capital.

Officers: Wm. B. Davidson, pres.; A. L. Irish, v. p.; D. J. Hoge, sec.-treas.; with A. E. Rutherford and P. B. Ellis, directors; W. J. McCray, mgr.

Cap., $150,000; shares 10c par. The new company has paid for the mine partly in stock and given a first mortgage trust deed for $66,000.

Property: 200 acres patented and 300 acres unpatented land in sec. 35, T. 4 S., R. 16 E., 4½ miles E. of Hornitos, on the west vein of the Mother Lode, said to show gold ore.

Development: by 1,350′ incline shaft with 11 levels and about 8,000′ of workings. At present the mine is full of water, but old records are said to show a 5′ vein assaying $7 per ton.

Equipment: includes electric hoist, air compressor and 20-stamp mill with amalgamation and concentration tables. Electric power is obtained from the San Joaquin Power & Light Co.

Mine has been idle from 1910, until new company came into possession on May 10, 1916. Reported to have added a 100-h. p. electric hoist and overhauled the mill, preparatory to starting operations.

MOUNTAIN COPPER CO., LTD. **CALIFORNIA**

Secretary's address: 3 Lombard St., London, E. C., England. Operating office: 332 Pine St., San Francisco, Calif. **Mine office:** Keswick, Shasta county, Calif. **Works office:** Martinez, Contra Costa county, Calif.

Directors: Major F. B. Lawson, chairman; Henry J. Wenham, J. T. Middleton, E. T. McCarthy and A. N. Frewer; Wm. F. Kett, gen. mgr.; M. J. Murphy, mine supt.; T. B. Swift, smelter supt.; Jardine, Matheson & Co., Ltd., 25 Madison Ave., New York, American sales agents.

Inc. Dec. 1, 1896, in Great Britain, and reorganized May 10, 1902. **Cap.,** £250,000; shares £1 par. In 1899 the company changed its capitalization to £250,000 in shares and £1,000,000 in 6% in debenture stock; shares £4 par, on which a first payment of £1 per share was made Jan. 16, 1905, leaving £750,000 of stock outstanding. The change in 1899 was practically a complete amortization. A further refund of 10s per share was made in 1918, leaving the outstanding, as at Jan. 1, 1919, £625,000.

Dividends: before reconstruction, 1897-1901, aggregated 58½%. No more are to be paid until debentures are paid off.

Profits were £150,255 in 1907; £28,115 in 1908; £24,557 in 1909; a deficit of £3,042 in 1910; profit of £55,069 in 1911; £81,686 in 1912; £53,456 in 1913; £35,562 in 1914; £106,365 in 1915; £232,106 in 1916; £114,674 in 1917.

Property: is extensive, including the Iron Mountain and Hornet mines, 10 miles N. W. of Redding. The Iron Mountain mine was opened, 1880, for silver, and had a 20-stamp mill, treating the gossan in a small way for some years after 1884.

The Iron Mountain mine had a gossan of 100′ to 300′ width, covering a lens of ore, 100′ to 400′ wide, 800′ long and 500′ deep, in a shear zone of meta-rhyolite. The ore carries chalcopyrite associated with pyrite, averaging about 5% copper, 2 oz. silver and slightly under $1 gold per ton. The orebody was worked pillar-and-stall, and stopes filled with waste, but pillars have been robbed and the mine now shows little high-grade suphide ore. The old orebody being pyrite, there was trouble from fires, but the application of the plenum system of ventilation, by Mr. Wright, restored normal conditions. Considerable cement copper was secured from the charged waters coming from the fire zone.

Ore reserves in No. 8 mine at end of 1918 were 300,000 tons.

The Hornet mine, lying to the north of the Iron Mountain, developed about 5,000,000 tons of pyrite ore, averaging only about 1% in copper tenor, with patches up to 2.5% copper, and carrying 47 to 50% sulphur. Gold and silver contents are very small, but the ore is valuable for the manufacture of sulphuric acid, saving the copper and precious metals as by-products. A large quantity of this ore is sold around San Francisco Bay, and a description of the crushing and screening plant that prepares the pyrite for market will be found in the Mining and Scientific Press of Nov. 1, 1919, by L. C. White.

The mines are connected with Keswick by an 11-mile narrow-gauge steam railway, traversing a rugged country, with an average grade of nearly 4%, the elevation gained being 2,000'.

Since Sept., 1917, company has been treating an average of 500 tons daily in its flotation mill. Including mill concentrates, pyrites from the Hornet mines and other ores, about 20,000 tons a month are shipped from the mines to the Martinez smelter.

Employs about 500 men in Shasta county, and 200 at the smelter in Contra Costa county.

The Keswick smelter, fully described in Vol. VIII, Copper Handbook, has been dismantled. The 250-ton oil flotation mill started operating in March, 1915, and was enlarged to 550-ton capacity in 1917. It is located 5 miles from Iron Mountain on the narrow-gauge railway. A complete description is in the Mining and Scientific Press of Sept. 6, 1919.

The 350-ton Martinez smelter, on San Francisco bay, has extensive acid works built at a cost of approximately $1,250,000. The Hornet ores., low in copper but rich in sulphur, are burned, the sulphur fumes collected in lead-lined chambers and transformed into sulphuric acid by the Meyer chamber process, the cinder remaining after the roasting is smelted for its copper contents. The acid is sold crude and also is used as the basis of commercial fertilizers for which there is a considerable demand in the rich fruit and agricultural districts of California and the other Pacific coast states. The Martinez works also do a general custom business and are fully equipped with steam, electric and pneumatic power.

A 150-ton leaching plant was added to the smelter in 1917, and is successfully extracting copper from the cinders remaining after the sulphur is burned from the Hornet sulphide in the manufacture of sulphuric acid.

Production: Jan., 1919, was at the rate of 650 tons daily from the mines at Iron Mountain, and 500 tons daily from the Hornet. At one time, only a decade ago, this company was among the largest copper producers of the world, but has since greatly declined in output, production having been 29,727,040 lb. fine copper in 1901; 19,116,160 lb. in 1903; 6,814,000 lb. in 1907; 3,638,619 lb. in 1908; 2,775,197 lb. in 1909; 2,987,815 lb. in 1910; 5,400,000 lb. in 1911; 5,614,000 lb. in 1912; 6,890,000 lb. in 1913; 5,454,000 lb. in 1914; 7,280,712 lb. in 1915; 9,172,390 lb. in 1916; 8,122,325 lb. in 1917, and 6,802,612 lb. in 1918. In Aug., 1919, the company stood at the head of Shasta county copper producers as the result of increased output and idleness of the Kennett smelter of the Mammoth Copper Co.

Company has been managed with great prudence and marked success, both financially and technically and notwithstanding the depletion of an originally rich mine, has been able to make a success by the treatment of low-grade pyrite ores, with the manufacture of acid.

MOUNTAIN KING MINING CO. CALIFORNIA

Office: 244 Kearny St., San Francisco.

Officers: Anthony McMillan, pres. and managing director; A. T. Dunbar, v. p.; J. C. Fitzsimmons, v. p.; Jas. S. Spilman, sec.-treas.; with H. T. Harper, R. W. VanNorden, C. G. Campbell, and John Watt, directors. Arthur Hillier, supt., Mountain King, Mariposa county, Cal.

Cap., $600,000; $1 par; assessable, 598,340 issued. Annual report for year ending March 31, 1919, shows total receipts of $145,267 of which amount $123,764 was from bullion. Disbursements were $126,638, leaving a cash balance of $18,629. Initial dividend of $17,950 paid May 31, 1916, equal to 3c per share.

Property: 19 claims, patented, on the north fork of the Merced river on the Yosemite Valley R. R., in Coulterville, Mariposa county.

Geology: the Mountain King quartz vein is in slate and greenstone, and carries gold and silver in iron pyrite and tetrahedrite.

Development: by 450' shaft sunk at 55° incline; also 2,645' tunnel, which

is the 1,000′ level. The 1,700′ level is being developed and company intends sinking to 2,000′ level.

In 1918, mining operations were mainly on the 1,100, 1,200 and 1,400′ levels; most of the ore coming from the 1,400′ level. It has been found that the values in the ore are not evenly distributed, that there exist zones of enrichment which alternate with areas of lower gold content, that there is a general improvement as depth is gained. New work for the year totaled 1,671′.

Equipment: includes air-compressor, hydro-electric plant, built in 1915, and a 30-ton stamp mill with concentrator. Power plant has one 350-kva. 3-phase, 4,000-volt generator direct connected to a turbine running at 600 r. p. m. Underground haulage is by electric trolley locomotive.

Production: Years ending March 31:

	Tons Ore Milled	Value per ton	Recovered Amal.	Conc.	Total	Cost per Ton Op't'g.	M'l'g.
1919.....	23,648	$5.63	78.9%	13.1%	92.0%	$5.168	$0.488
1918.....	15,940	4.59	64.5	26.6	91.1	5.538	0.462
1917.....	13,186	3.09	53.2	35.1	83.3	3.646	0.331

Company is operating a mine with good equipment and capable management.

MOUNTAIN MONARCH GOLD MINING CO. CALIFORNIA

Probably dead. A Shasta county promotion. See Vol. XII.

MOUNTAINEER MINES CONSOLIDATED CALIFORNIA

Address: F. J. J. Sloat, 240 N. 7th St., Hamilton, Ohio.

Officers: Fred Searles, pres.; Carrol Searles, sec.; F. J. J. Sloat, treas.; with Herman Brand, Ed. Schmidt and Peter Bender, directors.

Cap., $1,000,000; shares $13 par. Capital reduced from $3,750,000, and organization not completed since.

Property: 15 claims, 3 patented, next to the Champion mine, in Nevada City district, Nevada county, Calif. Claims contain a gold vein in granodiorite, with ore averaging $11 per ton.

Development: by 1,200′ incline shaft and 2,000′ tunnel with total workings of 10,000′ to depth of 1,200′. Ore reserves estimated, but not blocked out, at 125,000 tons. Mine worked by lessees at last accounts.

In Aug., 1919, Peter Bender of San Jose, Calif., who had loaned the company large sums of money, and held a mortgage on the mine, bid in the property for $151,475. Mine has had a checkered career as a gold producer.

NAPOLEON MINING CO. CALIFORNIA

Address: L. D. Adams. Milton, Calaveras county, Cal. D. E. Coughanour, supt.

Property: the Napoleon copper mine, 10 miles S. W. of Copperopolis, held under 10-year lease by the above. The ore is mainly chalcopyrite, occurring in lens shaped masses up to 20′ in width.

Development: 500′ shaft which is only unwatered to 200′.

Equipment: in 1918 a new hoist was added, also 2 Diesel engines to drive an Allis-Chambers ball-mill, and an M. S. flotation unit, planned to treat 90 tons ore daily.

The mine was operated as early as 1881, and is credited with a past production of $1,200,000 in copper and gold.

NASSAU COPPER CO. CALIFORNIA

Mail returned from 339 Bush St., San Francisco, A caretaker is at the Nassau mine, via Angels, Calif.

Property: 2 patented claims, 40 acres, and 1,560 acres of agricultural lands, 4 miles north of Copperopolis, Calaveras county, Calif., covering a length of 15,840′ on the lode. Ore occurs in lenses and streaks as copper sulphides, pyrite, gold, silver and zinc in a 10′ vein running N. 35° W. and dipping 65° N. E.

Development: by 280′ shaft with 1,000′ of drifting N. and S. on the 95′ level and 1,100′ of drifting N. and S. on the 200′ level. Ore was shipped

to the Selby smelter from Angels, 9 miles distant. Shipments averaged 17.90% zinc, 5.22% copper, 4.60 oz. silver, 0.20 oz. gold, 11.90% iron, 39% silica.

The complex character of the ore and consequent low returns, coupled with litigation have led to a shut-down, and the mine is closed, save for keeping water down. The mine-water is run through troughs containing scrap iron to recover copper-content. Property is reported to have possibilities.

NATIONAL GOLD MINES **CALIFORNIA**

Address: Jesse Mangante and William Trenton, Sonora, Cal.

Property: the National quartz mine near Priest station, Tuolumne county, opened by a tunnel and shaft. A hoist, 10-stamp mill, and other equipment were to be erected late in 1919.

NATIVE COPPER MINING CO. **CALIFORNIA**

Inc. in 1911, to develop the Copper King, Native Copper and other claims on Table mountain, Monterey county, Calif. W. H. Kerr, Coalinga, Calif., pres., at last report.

NATOMAS COMPANY OF CALIFORNIA **CALIFORNIA**

Officers: P. C. Knapp, sec., 310 Sansome St., San Francisco; L. D. Hopfield in charge of dredges at Natoma.

Officers: F. B. Anderson, pres.; Louis Sloss, v. p.; John D. McKee, treas., with P. T. Morgan, J. D. McKee, Leon Schloss, W. M. Newhall, G. E. Webber, H. Fleishhacker, F. W. Griffin, all of San Francisco, and F. W. Kiesel, of Sacramento, directors. Emery Oliver, gen. mgr.

Inc. Dec. 24, 1914, in California. **Cap.,** $25,000,000; shares $100 par; non-assessable; $16,104,000 issued. Bonds authorized: $16,500,000; $10,282,665 issued.

Balance sheet for 1918 shows gross earnings of $2,008,966, and net earnings of $749,119 compared with 1917 figures of $2,303,000 and $1,099,309 respectively. Properties are valued at $16,061,896.

The financial statement: To present briefly the operations for 1918 is impossible, owing to the complexities of the land business, but the following gives an idea of the position; the report being mainly a restrospect or summary of operations since the reorganization:

Indebtedness at end of 1914, exclusive of bonds, interest, and stock of Natomas Consolidated	$3,698,751
Indebtedness at end of 1918	460,943
Mortgage and bonded debt	10,869,485
Current liabilities	200,943
Capital assets	16,061,896
Securities at end of 1918	1,074,244
Current assets ($367,315 cash)	1,439,735
Total of last two items	$2,533,979

Company is a reconstruction of Natomas Consolidated of California, whose history is long and complicated. Past troubles have been due to incorrect estimates of value and amounts of dredging ground, the land reclamation project, and because the large profits of dredges were largely absorbed by bond interest. These burdens are gradually being lifted by a careful management.

Property: over 15,000 acres of mining lands, near Folsom, Sacramento county, and near Oroville, Butte county, Calif.; and about 70,000 acres of farm lands in Sacramento county.

Equipment: includes 10 large, modern, electrically-driven dredges, and 2 large rock crushing plants. Improvements in machinery and gold-saving apparatus are continually being made, also in leaving the dredged ground suitable for agriculture.

Production: during 1918 the boats dug 24,172,626 cu. yd., recovering gold worth $2,008,966, of which $746,119 was profit. In five years the total recovery was $11,517,170, giving a profit of $5,669,061. All of the dredging

profits are absorbed in paying bond interest. In 1915 it was estimated that there was 216,000,000 cu. yd. of pay-gravel, but additions have been made, so that after 128,000,000 yd. of the original area have been dredged, there are 182,220,000 yd. still available, plus 40,000,000 yd. if pre-war costs prevail before this ground is reached. The apparatus placed on the boats to save fine gold has recovered $107,000 net, most of which would have been lost under previous methods. Four boats must be reconstructed during the next five years so as to complete the dredging operations.

Rock Crushing: in five years, the plant at Fair Oaks produced 1,733,944 tons of crushed rock, 198,944 tons of washed gravel, and 275,724 tons of screened gravel; and the plant at Oroville 451,364 tons of crushed rock, and 458,016 tons of screened gravel. The crusher products and field gravel are sold throughout the State.

Land Department: reclamation work has cost $4,480,500 to date, inclusive of accrued interest, etc. In district No. 1000, there have been sold 10,147 acres for $2,889,446; and in No. 1001, 1292 acres for $343,537. All of these properties are being irrigated, provided with roads, and generally prepared for sale.

If Natomas were operating its dredges alone, good dividends could be paid; but until the land project is self-sustaining there can be no distribution of profits. See Addenda for later information.

NEW ALMADEN CO., INC. CALIFORNIA

Is the operating subsidiary of the Quicksilver Investment Co., Inc., which has 25-year lease on the entire holdings of the Quicksilver mining Co., including the New Almaden mines.

Is no longer working the New Almaden mine, save to clean up old workings, but is mining quicksilver ore from the Senator mine, nearby—See Quicksilver Mining Co. for owners of property, for discription.

NEW GUADALUPE MINING CO. CALIFORNIA

H. C. Davey, pres.; R. F. D. No. 5, Los Gatos, Calif. John L. Stubbs, v. p.

Property: 2,500 acres including the Guadalupe quicksilver mine, 10 miles S. of San Jose, was discovered in the early 50's. Operated at one time under name of Century Mining Co.

Development: 700′ incline shaft, tunnels, and many miles of workings. A concrete flume, 740′ long, 55′ wide, 9′ high was built in 1917 to carry the stream over old mine beneath, so that the old 625′ vertical shaft could be unwatered.

Equipment: includes electric hoists, air-compressors, and a reduction plant with two 18-ton coarse-ore furnaces, and two 30-ton fine-ore furnaces, also a 50-ton concentrating plant to handle material from old mine dumps. In 1917 company employed 75 men.

Production: total recorded output to 1919 about 106,772 flasks of quicksilver; in 1918 the yield was close to 1,000, but in 1919 only 200 flasks.

See Quicksilver Resources of California. Bull. 78, p. 158, published by Cal. State Mng. Bureau.

NEW IDRIA QUICKSILVER MINING CO. CALIFORNIA

Office: 70 Kilby St., Boston, Mass.

Officers: Andrew Adie, pres.; H. C. Buckminster, sec.-treas., and gen. mgr.; with R. B. Sterns, F. Rothschild, Sydney Harwood, C. B. Wiggin, J. E. Simpson, and Jas. D. Colt, directors; H. W. Gould, mgr.

Inc. 1896 in Wyoming. **Cap.,** $500,000; shares $5 par; all issued. Stock listed on Boston Stock Exchange. State Street Trust Co., transfer agents, American Trust Co., Boston, registrar. Annual meeting, third Wednesday in January, at Cheyenne, Wyo. Company has been a dividend payer since 1897, with total disbursements to date of $24.30 per share, or $2,430,000.

Comparative Balance Sheet:

Assets:

	Plant	Deprec.	Supplies	Cash	Quicksilver
1918	$704,877	.....	.....	$17,869	$305,984
1917	571,085	.....	.....	33,311	234,001
1916	186,471	$302,718	$55,737	9,575	200,000
1915	234,979	254,209	19,482	24,448	98,850
1914	258,170	231,019	20,651	6,823	73,200

Liabilities:

	Capital Stock	Accts. and Notes Payable	Profit and Loss	Sell. Agents	Tax Reserve	Dep. Reserve	Total
1918	$500,000	$157,203	.....	.....	$60,991	$3,930,755	$4,729,460
1917	500,000	237,713	.....	.....	99,481	3,823,814	4,580,499
1916	500,000	37,284	$118,128	$99,089	.....	.....	754,501
1915	500,000	33,078	98,892	.....	.....	.....	631,970
1914	500,000	.....	89,863	.....	.....	.....	589,863

Income in 1918 was $1,311,394 from quicksilver sold. Operating expenses, depreciation, and depletion totaled $1,101,205. In 1917, paid four dividends, totalling $3; in 1918, four of 50c each; Jan. 1, 1919, 25c was paid, and the next one, due April 1, was passed.

Property: the new Idria and San Carlos mines at Idria, San Benito county, Calif.

Operating results:	Flasks Quicksilver	Net Earnings	Cost per Flask	Average Price
1918	10,700	$167,540	.....	.....
1917	11,000	207,762	.....	†$105.00
1916	10,828	419,236	$47.50*	89.57
1915	6,250	159,028	55.50	74.21
1914	6,550	Loss 45,010	52.	48.31
1913	9,700	65,012	30.	39.54
1912	9,600	73,763	31.60	42.46
1911	9,750	136,809	26.50	46.54
1910	10,800	186,939	26.	47.06
1909	8,900	109,639	27.50	46.30
1908	9,600	147,289	25.50	44.84
1907	7,675	89,650	25.50	41.50

* Includes cost of erecting new mill and aerial-tram, $70,000, or about $6.40 per flask. †On government requisitions; average price in open market was about $125.

A large amount of construction work was done in 1918; 5 rotary-kiln furnaces were added with total roasting capacity of 400 to 500 tons per day. This was done upon practical request of War Industries Board which stated that 1919 requirements would be largely in excess of those for 1918. In spring of 1919 mines were idle for several months, but reopened in June.

The management at New Idria is progressive, and leads in metallurgy of quicksilver.

NEW PROVIDENCE GOLD MINING CO. CALIFORNIA

Office: 2041 Emerson St., Berkeley, Cal. John D. Hammond, sec.

Property: 5 claims, 90 acres, including the Providence and Consuelo, about 2½ miles S. E. of Tuolumne county, Calif., said to show 2 parallel veins, 5′ wide, in black Calaveras slate, running N. 8° E., with dip 45° E. Ore is gold with galena and 2% pyrite.

Development: by 1,300′ shaft with levels every 100′.

Equipment: includes 10-stamp mill. Product is a gold-silver concentrate said to run better than $90 per ton. About 12 men used to be employed. No recent returns.

NORTH FORK MINING CO. **CALIFORNIA**

Office: 57 Post St., San Francisco, Cal. **Mine office:** Forest, Sierra county, Calif.

Officers: Lewis Tasheira, pres.; W. C. Wallace, sec.; Geo. F. Stone, supt.

Property: the North Fork mine and adjoining properties, in Alleghany district, near Forest, shows a quartz vein 4′ to 20′ wide with occasional lenses of ore containing arsenical sulphides and free gold.

Development: 700′ tunnel and 300′ incline shaft, lowest workings 265′ below surface.

NORTH STAR MINES CO. **CALIFORNIA**

Offices: 22 William St., New York; 15 Exchange Place, Jersey City, N. J.; Grass Valley, Calif.

Officers: Geo. B. Agnew, pres.; Sidney M. Colgate, v. p.; with C. E. Dodge, Walter Douglas, and Ernest Howe, directors; W. D. Pagan, sec.-treas.; A. B. Foote, gen. supt.

Inc. April 10, 1899, in New Jersey. **Cap.,** $5,000,000; shares $10 par; $2,500,000 outstanding. Stock is listed on Boston Exchange. New York office and Old Colony Trust Co., Boston, transfer agents. Central Trust Co., New York, registrar. Annual meeting, 2nd Wednesday in April.

Income account for 1918, exclusive of balance of $989,408 carried forward shows; total production North Star mine, $775,688; production Champion mines, $271,108; interest and dividends, $36,331; total, $1,083,128.

Expenditures: total operating expenses, $1,021,888; dividends absorbed $100,000; improvement and property purchase, $32,759; total $1,121,888.

Balance sheet:

Assets:	Property	Plant and Improvm'ts.	Current	Deficit	Total
1918.....	$941,955	$369,974	$950,648	$187,423	$2,450,000

Liabilities:	Stock Capital	(Distribution of Capital Assets) Less Div. 55	Total
1918.....	$2,500,000	$50,000	$2,450,000

Dividends: 2% in 1899; 5% in 1903; 6% in 1904; 8% in 1905; 10% in 1906 and 1907; 15% in 1908; 23% in 1909 and 1910; 17% in 1911; 12% in 1912 and 1913; 18% in 1914; 10% in 1915; 12% in 1916; 10% in 1917; 4% in 1918. One of 50c was paid in 1919. Total dividends, to date, $5,562,040.

Property: the North Star mine, 1½ miles S. of Grass Valley, and the Champion mine, at Nevada City, Nevada county, Calif.

The North Star, the main producer of the group, was discovered 1851 and operated continuously to date, with exception of 10 years, 1874-1884, first by the original locators and later by the North Star Quartz, the North Star Gold Mining Co., and the North Star Mining Co. It is the second largest gold producer in the State.

Geology: ore carries gold and silver in a quartz gangue, the precious metals occurring free or associated with pyrite, galena, and sphalerite. The veins have a maximum width of 5′, with ore shoots averaging 400′ to 600′ long and proved for over 2,000′ in depth.

Development: at the North Star mine, most of the ore in 1918 came from the 3,400, 4,000, 4,400, 4,700 and 5,000 ft. levels. Conditions are favorable on 6,300 ft. level where X vein has been opened for 1,000′. The mill treated 99,550 tons of $7.79 ore from this mine with an extraction of 94%; costs per ton ore mined and milled, $7.29. The prospects for developing additional resources in the North Star mine are considered favorable, on and above the 4,000′ level, and on the 6,300′ level.

The Champion mine produced 41,300 tons of $6.56 ore, mainly from the 2,400 to 2,700′ levels of the Providence mine and for the first time showed a small profit of $8,000. This mine has thus far been disappointing and it is said the outlook is not encouraging.

Milling plants: company now operates 2 mills, sixty 1,500-lb. stamps for the North Star mine, and forty 1,000-lb. stamps for the Champion. Ore is hoisted at the Central shaft of the North Star mine in 4-ton skips, dumping into bins over 1½" grizzlies. The coarse from the grizzlies goes into a bin separate from the fines and thence over two sorting tables to two 14x14" Wheeling crushers. As it passes over the sorting tables it is washed and the waste sorted by hand; 7 men picking out 70 tons of waste a day. Bins at shaft have capacity of 500 tons of ore and 100 tons of waste. Ore is hauled to mill in 2½-ton side dump cars by 5½-ton electric locomotive. Mill bins have a capacity of 1,000 tons. Each ten stamps in mill are belted to a 35-h. p. back-geared motor. Pulp flows over twelve 3'x16' copper plates, thence to 7 Richards pulsator classifiers and three 5' cones. Overflow (slime) to cyanide; underflow to 7 double-deck Deister concentrators. Middlings from concentrators to single-deck concentrator, concentrates to 5'x10' tube-mill, tailings to twelve 100-ton leaching vats for cyanidation. Ground concentrates from tube-mill over amalgamated plate to thickeners to 3 Devereaux agitators, slime overflows from classifiers to Dorr thickeners, thence to Pachuca agitators and Oliver filters. Concentrate tailings after treatment in Devereaux agitators are added to slime. Merrill presses used for precipitation.

Production: total to the end of 1918 was 1,898,584 tons, averaging $11.47 per ton, yielding $21,780,034. In 1918 the yield was 99,550 tons of $7.79 ore from the North Star, and 41,300 tons of $6.56 from the Champion. Costs were $7.29 per ton, compared with $5.20 in 1913. The average cost since 1884 was $7.77 per ton.

NYMAN CONSOLIDATED MINES CO. CALIFORNIA

Office: 502 Humboldt Bank Bldg., San Francisco, Cal. **Mine office:** Stent, Tuolumne county, Calif.

Officers: A. L. Trowbridge, pres.; R. W. Barrett, v. p.; W. C. Graban, sec.-treas.; with C. P. Cutten and F. G. Mudgett, directors; Fay Chadbourne, supt.

Inc. March 19, 1915, in California. **Cap.,** $200,000; $1 par; assessable; 161,586 shares issued.

Gross earnings from July, 1915, to March, 1917, were $51,086, and cost of operation and maintenance, $53,614. Cash assets at end of April, 1917, were $8,791.

Property: 5 patented claims, 240 acres, on the Mother Lode, between Quartz and Stent, 2 miles S. of Jamestown, adjoining the Dutch-App on north and Cloudman-Jumper group on the south.

Geology: claims show a contact zone between amphibolite schist and greenstone. Three vein systems have been opened. The West or App is 20 to 90' wide, showing at N. end of Nyman claim; the Heslop or Middle is 50' long, with $5 to $10 ore across 7'; the Knox & Boyle shows 2' to 8' of higher grade ore on the 700' and 800' levels. The Mascot shows shoots of high grade ore in Calaveras slate hanging wall.

Production: in 20 months ended March 31, 1917, 8,550 tons yielded $51,000 of gold. Mill recovery was 85 to 90% by amalgamation and concentration. Output to date is $2,000,000. Costs with full equipment are estimated at between $2.50 and $3 per ton.

Development: by 15,000' of underground workings, consisting of 700' tunnel, 850' vertical shaft and 2 incline shafts, one 825' and the other 810' deep, both dipping 60° E., with levels 100' and 200' apart. Drifts have been started on $6 ore N. and S. of old crosscuts that apparently had not been sampled years ago.

Equipment: includes 2,000' double-drum hoist, 750 cu. ft. air compressor, pumps, electric power; 200-ton 40-stamp mill, with Frue vanners for 20 stamps and 22 buildings. No recent information.

OCEANIC QUICKSILVER MINE CALIFORNIA

Murray Innes, owner, 217 Kohl Bldg., San Francisco, Cal. E. W.

Carson, mgr., Cambria, San Luis Obispo county, Calif.; Thos. Knowles, supt.

Property: 3 patented claims, 500 acres, about 5 miles E. of Cambria, shows a contact deposit 800′x650′x20′ in width running N. W., with nearly vertical dip, in serpentine and sandstone formation. The ore contains cinnabar and iron sulphide, assaying 0.4% quicksilver.

Development: to depth of 650′ by 300′ vertical winze and 1,500′ tunnel. Underground workings total 5,000′.

Ore reserves: estimated by owner at 300,000 tons with 150,000 tons blocked out, July 1, 1917.

Equipment: includes 25 h. p. hoist, compressor, pump, ½-mile wire tramway and two 50-ton furnaces.

Recent production: 1,125 flasks in 1913; 1,256 flasks in 1914; 1,213 flasks in 1915; 1,070 flasks in 1916; June-July, 1917, at rate of 150 flasks monthly. In 1918, 1,650 flasks were sold for $100 per flask.

OLD COWBOY MINING CO. **CALIFORNIA**

Address: Dr. C. H. Bryson, pres., Los Angeles. Theodore Martin, sec., Security Bldg., Los Angeles, Calif.

Company is a close corporation owning the Cowboy mine near Caliente, Kern county. Mine worked 1919 under bond and lease by Walter X. Osborne, employing 6 men. A 5-ton cyanide plant is in operation and ore shipments are also made. Ore is said to assay about 140 oz. silver, and $12 gold per ton. There is said to be a considerable tonnage of 20 oz. silver ore.

OLD EUREKA MINING CO. **CALIFORNIA**

Office: 42 Broadway, New York City. Mine at Sutter Creek, Amador county, Calif.

Officers: Wm. D. Thornton, New York, pres.; G. E. Tener, Pittsburgh, v. p.; J. D. Clarke, sec.-treas; T. C. Gorrie, gen. mgr.

Inc. 1916, in Delaware. **Cap.,** $3,000,000; shares $10 par; 100,000 issued,

Property: originally owned by Hetty Green, was purchased in 1916 from the Amador Cons. Mng. Co. Is credited with past production of $20,000,000. Main shaft has a depth of 2,063′. In February, 1916, large trees were growing out of the shaft, and water was flowing from the collar.

For history of the property, see Mining and Scientific Press, Vol. 112, No. 26. The vein runs N. W., dips 71° E. and has a 700′ ore shoot.

Property was unwatered in 1917, after a shut-down of over 40 years. The 2,190′ shaft was enlarged from a one to 3-compartment shaft below the 1,600′ level down, and sunk 1,000′ deeper, with a station cut on 3,000′ level. Large quantities of low-grade ore have been found in the 1,200, 1,600 and 2,100′ levels. In November, 1919, a contract was let to sink 550′ below the 3,000′ level at $29 per foot. Prospecting continues at 2,100 and 3,000′ depth.

Equipment: modern sinking pumps, 300-h. p. electric hoist, Ingersoll compressor, and necessary buildings.

This is a genuine and expensive project to reopen an old gold producer, the owners relying on the continuity of the Mother Lode ore-channels, and the economical conditions afforded by power, water and climate in handling them. The old Plymouth proved highly profitable, so probably will the Old Eureka.

ORD COPPER MINE **CALIFORNIA**

Property, in San Bernardino county, 12 miles south of Daggett, shows a series of wide veins, said to be traceable 3 miles across country, with widths in places of 50′ of 2 to 3% copper ore and good gold values. Gangue is heavy in barite, making gravity concentration impossible. New York capitalists are said to have taken over the property on a development basis, no payments for a year, but doing 300 shifts of work per month in 1919.

ORIENTAL GOLD MINING CO. **CALIFORNIA**

Address: New York Office, 734 Fifth Ave. **Mine office:** Alleghany, Sierra county, Calif.

Property: the Oriental mine, on Kanaka creek, about 1½ miles W. of Alleghany, has 2 quartz veins in granite and schist, with strike N. 70° W., and dip 35° N. The ore contains pyrite, arsenopyrite and gold.

Development: by tunnel 4,150′ long and several crosscuts.

Equipment: includes 10-stamp mill with two 6′ Frue vanners. Property was idle for several years, but lease was acquired by the Croesus Gold M. & M. Co. several years ago and some development work was done. The lease has since been cancelled and property closed down.

ORIGINAL AMADOR CONSOLIDATED MINES CO. CALIFORNIA

Company dissolved: described in Vol. XIII. See also Amador Mines Company.

ORIGINAL MINING & MILLING CO. CALIFORNIA

Office: Merced, Merced county, Calif.

Property: the Original Quartz mine, 4 unpatented claims, in Mariposa county, in Sec. 21, T. 3 S., R. 19 E., said to carry a 2′ vein, with slate hanging and footwall.

Development: by 800′ shaft and several thousand feet of workings.

Equipment: includes compressor, electric hoist, machine-drills, 10-stamp mill and several buildings. Employed 40 men in 1917, and was working continuously in 1919.

ORO BELLE CONS. MINES CO. CALIFORNIA

Address: W. B. Andrews, 402 Palladio Bldg., Duluth, Minn.

Officers: W. B. Andrews, pres.-treas.-mgr.; C. Wilson, sec.; with Thos. A. Merritt and Stella Andrews, directors.

Inc. 1916, in Nevada. **Cap.,** $1,250,000; $1 par; 625,000 issued; 500,000 reported to have been given for the property, 1,000 shares issued to directors and incorporators and balance under option until Oct., 1918, to John Hays Hammond and associates, of New York.

Property: the Oro Belle mine and millsite, in Hart mining district, San Bernardino county, Cal., about 14 miles W. of Searchlight, Nev. **Ore:** mainly gold, occurs in two veins. On the 700′ level the vein is said to be 6′ wide and to carry 4′ of ore averaging $8 per ton. The Woodward lode was cut on the 100′ level, showing a width of 125′ and giving assays of from $5 to $20.

Development: by 814′ vertical main working shaft with levels at every 100′, a total of 2,700′ of lateral work.

In 1915, the Oro Belle was under lease to the Tonopah Belmont Development Co., but option was relinquished within the year; mine idle at present.

ORO BELLE MINES CO. CALIFORNIA

Reorganized, 1917, as Oro Belle Cons. Mines Co., which see. Stock exchangeable on basis of 2 old shares for 1 of the new.

ORO FINO MINING CO. CALIFORNIA

Address: East Auburn, Cal.

Officers: Wm. L. Curtis, pres.; Geo. H. Hyde, v. p.; Haines Gridley, sec.-treas.-mgr.

Inc. Aug. 29, 1913, in California. **Cap.,** $200,000; shares $1 par; 196,865 outstanding. Annual meeting, 2nd Monday in March.

Dividends: at rate of 12% yearly started Dec. 20, 1916. Paid to 1917, $11,722.

Property: the Bellevue & Bullion mines, 13 claims, 8 patented, 95 acres, in Ophir Mining district, Ophir, Placer county. Shows a fissure vein, 1′-4′ wide, running E.-W., with dip of 75°, between schist hanging-wall and grano-diorite footwall. Ore is quartz with some sulphides, assaying from $7-$10 per ton in gold and silver.

Development: by 600′ vertical shaft, with a total of 6,800′ underground workings. Management estimated 36,000 tons of ore blocked out, Jan., 1919.

Equipment: includes 50 h. p. electric hoist, compressor, 3 electric pumps, and 10-stamp forty-ton mill. Mill started operating in Oct., 1915.

Production: gross in 1918, yielded $69,176.

OROVILLE DREDGING, LTD. CALIFORNIA

Controlled by Oroville Dredging Co., Ltd., of England. Henry Rich-

ards, sec., 441 Salisbury House, London Wall, London, E. C. 2, Eng. Directors: F. W. Baker, chairman; John A. Agnew, F. D. Behrend, Lord Brabourne, A. S. Elmore and H. C. Porter. W. A. Prichard, cons. engr. The company also controls Pato Mines and Nechi Mines, Ltd., Colombia, South America.

Office: Alaska Commercial Bldg., San Francisco, Cal.

Inc. June 19, 1905, in Maine. **Cap.**, $3,500,000; $5 par; 686,531 issued.

Report of American company for year ended Sept. 30, 1918, shows operating profits of $25,908, compared with $206,537 the previous year. Results after deductions show a loss of $19,185, compared with a profit of $142,700 the previous year.

Dividends: 2½% in 1905, 10% in 1906, 7½% in 1907, 10% in 1908, 7½% in 1909, none from 1910 to 1913, on account of expenditure on English company's property in Colombia, 5% in 1913-14, 7½% in 1914-15, 10% in 1915-16, and 2½% in 1916-17. In 1917-18 four dividends, Nos. 27 to 30, were paid, totaling $354,202.

Property: 2,500 acres of placer ground along the Feather river, near Oroville, Butte county, Cal.

Equipment: at present includes 2 dredges. Company maintains repair shops at Oroville.

Production: during year ended Sept. 30, 1918, 2,433,161 cu. yd. excavated averaged 3.92 cts. per cu. yd., with a net revenue of 0.55 cents. In 1917, 2,628,709 cu. yd. yielded 8.15 cts. per yard, at cost of 4.58 cents.

Like the other dredging companies at Oroville, this one has been nearing its end for some time, and is now being liquidated.

PACIFIC COAST GOLD MINES CORP. **CALIFORNIA**

Address: 614 Crocker Bldg., San Francisco.

Officers: W. J. Loring, pres. and mgr.; John F. Davis, v. p.; C. H. Beesley, sec.-treas., with M. E. Loring and J. S. Wallace, directors. Phil. Huber, supt., Quartz, Tuolumne county, Cal.

Inc. Dec. 5, 1917, in California. **Cap.**, $1,500,000; par $1.

Property: the Dutch mine, formerly owned by the Dutch Cons. Gold Mining Co. and Dutch Sweeney Mining Co., 70 acres, and the App, Heslep and Hitchcock groups. Claims are on the Mother Lode and carry gold values. On the Dutch claim the vein splits into 2 veins about 75′ apart; the east vein is irregular, breaking up into stringers running in all directions, while the west vein is more regular. General course of veins is N. 35° W., with dip of 65° N. E. Both walls are of Calaveras slate.

Development: by incline shafts. Main working shaft, 2,250′ is sunk on 65° incline, with levels to the 1,200′ level at 100′ intervals, remaining levels at 150′ intervals. On the 1,650′ level the orebody has an average width of 16′.

Equipment: includes 150 h. p. double-drum electric hoist, one 450 cu. ft. Leyner and one 1,000 cu. ft. Rand duplex air-compressor. Water is pumped from 1,000′ level by a Deane triplex pump. Mill employs 40 stamps, and treatment by gravity concentration and flotation.

PACIFIC DEEP MINE **CALIFORNIA**

Address: J. H. Sexton, Placerville, Eldorado county, Cal.

Property: a drift-gravel mine 17 miles E. of Placerville, sold in September, 1919, to above by J. H. Zimmerman. In October, a dozen men were erecting an air-compressor, smithy, change-house, etc. A 1,300′ crosscut tunnel, 30′ lower than the old 900′ tunnel, is to be driven.

PACIFIC MINES CORPORATION **CALIFORNIA**

Offices: 120 Broadway, New York, N. Y. **Mine office:** Stagg, San Bernardino county, Cal.

Officers: J. N. Beckley, pres.; David I. Walsh, v. p.; J. H. Hobbs, sec.-treas.; Josiah Anstice, asst. sec.-treas.; above, with Jas. M. Curley, Col. Sir Henry Mill Pellatt and D. C. MacDonald, directors; Frank W. Royer, mgr.

Inc. 1910 in New York. **Cap.**, $1,000,000; shares $5 par; reincorporated

May 2, 1916, in Maine. Cap., $1,000,000; shares $1 par; 642,000 shares issued; 300,000 shares treasury stock offered to the public, 1916.

International Trust Co., Boston, and U. S. Corporation Co., New York, transfer agents; Federal Trust Co., Boston, and U. S. Corporation Co., New York, registrars. Company is a consolidation of the Bagdad Chase Gold Mining Co. and the Roosevelt Mining & Milling Co. **Dividends:** to end of 1912, $205,440. Last payment of 2% paid July, 1916. Listed for 642,000 shares on New York and Boston Curbs.

Property: 15 claims, patented, about 300 acres, in Bullion Mountain district, 9 miles from Ludlow. Country rock is trachyte porphyry and quartz monzonite. Orebodies occur in a silicified breccia along an E.-W. fault line, and have an average dip of about 35° N. Ores carry malachite and oxide with a little chalcocite and average 1.5% copper, 1.56 oz. silver and 0.36 oz. gold per ton.

Development: by about 8,000′ of workings, including three shafts, deepest 300′, and several tunnels. **Ore reserves:** estimated at 100,000 tons of $10 ore and 200,000 tons of $5 ore, according to report of F. W. Royer.

Equipment: includes an 85 h. p. Union gas engine, 3 hoists and a 10-drill compressor. Company also owns the Ludlow and Southern 9-mile standard-gauge railroad, with 2 locomotives. A concentrator was finished in 1918.

Production: to end of 1915 is estimated at $3,000,000. Production in 1914, 1915 and 1916 was about 100 tons per day. No production reported since.

PACIFIC GOLD MINING & MILLING CO. CALIFORNIA

Office: 1120 Investment Bldg., Los Angeles, Cal. **Mine office:** Mokelumne Hill, Calaveras Co.

Officers: Max Muller, pres.; W. H. Rocholl, v. p.; Walter Wessels, sec.-treas.; A. M. Howat, mgr.

Inc. August, 1917, in California. **Cap.,** $1,000,000; issued 995,000 shares. Par $1; assessable. Annual meeting, February.

Property: 420 acres, 1 mile E. of Mokelumne Hill, Calaveras county, shows a quartz vein in diorite worked by 315′ shaft, 300′ tunnel and 4,000′ underground workings. Shoots vary from 6′ to 20′ wide, 60′ to 150′ long, and average 0.30 oz. gold, trace silver, 5% iron pyrite. Mining is by square sets and shrinkage stopes. Ore reserves reported at 30,000 tons. A 125-ton concentrator produces concentrate stated to assay 3½ ozs. gold per ton, extraction averaging 86.7%.

Equipment: besides mill, 30 h. p. hoist, electric compressor, etc.

In 1918, company received $40,908.40 from sale of concentrate. Ore treated 1917, 10,000 tons; 1918, 11,100 tons.

PARADISE MINE CALIFORNIA

Address: R. Randolph Bruce, mgr.

Property: 5 claims on Spring creek, about 20 miles N. of Barstow, said to have an orebody, proved for 1,000′ in length, carrying carbonate and sulphide of lead, with iron oxide, in a gangue of silicious lime. The mine was idle from 1903-16.

The property is credited with production of 2,000 tons ore to 1904, that averaged 51.4 oz. silver and 59% lead. Shipments from Oct. 1, 1916, to Jan. 31, 1917, amounted to 1,050 tons, averaging 40 oz. silver and 40% lead p. t. No production reported since. In 1918, W. F. Bray, of Bakersfield, was reported to have taken a lease on the mine.

PATRIQUIN QUICKSILVER MINE CALIFORNIA

Owned by Louis and A. G. Patriquin, Parkfield, Monterey county, Cal. Gross earnings for 1915 were $60,000 and operating expenses, $12,000. No returns reported since.

Property: 6 claims, 110 acres, in Sec. 2, T. 23 S., R. 14 E.; near Parkfield, is said to show cinnabar ore in veins and in chamber deposit in serpentine. Orebody said to be 3,000′ long, with N. W. strike and dip of 60° N. E.

Development: by 360′ tunnel and a total of 3,200′ of workings.

Equipment: includes a 2-ton Johnson McKay retort furnace. About 1,800 tons of 5% ore were treated in 1915, yielding 340 flasks of quicksilver. No

figures since of production, but in 1918 operations were stopped at the Patriquin mine and work started in Kings county, about 2 miles from the Scott furnace of the Kings Quicksilver Mining Co., a former producer. Ore is hauled to the furnace in trucks.

PENN MINING CO. **CALIFORNIA**

Office: 727 Foster Bldg., Denver, Colo. **Mine office:** Campo Seco, Calaveras county, Cal.

Officers: Chas. Loughridge, pres.; Wm. D. McIlvaine, sec.-treas.; Alfred P. Busey, Jr.., gen. mgr.

Inc. June 1, 1910, in Wyoming, as successor of Penn Chemical Works. **Cap.,** $250,000; shares $1 par. Is operated as a close corporation.

Property: the Campo Seco, Hecla, Little Satellite and Satellite, patented claims, near Campo Seco, in the foothill copper belt, 80 acres, with a 20-acre smelter-site and 2,305 acres of timber and miscellaneous lands, giving total holdings of 2,405 acres.

Geology: the ore deposit, having a maximum width of 30′ at depth of 400′, lies between amphibolite schist and talcose shale, and north of the Campo Seco shaft splits into veins known as the East and West, which continue parallel. Ore is mainly chalcopyrite, associated with sphalerite, sometimes occurring in considerable quantities, and pyrite, and also includes occasional chalcocite and bornite. The average assay of ore smelted in 1916 was 5-15% copper, 2.39 oz. silver, 7.9% zinc, 0.073 oz. gold. The gangue ranges from talcose schist, through clay, to quartz. Faulting considerably displaced the vein below 700′ depth.

Development: includes the 2,900′ working shaft, No. 3, and a tunnel, also 4 other shafts, 2 on the East vein at the Campo Seco and Hecla mines and 2 on the West vein at the Satellite mine. No. 1 shaft, 300′ deep, is useful only for ventilation; No. 2 shaft, 750′ deep, at the Satellite mine, is the main working shaft on the West vein, with a compressed air hoist; No. 3 shaft, at the Campo Seco mine, about 1,300′ from No. 2, is 2,900′ deep, with levels at 150′ intervals, has an electric steam hoist; No. 4 shaft, at the Campo Seco mine, 200′ deep, is used as an air shaft and manway; No. 5 shaft, at the Hecla mine, 400′ deep, is used as an air shaft.

Ore reserves: estimated sufficient for two years.

Equipment: includes 2 Wellman-Seaver-Morgan electric hoists with 1,500′ and 2,500′ capacity drums. The smelter has a 400-h. p. steam and electric plant, ice plant, pumping plant and a Nordberg air compressor, capacity 1,400 cu. ft., to supply the mine and smelter. Fuel is crude petroleum, which also is burned in the locomotives. The Southern Pacific Railway is 5 miles distant, at Valley Springs, and transportation between that point and the mine is by wagons, making one round trip daily. A short private railway connects the mines and works.

Smelter: the 300-ton smelter, a quarter of a mile from the mine, has an Allis-Chalmers converter, one Herreshoff roaster, two oil-fired 150-ton reverberatory furnaces, and eight 16-ton McDougall calciners. The smelter railway, for charging and slags, has electric locomotives. Some cement copper is produced from mine water.

Blister copper is shipped to the American Metal Co. for refining.

The company has experimented on the Thiogen process for elimination of sulphur, mainly on account of fume litigation. The smelter was in continuous operation for over 16 years, but was closed April 1, 1919, for extensive repairs.

Production:

	Tons Ore Treated	Lbs. Refined Copper
1918	36,097	3,076,858
1917	35,653	3,235,286
1916	43,210	3,973,111
1915	42,365	3,152,071
1914	42,928	4,007,149
1913	50,427	4,467,982
1912	51,163	5,175,875

This is a well-managed and profitable property.

PHILADELPHIA EXPLORATION CO. **CALIFORNIA**

Office: Albert Burch, mgr., Crocker Bldg., San Francisco, Cal.

Officers: Harold Boericke, pres.; Gideon Boericke, v. p.; John Boericke, sec.; C. A. Joy, supt.

Inc. Oct., 1916, in Delaware. **Cap.**, $100,000; increased to $200,000; assessable. Is a close corporation with only 5 shareholders.

Property: 14 claims, 3 patented, 140 acres, including the old Crescent and Green Mountain mines, near Crescent Mills, Plumas county, Cal. Mines have not produced since 1886. **Ore:** gold-bearing quartz veins in granodiorite.

Development: by 600′ shaft and 6,000′ tunnel. Workings were unwatered and reopened, 1917, closed down in August, 1918, and reopened again in May, 1919.

Equipment: includes 50 h. p. electric hoist, compressor, 5 centrifugal pumps.

PHOENIX CONSOLIDATED MINES CO. **CALIFORNIA**

Office: Humboldt Bank Bldg., San Francisco, Cal. A. Goering, supt., Box 171, Nevada City, Cal.

Officers: Judge B. V. Sargent, pres.; A. B. Mahony, v. p.; C. Martel, sec.; S. O. Trescott treas.; H. C. Bocchio, mgr.; all of San Francisco.

Inc. Dec. 21, 1916, in Nevada. **Cap.**, $1,000,000; $1 par; 600,000 issued; 400,000 held for development fund.

Has a 4-year lease and option to 1921 on the Phoenix Cons. mine, formerly worked by the Phoenix Gold Mng. Co., for $15,000, payable out of a 15% royalty.

Property: 4 claims, 2 patented, 320 acres, 1 mile N. of Nevada City, Nevada county, Cal., adjoining the Odin and Manzanita mines. Ore deposit consists of a gravel channel which is believed to be the continuation of the Manzanita channel, credited with $7,000,000 gold production. There are also 3 quartz veins occurring along a rhyolite-granodiorite contact. One vein was worked to water early in the 80's and the ore is said to average $20 gold per ton.

Development: in 1917 tunnel was being driven to tap the Manzanita channel. Quartz veins are not being developed at present.

PINE CREEK TUNGSTEN MINE **CALIFORNIA**

Twenty miles from Bishop, Inyo county, at an altitude of 11,000′; operated by Cooper Shapley, James Seager, Fred Close, and associates. Said to have 200,000 tons of ore that will average 1.34% tungstic oxide.

In 1918 a 300-ton mill was built, also a 2,200′ gravity tramway between the mine and mill. Closed down in spring of 1919 to wait for better market of tungsten.

PIONEER CHIEF GOLD MINING CO. **CALIFORNIA**

Mail returned from former address, 923 Monadnock Bldg., San Francisco, Cal. Mine office: San Andreas, Cal.

Officers: at last accounts, N. J. Martin, pres.-mgr.; B. F. Marshall, v. p.; Judge W. F. Crist, sec.-treas.; with M. V. Van Fleet and G. G. Damon, directors; J. E. King, supt.

Inc. Aug. 26, 1915, in California. **Cap.**, $300,000; shares $10 par; assessable; 23,603 shares outstanding. Transfer office: 923 Monadnock Bldg., San Francisco, Cal.

Property: 15 patented claims, 200 acres, on the footwall belt of the Mother Lode, near San Andreas, Calaveras county, said to show gold ore occurring in veins with slate hanging and diabase footwall. Veins have N. 30° W. strike and dip 65° E. Management reports pay-ores in shoots 7′ wide and 200′ long, containing quartz sulphides, chalcopyrite, pyrite and galena, with average assay of $9 in gold.

Development: by 2-compartment, 500′ shaft.

Equipment: includes electric power, 40 h. p. single-drum hoist and 600-cu. ft. compressor. No recent information obtainable.

PITTSBURG LIBERTY MINE **CALIFORNIA**

Address: Masonic, Mono county, Cal.

Property: purchased at receivers' sale in 1914 for $20,000 by the Stall Bros., was formerly owned by the Pittsburg Liberty Mining Co. The mine,

near Masonic, was located in 1902 and started shipping to Selby smelter in 1907, operated until 1910 with a reported production of $600,000; idle until 1915 when work was resumed. Operated recently by lessees.

Ore: which carries gold, is found in 5 veins, occurring in metamorphic schist, quartzite, slate and intrusive granite. Veins strike N. 25° W. and dip to the east.

Development: by 172′ shaft and 2 adits, cutting the vein at 271′ and 413′ depth.

Equipment: includes 100-h. p. gasoline engine, and the 60-ton Pittsburg-Liberty mill, which was remodeled and equipped with cyanide plant and tube-mill in 1915.

PITTSBURGH & MOUNT SHASTA GOLD M. & M. CO. CALIFORNIA

Office: 403 Real Estate Savings Bldg., Pittsburgh, Pa. **Mine office:** Keswick, Shasta county, Cal.

Officers: J. J. Schneider, pres.; Buffalo, N. Y.; R. Schmitt, v. p.; T. V. Scott, sec.-treas.; above with E. G. Lang, J. S. Phillips, F. A. Johnston, R. W. Medick, G. E. Meyer, Frederick Reineke, J. P. Jayne, G. H. Clapp and H. C. Steul, directors; C. F. Wieland, mgr.; J. J. Partington, supt.

Inc. 1903, in West Virginia. **Cap.**, $2,500,000; shares $1 par. Bonded debt, $117,000; $200,000 authorized 6% first mortgage notes, due May 20, 1919, but extended 2 years. Interest paid to May 20, 1919, payable semi-annually.

Property: 10 claims, patented, 175 acres, known as the Bennington group, in the Flat Creek district, north of Redding, said to have been bought for $18,000 cash and $60,000 shares, also 20 claims, on which final payment was made in 1918 for patent, known as the Alleghany group.

Development: several thousand feet of underground work. A 4,000′ main tunnel and 2 other tunnels show a vein of gold and silver-bearing copper ore of varying tenor. In Sept., 1919, the ore was said to be changing from gold to copper. Two diamond-drills were working in 1917, cutting a good grade of ore. A shaft is to be sunk at end of the long tunnel.

Equipment: includes 15-stamp mill, carpenter shop, smithy, boarding house and 3 bunk houses, with electric power.

PITTSBURG-SILVER PEAK GOLD MINING CO. CALIFORNIA

Office: 912 California Bank Bldg., Pittsburg, Pa.

Officers: Wm. Flinn, pres.; Geo. T. Oliver, v. p.; T. J. Crump, sec.-treas.; Wm. A. Bradley, gen. mgr.; John Mocine, supt.; B. A. Rives, res. pur. agt.

Inc. May 25, 1906. **Cap.**, $3,000,000; shares $1 par; 2,793,733 shares outstanding. Annual meeting, first Monday in May. Stock is listed on San Francisco and Pittsburg Exchanges Owns all the stock of the Silver Peak Gold Mining Co., 99¼% of the stock of the Mohawk-Alpine Mining Co., and all the stock of the Silver Peak R. R. running 17½ miles from Blair, Nev., to the Tonopah-Goldfield R. R., at Blair Junction.

Last dividend paid July 1, 1914, was 2 cts. per share, with total dividends to date of $784,800 or 28%.

Property: Company acquired the Rawhide gold mine near Sonora, Tuolumne county, Cal., in 1915, and moved the 120-ton mill and cyanide plant from Blair to the new property. The Rawhide mine is developed by an old 1,800′ shaft, which was unwatered.

Also owned 2,000 acres of mineral-bearing land at Blair, Esmeralda county, Nev., formerly one of the largest producers of low-grade ore in the State. The orebodies are exhausted, and it is reported, 1919, that company has ceased active mining operations, and equipment is being disposed of.

PIUTE MINE CALIFORNIA

Controlled by R. W. Crampton, mgr., Santa Monica, Cal.; Geo. Z. Smith, and F. A. Crampton, supt., Santa Monica.

Property: 13 claims, 260 acres, in Bullion mining district, near Cima, San Bernardino county, shows lead-silver-gold-platinum ore in limestone-granite contact deposits. Assays said to run 26% lead, 3.2 oz. silver, .05 oz. gold and 0.6 oz. platinum.

Development: 200′ shaft with 1,000′ of workings and 800′ of tunneling.

Equipment: includes a hoist and compressor.

Production: in 1917, 1,000 lbs. copper, and 306,000 lbs. lead; none in 1918; developing in 1919.

Management plans developing to 400′ level and building a mill.

PLUMAS BASIN MINES CO. **CALIFORNIA**

Address: U. S. Exploration Co., Oroville, mine operated under lease and bond by company which found good ore on 300′ level.

PLUMAS EUREKA CORPORATION **CALIFORNIA**

Address: Chas. D. Stark, Jr., mgr., Johnsville, Plumas county, Cal. Company was reorganized in 1916.

Property: one of the oldest and most prosperous gold quartz mines of California, having distributed over $17,600,000 in dividends.

PLYMOUTH CONS. GOLD MINES, LTD. **CALIFORNIA**

Offices: 20 Copthall Ave., London, E. C., Eng. **Mine office:** Plymouth, Amador county, Cal. Gen. mgr.: Bewick, Moreing & Co., 62 London Wall, London, E. C., Eng. San Francisco office: Crocker Bldg.

Officers: C. Wanklyn, chairman; C. A. Moreing, W. J. Loring, John Barry, J. P. and David Richards, directors. F. A. Crew, sec.; J. F. Parks, supt.

Inc. Jan. 15, 1914, in England. **Cap.**, £240,000; shares £1 par; all issued.

Gross earnings for 1918 were $693,315.57; operating expenses, $483,929, and net earnings, after writing off depreciation, $214,386; dividends absorbed, $15,600, leaving balance of $19,212.

Dividends: in 1915, were 3s. per share, or $173,000; in 1916, 3s. per share.

Property: the Plymouth Consolidated group of 13 patented claims and a tract of agricultural land, about 500 acres, at Plymouth, Amador Co., Cal. The holdings cover 4,800′ along the Mother Lode, showing 3 fissure veins in Mariposa slate. The veins run N. S., with dip 60° E. Ore is partly sulphide, occurring in shoots 6′ to 30′ wide and 150′ by 300′ long, said to average 0.30 oz. gold and 0.14 oz. silver, per ton.

Development: by several incline and one vertical shaft to depth of 2,700′. Workings total about 4 miles. The main or Pacific shaft is a vertical 3-compartment shaft to 1,600′ level where it turns into a 55° incline, sunk in the footwall of the Empire-Pacific veins to the 2,600′ level. Work in 1918 amounted to 6,681′, mainly drifts and raises.

Equipment: includes 500 h. p. electric hoist, 1,800 cu. ft., and 900 cu. ft. compressors, a 30-stamp 360-ton mill for amalgamation and concentration of ores, which makes a 90% extraction. The mill is equipped with No. 5 Gates gyratory crusher, Hardinge mills, classifiers, tables and vanners. A regrinding plant for the tailings recovered 25cts. per ton at an added operating cost of 7 cts. per ton. The concentrates average $130 per ton, and the tailings average 70 cts. per ton. Total cost per ton was $3.86 in 1918. Management estimated ore reserves at 108,000 tons of $6 ore, Jan., 1919.

Production: 44,775 tons of ore in 1914, yielding 11,132 oz. gold; 129,500 tons in 1915, yielding 31,193 oz. gold and 8,652 oz. silver, gross value $846,491; 125,000 tons in 1916, yielding 32,693 oz. gold and 8,016 oz. silver, gross value, $681,150. In 1918, 125,300 tons yielded 33,382 oz. gold and 8,530 oz. silver, gross value $698,315, compared with $686,000 in 1917.

The property is an old mine, dormant for 30 years, but made into a successful producer through the able judgment and operating ability shown by W. J. Loring.

POCAHONTAS MINING CO. **CALIFORNIA**

Office: 112 Market St., San Francisco. **Mine office:** Lewis, Mariposa county, Cal.

Property: 320 acres, patented, including the Great Northern mine, in the White Rock district, shows several veins of cupriferous iron ore, between diorite, with altered diabase gangue. The main orebody, about 100′ in width, occurs in a mineralized zone up to 1,000′ across, having an oxidized zone of about 100′ depth, from which a limited production of high-grade ores was made many years ago.

Development: by a 300′ shaft, 200′ tunnel and 900′ of drifting.

Equipment: includes steam power and a hoist, and buildings include an office, laboratory, smithy and bunk houses. Making small shipments to the Selby smelter. Property worked by lessees in 1915-16. No later returns.

QUAKER HILL BLUE LEAD MINES CO. **CALIFORNIA**

Address: 37 Wall St., New York City. H. L. Engelbright, mgr., Nevada City, Cal.

Inc. 1917, in Delaware. **Cap.,** $3,500,000.

Incorporators: H. E. Latter, C. L. Rimlinger and C. M. Enger

Reported to own gravel properties in the Colfax quadrangle, Nevada county, Cal. Water is supplied by a 21-mile flume.

QUEEN MINE **CALIFORNIA**

Address: G. H. Hamstadt, owner, Nipton, Cal. Operated for a while under lease by W. W. Wishon. Searchlight, Nev.

Property: 9 claims, 150 acres, in New York mountains, San Bernardino county, Cal., said to show fissure veins in monzonite carrying gold-silver values.

Development: by 1,100′ of underground workings, mainly tunnels. No. 2 tunnel reported to have opened up 10′ of ore assaying 2.5% copper, 0.9 oz. silver.

Working in 1917, but nothing reported since.

QUINBY MINING CO. **CALIFORNIA**

Idle for years.

Address: Quinby, via Burnt ranch, Cal.

Property: 6 claims, on Quinby Creek, in Trinity Reserve, showing 4′ vein of copper ore, developed by 2 tunnels, 100′ and 400′ long and 300′ drifts.

QUICKSILVER INVESTMENT CO., INC. (THE) **CALIFORNIA**

Office: 45 Broadway, New York.

Officers: Geo. H. Sexton, pres.; Robt. Gibson, v. p.; Harry A. Nichols, 2nd v. p.; Chas. A. Frank, sec.-treas.; A. Heyward McAlpin, asst. sec.-treas.; above with Ira Barrows and Wm. Herbert, directors.

Inc. 1915, in Virginia. **Cap.,** $1,061,900, in $61,900—7% cumulative, 1st preferred, issued to noteholders of old company; $421,300—7% 2nd preferred, and $578,800 common shares; shares $100 par; $461,900 outstanding. All stock is held in a 5-year voting trust; voting trustees: Chas. A. Frank, chairman, Robt. Gibson and Ira Barrows, N. Y. City.

Company has a 25-year lease from 1915 on the Almaden quicksilver mine of the Quicksilver Mining Co., through its subsidiary the New Almaden Co., Inc. (which see), and will pay 20% of its net profits to owners. Reported operating at a loss; indebtedness to noteholders, March 1, 1915, was $61,900. More than $60,000,000 has been produced by Almaden mine.

QUICKSILVER MINING CO. **CALIFORNIA**

Office: 45 Broadway, New York.

Officers: Jos. Kaufmann, pres.; Edw. Reynaud, v. p.; Chas. F. Tracey, sec.-treas., with Clinton E. Whitney, T. Tileston Wells, Clarence W. Francis, John Wells, W. L. Steinbarge, Wm. H. Lotty, Henry L. Steitz and A. H. Jarman, directors.

Inc. 1867, in New York. **Cap.,** 100,000 shares; $1 par, in 57,087 common and 42,913 preferred, 7% non-cumulative. Annual meeting, third Wednesday in June, in N. Y. City. Stock stricken from the New York Stock Exchange, 1919. Farmers Loan & Trust Co., New York, transfer agent; Equitable Trust Co., New York, registrar. In 1914, company defaulted on payment of notes, and was refinanced March, 1915.

Dividends: few and far between; none have been paid on the common since 1882 when 40 c. was paid. Payments on preferred: June, 1891, 4%; May, 1899, ½%; July, 1900, ½%; May, 1901, ½%; May, 1902, ½%; May, 1903, ½%.

Property: claims totaling 6,800 acres, including the New Almaden quicksilver mines at New Almaden, near San Jose, Cal. Mine is the oldest producer of quicksilver in the United States. Total production to end of 1917, was 1,021,183 flasks. For full description of property, see Quicksilver Resources of Cal., Bull. 78, issued by Cal. State Mining Bureau. Company has given a 25-year lease from Feb., 1915, on its mines to the New Almaden Co., a subsidiary of the

Quicksilver Investment Co., Inc., and will receive 20% of net profits. Stockholders were offered voting trust certificates in new company on basis of one share of second preferred for 10 shares of old preferred in consideration of payment of $3 for each share of old stock. New common was exchangeable for old common stock at same ratio plus $1.50 per share of old common.

The ores recently worked carry 0.2% to 1% mercury, being the low-grade ore left in previous years workings and old fills. Prospecting of unworked territory had not been successful at last accounts.

On Dec. 1, 1917, it was reported that the directors had applied to the Supreme Court of New York for a voluntary dissolution of the company, on the ground that its assets, $98,000, did not ensure payment of obligations. Maurice Deiches was appointed receiver.

Output in 1919 was about 20% of normal.

RAND DIVIDE MINING CO. **CALIFORNIA**

Now the California Rand Silver Mines, which see.

RAND MINERALS CO. **CALIFORNIA**

Mail returned from old address, F. R. Heineck, mgr., Glenville, Cal.

Property: probably idle. See Vol. XIII.

REDWOOD COPPER QUEEN MINING CO. **CALIFORNIA**

Idle. Is a San Francisco corporation. E. R. Leach, pres.; Thos. Mellersh, sec.-treas., at last accounts.

Property: 840 acres, patented, is 25 miles from Cloverdale, nearest rail point, Mendocino county, Cal. Developed by tunnels and winzes. Veins much broken by faults prominent on surface, has a 2′ to 4′ gossan capping, traceable for a mile. Country rocks are brecciated porphyry and sandstone. Ores include cuprite, melaconite, malachite, azurite, chalcopyrite, and tetrahedrite.

Mineralized zone is 300′ long, 10 to 40′ wide, 125′ deep, carrying kidneys and lenses of sulphide ore with as much as 8-9% copper and small gold-silver values. High sulphur content and absence of arsenic said to make ore desirable for manufacture of sulphuric acid. No recent information obtainable.

REWARD GOLD MINES SYNDICATE **CALIFORNIA**

Was controlled by Crown-Reserve Mining Co., Ltd., whose exploratory work proved unsatisfactory and mine was closed down. Described in Vol. XIII.

ROCKY POINT CONS. MINES CO. **CALIFORNIA**

Reorganized as Consolidated Wilshire Mining Co., which see. Troubles of old company described in Vol. XIII.

ROXBURY MINING CO. **CALIFORNIA**

Address: Yreka, or Scott Bar, Siskiyou county, Cal. Boston capital is behind this concern.

Property: placer claims near Scott bar. In Aug., 1919, company applied to State Water Commission for permission to divert water from Canyon and Kelsey creeks for hydraulicking. The present supply is only enough for two giants for about 4 months each year.

ROYAL GOLD MINES CO. **CALIFORNIA**

Acquired by Stockholders' Mining Co., which see.

RUBY COPPER MINING CO. **CALIFORNIA**

Mail returned from former address, E. A. Walters, Eureka, Cal. F. W. Belcher, sec. Mine near Korbel, Humboldt county, Cal.

Property: the Blind Lead and Ruby groups, 38 claims, 760 acres, unpatented, in Horse Mountain mining district said to show a copper deposit developed by a 1,000′ tunnel, and other short openings. Ores are chalcopyrite, cuprite, chalcocite and bornite, with some black oxides and gold. Formation is serpentine with porphyritic diorite dikes and quartzite.

Company planned installation of concentrator. Mine in development stage, and evidently idle at present.

RUBY KING COPPER CO. **CALIFORNIA**

Mine near Ladoga, Colusa county, Cal. Although generally known as a copper mine, no copper ore has as yet been discovered and property is operated

as a red ochre mine, by the Ruby King Mineral Paint Co., 1027 Eighth St., Sacramento, Cal.

Property: 6 patented claims, developed by 1,200′ shaft and 1,000′ tunnel. Ore is iron oxide containing a small precentage of cinnabar.

Production: 500 tons in 1914. No recent returns.

RUBY SILVER MINING CO. **CALIFORNIA**

Address: C. C. Waring, Santa Monica, Cal.

Officers: F. A. Crampton, pres.-mgr.; C. C. Waring, sec.-treas.; J. R. Comerford, v. p.-supt. Company is a close corporation.

Property: 3 groups of mining claims near Cima, San Bernardino county, the Ruby Silver, 1 claim, Navajo group, 6 claims, 123 acres; Ruth mine, 7 claims, 132 acres; covering contact deposits 2 to 10′ wide in limestone and granite. Examined by J. Nelson Nevius, A. H. Black, O. B. Suhr, and A. W. Clark.

Development: Ruby Silver mine has 250′ tunnel and 500′ workings, from which 40 tons lead-silver ore were shipped in 1917; Navajo group, 800′ of workings, produced 120 tons copper ore up to 1918; Ruth mine, 210′ shaft, and 2,000′ of workings produced 560 tons of lead ore to 1918, and is said to have 1,800 tons blocked out of 32% lead with some platinum.

Idle in 1918 due to the war, but management states that development work will be done in 1919 and a mill erected.

SACRAMENTO VALLEY COPPER CO. **CALIFORNIA**

Offices: S. W. Winn, fiscal agent, 149 Broadway, New York; A. B. Wilkins, mgr., 625 Singer Bldg., New York; T. G. Patton, sec., Placerville, Cal.; J. E. Lawyer, supt., Greenwood, Cal.

Officers: L. H. Wilkins, pres. and treas.; A. B. Winkins, v. p.; with W. Sheriff, E. C. Voorhies and Donald Woodrum, directors; A. B. Wilkins, mgr.

Inc. Oct. 3, 1911, in Arizona. **Cap.,** $1,000,000; shares $1 par; fully paid; non-assessable; all issued.

Property: Shamrock group of 24 claims, about 492 acres, in Sec. 26, T. 12 N., R. 9 E., in Eldorado Co., Cal., 2 miles south and 1 mile west of Greenwood. Does not embrace 12 claims adjacent N. E. in section 23, held by a partnership of similar name to this company.

Geology: Property shows an extensive series of sedimentary rocks with igneous rocks of various ages, intercalated with the sedimentaries, or more commonly occurring as intrusives. Ores occur as sulphide deposits in contact and shear zones, the latter flat-lying, with chalcopyrite disseminated in pyrite, and almost invariably containing gold and silver, but low in copper tenor.

Development: by 10 tunnels varying from 50′ to 380′ in length. Latest estimates of reserves is the "whole mountain, would pay to run through a suitable treatment plant on the premises." Shipping ore assaying 5 to 12½% copper, $2.50 to $25 gold, and $2 to $15 per ton silver is estimated to be 50,000 tons. There is no power equipment.

In Sept., 1917, the main Lipton tunnel was being retimbered and a motor truck road constructed to rail at Cool or Auburn, the latter 12 miles from the mine; ore shipments were then to commence from the tunnel; in 1919 management states "measures are under way for shipping facilities." At 1917 prices the value of the ore reserves above the tunnel were figured by company at $3,000,000.

Literature describing company's holdings and possibilities is, in our opinion, too optimistic.

SAGAMORE MINES CO. **CALIFORNIA**

Idle.

Offices: 401 First Nat'l Bank Bldg., Riverside, Cal. Mine near Purdy, San Bernardino county, Cal. Norman P. Sloan, pres. and mgr.

Company was originally the Sagamore Mining Co., and had offices at 3rd and Chestnut Sts., Philadelphia; this company was merged into the Sagamore Mining & Milling Co., and this into the Sagamore Mines Co., incorporated under laws of Delaware.

Property: 8 claims, 160 acres, known as the New York mine, 5 miles

S. E. of Manvel, in the New York mountains, an extension of the Providence range, shows limestone, quartzite and schist, with intrusive dikes of rhyolite and felsite along which the principal veins are found. Ores found in the quartzite are gold bearing, the silver and copper ores being in limestone.

Development: by shafts of 30′, 45′, 100′ and 150′ and several tunnels, longest being 454′, showing a number of veins ranging from 18″ to 4′ in width. A complete report on the property was made, 1902, by Carl Andersen.

Equipment: includes gasoline power and a 50-ton mill.

SAINT JOHNS MINES CO. **CALIFORNIA**

Address: Box F, Vallejo, Cal.

Officers: C. G. Dennis, pres. and mgr.; John Martin, v. p.; R. V. Joste, sec.

Inc. May, 1914, in California. **Cap.**, $150,000; shares $1 par; outstanding $90,000. Transfer office: 1022 Crocker Bldg., San Francisco. Annual meeting, first Monday in May.

Condensed balance sheet for 1918 shows: assets, $102,131. Liabilties include: capital stock, $90,000; surplus, $10,293; other liabilities, $1,838. Gross earnings, 1918, reported as $57,125, with operating expenses of $57,198.

Property: 713 acres on Soscol ranch, 6 miles N. E. of Vallejo, Solano Co., is said to show cinnabar ore occurring as bunches in sandstone and shale over a width of 2′ to 30′. Developed by 320′ shaft and tunnels; greatest depth of workings, 320′. Management reports 12,000 tons ore blocked out, average assay 0.27% quicksilver.

Equipment: includes a 25-h. p. gasoline hoist, two 7½-ton Neate and one 15-ton Scott furnace, capacity 30 tons daily and a 25 h. p. oil engine with 15 k. w. generator.

Production: 1916, 9,068 tons ore, yielding 48,675 lb. quicksilver; 5.37 lb. recovered per ton of ore; cost per 75 lb. flask, $62.11. No yields reported since.

SALT LAKE-CALIFORNIA COPPER CO. **CALIFORNIA**

Mail returned from former office, and company inactive several years. Described in Vol. XIII.

SANTA ROSA MINING CO. **CALIFORNIA**

Subsidiary of West End Cons. Mining Co. of Nevada, which is reported to own 350,000 shares.

Property: the Santa Rosa lead-silver mine in the Lee district E. of Cerro Gordo and 26 miles from Keeler, said to show ore in veins along the contacts of limestone intruded by porphyry dikes. There are two systems of veins whose average width is 4′. The fine outcrops would indicate a high degree of mineralization, but the orebodies are apparently superficial.

Development: shallow shafts and tunnels said to show that rich ore was in all cases found close to the surface. The mine was reopened in 1916 after having been idle for several years. No recent information.

SARITA MINES CO. **CALIFORNIA**

Address: F. W. and G. E. Stall, mgr.; Masonic, Mono county, Cal. Not a share corporation.

Property: mine near Masonic, Cal., said to show a quartz vein in porphyry, dipping 45° W. and pitching W. Orebody is from 4′ to 20′ wide and shoots are from 50′ to 200′ long. Ore said to contain gold and silver, worth $20 per ton.

Development: by 700′ tunnel to 200′ depth.

Equipment: electric power, aerial tram, and 75-ton cyanide plant. Concentrate assayed $500 per ton; extraction was 90%. Production, if any, not available.

SELBY SMELTING & LEAD CO. **CALIFORNIA**

In 1918 the corporate name of the company was discontinued and plant is now known as Selby Smelting Works, which see.

SELBY SMELTING WORKS **CALIFORNIA**

Formerly known as Selby Smelting & Lead Co., which company was described in Vol. XIII. In 1918 American Smelters Securities Co. assumed all

assets and liabilities of that company and property is now known as Selby Smelting Works.

Office: Merchants' Exchange Bldg., San Francisco, Cal. **Works office:** Selby, Contra Costa county, Calif.

Officers: Eugene B. Braden, gen. mgr.; C. A. Thomas, mgr.

The smelter at Selby, on San Pablo Bay, near Carquinez Strait, receives ore by rail and water, from all of the Pacific states, principally from Idaho and Nevada. The works include a 400-ton smelter having lead stacks, a refinery for parting gold and silver, a plant for the manufacture of bluestone, a shot tower and sheet lead rolls. At San Francisco a plant is operated for the manufacture of pipe, lead traps and mixed metals.

Equipment: includes steam, electric and air power. The plant includes a bag house, and also a special chamber having the Cottrell process for precipitating solids from fumes, before passing to the main stacks.

The Selby is perhaps the largest smelter producing gold in the United States, or possibly in the world. The plant and improvements were described in 1916 by T. A. Rickard in the "Mining and Scientific Press."

SENECA CONS. GOLD MINES CO. **CALIFORNIA**

Address: J. J. Reilly, supt., Seneca, Plumas county, Cal.

Property: the White Lily mine and claims a mile above Seneca on North Fork Feather River, driving 1,000′ tunnel, and planned to build a cyanide plant in 1917. No reports since.

SHASTA BELMONT MINING CO. **CALIFORNIA**

Office: Carson City, Nev. **Mine office:** Winthrop, Shasta county, Cal.

Officers: Will E. Casson, pres.; W. Brougher, v. p.; Jas. T. Davis, sec.-treas., with S. L. Lee, W. H. Cavell, directors.

Cap., $1,000,000; shares $1 par; 730,000 issued, and 50,000 offered at 25c each in Dec., 1916.

Property: 7 claims, unpatented, 120 acres, known as the Graham group, in the Copper City district and in the west central part of the Shasta copper belt. The group is about 3 miles east of the Bully Hill mine and smelter, and 8 miles from the Mammoth mine. The property is said to have a surface outcrop resembling that of the Bully Hill mine.

Development: by a 75′ shaft, 4 short tunnels and several opencuts, all showing streaks and bunches of high-grade copper ore. Company has made one small shipment of ore to the Mammoth smelter, which ran 7.21% copper and about 4 oz. silver. Driving lower tunnel to reach the main orebody. No report since 1917.

SHASTA COPPER EXPLORATION CO. **CALIFORNIA**

Address: Redding, Shasta county, Cal. M. E. Dittmar, mgr.; O. Scribner, sec.; Chas. Wheelock, supt.

Property: about 650 acres, lying between the Balaklala and Iron Mountain mines, near Kennett, is developed by 8 tunnels, of about 3,000′ aggregate length. No. 7 tunnel cut 3 small stringers of copper ore. Company did a large amount of exploration and development work, 1915, but no recent report has been received despite repeated requests mailed them.

SHASTA-KENNETT COPPER CO. **CALIFORNIA**

Address: Kennett, Shasta county, Cal.

Inc. 1907, in Colorado. **Cap.,** $2,500,000. W. R. Girdner, M. J. Jordan and L. E. Dabold, organizers.

Property: near Kennett, has a 600′ tunnel, said to show bodies carrying low to medium grade copper ore.

SHASTA MAY BLOSSOM COPPER CO., CONS. **CALIFORNIA**

Office: 604 Mills Bldg., San Francisco, Cal. **Mine office:** Winthrop, Shasta county, Cal.

Officers: Frank J. Blake, pres.; Simon Peter, v. p.; Kingsley W. Cannon, sec.; Carl Henrich, treas.; Mrs. M. B. Lindley, directors.

Inc. 1903, in Arizona, as a reconstruction of the Shasta May Blossom Mining & Smelting Co. **Cap.,** $10,000,000; shares $1 par.

Property: known as the Keith group, has 22 claims, about 300 acres,

½ mile N. of De La Mar, in the Pittsburgh or Copper City district. The claims show prominent outcrops and have several deposits between granite porphyry footwalls and slate hangings. The East vein outcrop, said to be 30′ wide and traceable for about 1,500′, shows copper ore with gold and silver values. The middle vein, 5′ to 40′ wide and said to be traceable, 1,900′, carries sulphide ore, and is opened by tunnels of 200′, 300′ and 650′, with about 1,500′ of workings said to show a considerable tonnage of chalcopyrite ore. The West vein, reported to be upwards of 100′ in width, has a 100′ shaft and 780′ tunnel which show ore giving assays of 2 to 7% copper and $2 to $2,000 per ton in combined gold and silver values. The mine, as a whole, is reported to have about 4,000′ of workings.

In 1918, company reported that the Compressor, or lower tunnel, had been driven farther toward the 7 outcropping lodes.

Equipment: includes a hoist, air compressor, electric light and power station and machine-shop.

SHASTA MONARCH MINING CO. **CALIFORNIA**

Address: M. P. Fries & Co., 1635 Broadway, New York. **Mine office:** Kennett, Calif.

Property: 80 acres at Stella (Whiskeytown), Shasta county, has been worked for many years; credited with a production of $127,000 from 1870-1912. There are 4 parallel veins, strike N. 50° W., dip 50° N., in alaskite porphyry near the contact with meta-andesite; pay shoot averages 18″ in width; ore is free milling.

Development: by tunnels.

Equipment: includes a 10-stamp mill, erected 1914, at which time 10 men were employed. (For geology, see U. S. G. S. Bull. 540, pp. 38, 39, 50, 51.)

SHASTA NATIONAL COPPER CO. **CALIFORNIA**

Address: M. P. Fries & Co., 1635 Broadway, New York. **Mine office:** Kennett, Calif.

Officers: W. H. McEwen, pres.; M. P. Fries, v. p. and gen. mgr; Horatio Alling, sec.-treas., with S. S. Norton and A. Kennedy, directors.

Inc. in 1917. **Cap.,** $5,000,000; shares $1 par. Company was organized to develop 1,000 acres of copper bearing land adjoining property of Mammoth Copper Co., Shasta Co., Cal. Reported in 1918 that the company had made final payment of $40,000 on some of its claims. Mine developing 1919, until shut down in December.

SHENANDOAH MINES CO. **CALIFORNIA**

Letters returned from former address, Clunie Bldg., 519 California St., San Francisco. A. Tisher was mgr.

Property: 3 claims and 2 mill sites, 63 acres, on Jesus Maria Creek, 5 miles N. W. of Eldorado, described in Vol. XIII.

SHIPSEY MINING CO. **CALIFORNIA**

Address: John Shipsey, Randsburg, Kern County, Cal.

Property: King Solomon group of 7 claims near Randsburg, Cal., said to have yielded gold worth about $2,000,000 in past 20 years, from depth of 500′. Five-stamp mill reported to be crushing $35 ore in July, 1917. No report since.

SIERRA ALASKA MINING CO. **CALIFORNIA**

W. S. Schuyler, pres.-mgr., Pike Cal. J. F. Dickson, v. p.; O. Crook, sec.

Inc. Jan. 22, 1912, in California. **Cap.,** $2,000,000; $1 par; changed in 1918 to $200,000, $1 par; all issued.

Property: near Pike, Sierra county, carries a quartz vein with gold and pyrite, without base sulphides. Developed by 900′ shaft and 1,700′ of workings.

Has a 40-stamp mill with 10-ton cyanide annex. The president writes that work was being done on a deep drainage adit, 1919.

SIERRA RANGE COPPER CO. **CALIFORNIA**

Address: A. L. Beardsley, mgr., Sioux City, Iowa. **Mine office:** Genesee, Plumas county, Calif.

Property: the Mountain Lion group, shows a vein of gold-silver-copper ore, developed by tunnels, and the Iron Dyke and Hirchman groups.

The Iron Dyke was under bond to the U. S. S. M. & E. Co. Main tunnel was in 700′ and opened high-grade ore.

SISKIYOU SYNDICATE **CALIFORNIA**

I. J. Luce, pres., 618 2nd Ave., Seattle, Wash. Mine office: Etna Mills, Calif.

J. M. Tetherow, v. p.; Alex. Parker, sec.; Jos. Stephens, treas.

Inc. 1909, in Washington. **Cap.**, $750,000; 25c par; $700,000 outstanding.

Property: 3 separate groups of unpatented quartz mining claims in Siskiyou county, said to show veins up to 3′ in width. Developed by several tunnels, none over 300′ in length. Management states that development work done in 1918, cost $2,000, and receipts from sale of chrome ore were $1,750.

SIXTEEN TO ONE MINING CO. **CALIFORNIA**

M. C. Sullivan, supt.

Property: situated ¾ of a mile south of Alleghany, Sierra county, Cal., was located in 1908 and is credited with a production of $150,000 to $300,000 in gold to 1914. Company was in the limelight during 1919, and for some time previous on account of litigation with the Twenty-One Mining Co. over extra-lateral rights; and in Oct., 1919, company was awarded $93,000 damages.

Ore: quartz in a vein ranging from a narrow streak up to 4′ in width. Country rock is amphibolite.

Development: by tunnels, main tunnel 900′ long. Twenty men employed at last accounts. A 35-ton 10-stamp mill started operating early in 1919. Production not made public.

SKIDOO MINES CO. **CALIFORNIA**

Company liquidated. Described in Vol. XIII.

SLATE RANGE MINERALS CO. **CALIFORNIA**

Morris B. Parker, supt., Bakersfield, Cal.

Property: located in Inyo county, 8 miles N. E. of Trona, shows lead carbonate ore. Company is erecting a 50-ton mill, for which there is said to be a 3-years' ore supply blocked out.

Production: in 1918, 1,331,440 lb. of lead, 1,786 oz. gold, 64,389 oz. silsilver, and 90,124 lbs. copper, with gross receipts of $142,822.

SOUTH EUREKA MINING & MILLING CO. **CALIFORNIA**

Reported in 1918 that its property was closed down due to lack of paying ore, or until conditions favored resumption. Described in Vol. XIII.

SOUTH FORK GOLD GRAVEL CO. **CALIFORNIA**

Address: Robert Edgar, supt., Lindsay, Tulare county, Cal.

Property: placer claims near La Porte, in Plumas county. Drilling has indicated a channel 1,500′ wide, and mining was to be started late in 1919.

SOUTH KEYSTONE CONS. MINING CO. **CALIFORNIA**

Mail returned from former address, Amador City, Cal.

Officers: W. Virges, pres.; C. H. Colper, v. p.; F. F. Wood, sec.-treas., with J. A. McIntire and C. Huth, directors.

Cap., $1,000,000; shares $1 par.

Property: several well known gold claims between Amador City and Sutter Creek, Cal.

Development: ground was unwatered in March, 1917, and exploration started on the 600′ and 1,000′ depth in North Star claim. A 10′ vein was cut at 600′, but nothing has since been reported. This is another of the old Californian mines being reopened under modern conditions.

SOUTH YUBA MINING & SMELTING CO. **CALIFORNIA**

A. Elliger, pres.; C. D. Tregoning, supt. Cap., $50,000.

Property at French Corral, Nevada Co., idle for 2 years. Described in Vol. XIII.

SOUTHERN CALIFORNIA GOLD DREDGING CO. **CALIFORNIA**

Mail returned from former address, M. L. Brackett & Co., 334 Citizens Natl. Bank Bldg., Los Angeles, Cal.

Officers: A. S. Maynard, pres. and mgr.; Lyman Farwell, sec.-treas.; with A. H. Pratt, F. S. Owens, and W. W. Benson, trustees. O. S. Williams, supt.

Cap., 1,000,000 shares of no par value; non-assessable; 898,000 issued.

Property: 15 claims, 2,528 acres, in Palomas district, Los Angeles Co., Cal.

Development: drilling started in Jan., 1917. Gravel said to average 51c per yard.

Extracts from reports given in prospectus are: "An average of 36c. per cu. yd."; "It will be a Klondyke"; "Sufficient gold . . . to pay all of the National debt"; "Will yield $14,435,559"; "Reasonably expect $30,000 to $40,000 a month"; "Most promising I have ever seen"; "A good and profitable dredging proposition." Five engineers gave gold contents as 45c., 22c., $1, 40c., and 35c. per yard.

The above quotations show that the company was not in conservative hands, and as mail is returned to writer, company is probably defunct. Is unfavorably regarded.

SOUTHERN EUREKA MINING CO. **CALIFORNIA**

Address: 411 Hyde Bldg., Spokane, Wash., and Greenville, Plumas county, Calif.

Inc. in Washington by George D. Needy, E. F. Yeager, M. A. DeHuff, Hal. J. Cole and H. R. Van Dreathen, all of Spokane. Cap., $2,000,000.

Property: the South Eureka, Hibernia, McClellan and Wardlaw mines, 12 claims, 450 acres, traversed by half a mile of the Crescent-Indian Valley and other lodes, near Greenville.

Work was resumed late in 1916 and a mill was proposed, but property was idle 1918 and 1919.

SPENCE MINERAL CO. **CALIFORNIA**

Idle.

Office: 1061 Mills Bldg., San Francisco, Cal., Mine near Spenceville, Nevada county, Calif. D. M. Kent, sec.

Property: an old mine, operated 1875-1903, the shaft caving in the latter year. Fully described Vol. XI, Copper Handbook.

Property was bonded in 1917 for 2 years to McLain & Hales, who have unwatered shaft and recovered a fair quantity of copper from the water, making 2 shipments to New York.

STANDARD AMALGAMATED EXPLOR'N CORP. **CALIFORNIA**

Office: Gahm Bldg., Boston, Mass. Mine near Esmeralda, Calaveras county, Calif.

Officers: Frank E. Bramhall, pres.; W. F. Dwyer, v. p.; A. E. Reidel, sec.; H. H. Brown, treas., with Alfred Grover, E. Koessler, E. F. Curtis, Geo. Clark and J. L. Whitten, directors. Louis Robin, mgr.; Chas. Cuneo, supt., Esmeralda, Cal.

Inc. Jan. 2, 1909, in Nevada. **Cap.,** $1,587,000; shares, $1 par; non-assessable; outstanding April 23, 1916, 2,264,223 shares.

Bonds: authorized and outstanding, $40,000. Company is successor of a corporation of same name, but greater capitalization.

Property: the Economic mine, 2 patented claims, 36 acres, near Esmeralda, is said to have a steeply dipping 6′ quartz vein of slate.

Development: by a 700′ tunnel, with total workings of 5,000′. Management claims ore blocked out sufficient to run the mill 4 years; assay $18 to $46, while "actual mill returns on try-outs to Selby smelter show better than $60.20 per ton."

Equipment: includes a 20-stamp mill, 100 h. p. compressor and electric power. Planned to build a cyanide plant in 1918, but nothing has since been reported.

STANDARD TUNGSTEN CO. **CALIFORNIA**

Ore reserves exhausted and property closed down, Nov., 1918. Plant has been dismantled and sold. Property was described in Vol. XIII.

STARR KING MINE, INC. **CALIFORNIA**

Office: 58 Sutter St., San Francisco, Cal.

Officers: R. C. Kennedy, pres.; M. J. Lindsay, v. p.; W. H. Young, sec.-treas.; John Watt, George J. Pressley, directors. George S. Dean, supt.

Inc. Sept. 26, 1917, in California. **Cap.**, $150,000; $1 par; 90,000 issued to Ronald C. Kennedy, in payment.

Property: Starr King and Sherman patented lode claims; American Gold, unpatented lode claim, and two mill sites, situated in Sec. 15, Twp. 1 N, R 16 E, M. D. M., also certain water-rights. Property is located above the North Fork of the Tuolumne river, two miles southeast of town of Tuolumne, terminus of the Sierra Railway, in Tuolumne county. Total is 75 acres, giving ownership for a distance of 3,500′ on the lode.

Geology: this tract shows the typical features of the east belt of the Mother Lode. The vein-system is in highly-tilted beds of Calaveras slates intercalated with schists and occasional occurrence of limestone, the whole intruded by parallel dikes of grano-diorite and diabase. Orebodies are said to average 3′ in width of $12 free-milling gold ore.

Development: consists of an incline shaft, 565′ in depth, with 5 levels driven a total of 2,800′ of work.

Equipment: electric hoist, compressor plant, 5-stamp mill and Wilfley table, electric transmission line, blacksmith shop, office, boarding-house, and miners' cabins. Power is furnished by the Tuolumne Light & Power Co.

Production: from 1886 to 1900 the mine was worked at irregular intervals by various owners, producing $300,000. Later test mill-runs produced $11,500. Due to increasing cost of labor and supplies, operations were suspended in 1918. but were to be resumed shortly (Nov., 1919.)

STEIFER MINING CO., P. B. **CALIFORNIA**

Defunct (?) See Vol. XIII of this work.

STOCKHOLDERS MINING CO. **CALIFORNIA**

Main office: 77 Franklin St., Boston, Mass. **Mine office:** Hodson, Calaveras county, Calif.

Officers: H. P. Brett, pres.; J. M. Whitcomb, treas.; E. F. Baxter, sec.; with W. A. Perry, T. L. Wiles, E. S. Hilton, and W. A. Mosman, directors. W. B. Farmer, business mgr.; Haines Gridley, mine mgr.

Inc. Jan. 10, 1917, in Maine, successor to the Royal Gold Mines Co., and the adjacent Mountain King Co. Cap., $2,000,000; shares $1 par, $1,500,000 issued for property and financing. Transfer agent: Commonwealth Trust Co., Boston. Annual meeting, first Monday in May.

Property: 17 claims, 14 patented, 180 acres on the Mother Lode, Calaveras county, Calif., containing low-grade gold ore. The ore-zone is said to be 5,000′ long and 500′ wide.

Property examined by W. E. Farish, W. P. Miller, J. H. Finlay, William Forstner, E. P. Jennings, and William Foster, who all reported favorably.

Geology: quartz veins in slates, which are traversed by dikes of diabase or greenstone, that often form one of the vein walls.

Development: 3 shafts, one 1,000′ deep, and 5,000′ of workings.

Equipment: hoist, crusher, tramway, 2 mills with 130 stamps, cottages, school, and hotel.

Operations were suspended in 1918, due to high cost of mining, and interest due on notes February, 1919, was not paid. It is understood that operations will be started as soon as general conditions improve.

SUNNYSIDE COPPER CO. **CALIFORNIA**

Address: Clyde Wardlow, Taylorsville, Plumas county, Cal.

Property: near the Engels mines. Development has been carried on for several years and machinery and buildings were erected in October, 1919.

SUTTER CREEK MINING CO. **CALIFORNIA**

Probably dead. See Vol. XIII.

TABLE ROCK MINING CO. **CALIFORNIA**

Address: 603 Union Savings Bank Bldg., Oakland, Cal. **Mine address:** Table Rock, Sierra county, Calif.

Officers: J. H. Hartley, pres.-mgr., 2432 Webster St, Berkeley, Cal. T. S. Elston, v. p.; W. W. Whitton, sec.-treas., with E. L. Oliver and Eula Sandow, directors.

Inc. Sept., 1915, in Nevada. **Cap.**, $500,000; $1 par; non-assessable; issued 307,899 shares.

Property: 12 unpatented claims at Table Rock, Sierra county, 25 miles S. of Quincy and 14 miles from La Porte, Plumas county. An old gravel channel is being explored and developed. Management states that $26,000 was spent on development in 1918 and $1,500 monthly in 1919. Gravel is said to assay $2 and over in gold per ton. Property is claimed to have produced $3,000,000.

TECOPA CONS. MINING CO. **CALIFORNIA**

Address: Tecopa, Cal.

Officers: Nelson Z. Graves, pres., 22 S. 3rd St., Philadelphia; L. D. Godshall, v. p.-gen. mgr., Los Angeles; J. S. Sullivan, sec.

Inc. in No. Dakota. **Cap.**, $3,000,000; $1 par.

Property: 17 patented claims at Tecopa, Inyo county, has veins carrying lead, silver and gold, average assays being 12% lead, 9 oz. silver, 0.1 oz. gold per ton.

Development: by incline shafts 300′ to 400′ deep, and by 2 tunnels, 1,500′ and 4,000′ long.

Management states that ore sales in 1918 were $232,426, and that dividends of $30,000 were paid.

TEDOC MINING CO. **CALIFORNIA**

Address: 268 Market St., San Francisco, Cal., or J. H. Hart, supt., Red Bluff, Tehama county, Calif.

Owns chrome mines on Tedoc Mountain, 51 miles from Red Bluff, on Eureka road.

THREE BUTTES & CONSUMNES COPPER MINES **CALIFORNIA**

Address: S. L. Watkins and associates, owners, Grizzly Flats, Cal.

Property: 30 sq. miles in Eldorado county, Cal., said to be heavily mineralized, carrying gold, silver, copper, molybdenum, etc.

Over 2,500 assays are said to show from 1 to 24% copper, with 50c to $2 per ton in gold for a large part of the deposit. No news recently.

TIGHTNER MINE **CALIFORNIA**

Address: Fred Searles, Jr., First National Bank Bldg., San Francisco.

Property: near Alleghany, Sierra county, Cal., formerly owned by H. L. Johnson, and sold to Grass Valley men for $500,000, the last payment being made in June, 1917.

Dividends: not published; but from $100 to $1,000 per share has been paid at various times, totaling fully $1,000,000 in 5 years up to 1918.

Geology: quartz vein in amphibolite schist, which is much altered and sheared near the walls of the vein. Faulting is frequent, and the shoots irregular.

Ore: carries gold, often in large, coarse particles and masses, associated with arsenopyrite and galena.

Development: in early days a bedrock tunnel in a drift-gravel mine cut a vein, but no attention was paid to it until 1907, when the tunnel was reopened and about $400,000 extracted up to time of selling to present owners in 1911. The lower tunnel is over 4,000′ long.

Equipment: complete, with 20-stamp mill.

Production: not published, but $1,000,000 to June, 1913, and fully as much since. Property closed down in 1918, owing to high costs and labor shortage. In 1919, Fred Searles, Jr., obtained an option on the mine, which will be unwatered and development resumed. New York capital is said to have acquired it for about $250,000 in August, 1919.

TITANIC COPPER MOUNTAIN MNG. CO. **CALIFORNIA**

Address: temporary office, Jan., 1919, given as 18 Ironmonger Lane, London, E. C., England.

Officers: H. F. Melville; Maurice K. Exham, sec.; Soledad, Cal.

Inc. Jan., 1914, in Arizona. **Cap.**, $1,000,000; $1 par; issued 625,000 shares.

Property: about 500 acres, 10 miles from Soledad, a station on the So. Pac. R. R. and 40 miles from Monterey, San Benito county,. The "private and

confidential" information issued by the company bears the earmarks of a promotion worthy of prompt investigation by the Postoffice authorities.

We quote: "The mine is 1½ miles long by ½ mile wide on the average, and covers close upon 500 acres. As compared with other celebrated copper mines, it is about 3 to 4 times the size of the famous Rio Tinto mine in Spain, and about twice that of the Anaconda mine proper. The Titanic company's ores are free from leaching and milling ore similar to those of Rio Tinto, but of much higher grade, i. e., 3½% metallic copper fine to the ton, whereas, Rio Tinto produces only about 2% to the ton. . . . The life of the mine is computed by the mining engineers and Mr. H. F. Melville to run into 3-4 centuries. Besides, the strippings constitute a fertilizer of nitrous potash which is in great demand, and can be sold locally at a handsome profit, which, however, for the present is not taken into consideration. . . . The company intends to purchase 20 Huntington stamp-mills, these taking an average of 30 tons per mill per day, should treat 180,000 tons of ore-bodies, which at 3½% copper fine to the ton, would equal 6,300 tons of pure copper. At the present price of £120 per ton, a gross profit of £756,000 would be earned by the company. Allowing for expenses at 6 cents per lb., these would amount to about £200,000. The net profit would be £556,000, i. e., over 275% on the total capital. . . . Quarterly dividends will be paid and yearly balance sheets issued up to the 30th June. . . . Three drifts of large cuts have been made, also a connecting tunnelling between them through the sulphide ore-bodies and splendid ores have been laid bare for immediate working, which can be produced at a very low cost. . . . It should be added that numerous large corporations, such as the Southern Pacific Ry. Co., the Amalgamated Copper Co., Henry K. Merton & Co., etc., have endeavored to buy up the whole property, but all offers however, tempting, have been wisely refused. The president of the company, Mr. H. F. Melville, has told all prospective buyers that there is not a corporation in the world who is in a position to offer sufficient money to tempt the company to dispose of their property. . . . The subscription list is now open privately and will be closed in a few days."

The property is described under name of Copper Mt. Mng. Co. in Mines & Mineral Resources of San Benito county, 1917, issued by Cal. State Mng. Bureau. An engineer known to us states that beyond a few hundred feet of workings there is nothing to indicate that property is anything but a prospect. The Government ought to look into this matter.

TRAIL CREEK MINING CO. **CALIFORNIA**

Address: Callahan, Cal. G. A. Foster, pres. and supt.; G. Hart, sec.

Property: 100 acres in Trail Creek, Siskiyou county, reached by trail from Callahan. A fissure vein occurring between schist walls, with dip 60° N. and course N. 40° W., is said to carry an ore shoot 300′ long and 2′ wide. Workings consist of 850′ tunnel, drifts and a stope 200′ long.

Equipment: includes two Huntington mills, run by water power, and several buildings. Owners claimed 3,000 tons ore reserves. Production to July, 1915, $40,000. No later report.

TREASURE MINING CO. **CALIFORNIA**

Office: 576 Mills Bldg., San Francisco. **Mine office:** Amador City, Cal.

Officers: W. Rothchild, pres.; E. J. McCutcheon, v. p.; E. S. McCurdy, sec.-treas., with H. G. Stevenson, G. W. McEnerney, directors. O. H. Rohlfs, superintendent.

Property: one claim, near Amador City, Amador county, said to show a gold quartz vein in schist with dip 45° to 55° and N. W. strike.

Development: winze 700′ deep; 50° incline shaft, with levels at 1,800′, 2,000′, 2,160′ and 2,300′. In 1918, reported good ore in lower levels, but nothing later is at hand.

TRINITY COPPER CO. **CALIFORNIA**

Office: 33 State St., Boston, Mass. **Mine office:** Kennett, Shasta county,

Officers: Thos. W. Lawson, pres.; Arnold Lawson, v. p.; John M. Reynolds, sec.; Allen Arnold, treas.; preceding with Arthur P. French, John N. Reynolds, John R. Turner, E. A. McSweeney, directors.

Inc. Oct. 18, 1900, in New Jersey. **Cap.**, $6,000,000; shares $25 par; 240,000 shares outstanding. International Trust Co., Boston, registrar; Federal Trust Co., Boston, transfer agent. Shares listed on Boston Stock Exchange and on the New York Curb. Federal Trust Co., Boston, transfer office. Annual meeting, October 7, 1919.

Trial balance as of September 1, 1916, showed assets totaling $6,188,744, including $5,221,000 for property, $711,980 for development and construction, $218,799 for expenses through Eastern office, $56,500 for railway and power company, and $464 cash. Liabilities included A. S. & R. smelting contract payable in ore, $28,548; ore account, $39,471; and accounts payable, $120,725.

Property: 1,700 acres, also a patented town site, near Kennett, with total holdings of 3,233 acres. Property includes the Shasta King, which is the principal mine, the Lost Desert and King Copper groups.

The **Shasta King** group, 12 claims, adjoins the Balaklala mine, on the southern fork of Squaw Creek, 4 miles east of Iron Mountain. The main double track tunnel is 1,145′ long; there is another tunnel driven 175′ vertically lower. The mine has 15,000′ of workings and property has been tested by 5,119′ of diamond-drill borings.

The orebody is a lens, claimed to be approximately 150′ wide by 1,000′ long, but apparently the ore does not go to great depth, and it is possible that the bottom limits have been reached. The property is said to have ore reserves of 400,000 tons, with fair chances of 750,000 tons, and possibilities of a greater tonnage. The crosscut tunnels, driven in from the sides of the mountain, connect with drifts on the orebody, which is low-grade pyritic ore containing disseminated chalcopyrite, and holding 1 to 2½% copper, with combined gold and silver values of about $1 per ton. The ore carries small quantities of zinc and an excess of iron, and probably averages around 2½% copper and 1 oz. silver per ton, with small gold values. The Trinity also has an orebody, of undetermined size, on the opposite side of the gulch from the Shasta King.

The Shasta King mine has ore bins, and a 2,000′ incline tram, of about 500 tons daily capacity, leading to the head house of the Balaklala tramway. The Copper King group of 22 claims, on Motion Creek, about 2½ miles S. of the Shasta King mine, has about 1,000′ of exploratory workings, but apparently no ore has been found in place. The Statesman group has been partially explored, in an effort to locate and develop silicious ore required for fluxing the heavy sulphide ores of the Shasta King mine. The Uncle Sam group, held under bond and lease at last accounts, also has been exploring for fluxing ores, the Shasta King having large bodies of low-grade copper sulphide, but lacking the silicious ores required to make free-smelting furnace mixtures. The Uncle Sam group shows some oxidized ore, at and near surface, of 3 to 8% copper tenor.

Equipment: includes a steam plant with a 6-drill air compressor and power drills; also a diamond drill, with which considerable boring has been done. Buildings include a laboratory, warehouse, shops, hospital and about 25 houses for employes.

The company was reported to be ready for production September, 1907, at the rate of about 150 tons daily. It started production October, 1908, and shipped ore to the Balaklala smelter, but closed down early, 1909, and no record of the actual production of copper can be secured. The Trinity Co. claimed to have a contract with the Balaklala smelter calling for the treatment of 300,000 tons of ore for the first year and 360,000 yearly for the 9 succeeding years; with a minimum of 300 and maximum of 1,000 tons daily, which was to have been matted for $3 per ton, but the contract was not carried out, and the mine has been closed down since February, 1909, waiting first for 15c copper and now for the Balaklala smelter to resume operations. For history of the company, see Vol. X, Copper Handbook.

President Lawson stated, at the annual meeting, 1913, that Trinity's day will come and that the property's decriers will be forced to "eat their born-of-ignorance criticisms." His statement was in part as follows: "Trinity is still awaiting the resumption of First National-Balaklala smelting operations, and if

these efforts are successful, the unbroken chain of Trinity's misfortunes should be at an end."

On August 13, 1917, T. W. Lawson told shareholders that the mine was again in operation and the entire property to be diamond-drilled; also that an advantageous 10 to 15-year contract had been made with the U. S. S. Co. for 200 tons of 3% ore daily. Furthermore, that even if no additional ore is discovered the present developed deposit will supply 3% ore for many years. He added that a mining and financial statement would soon be made. He advises: hold on to shares, as Lawson tips on Butte, Chino and Copper Range were all correct.

In October, 1918, the company issued a report saying since operations were resumed in October, 1917, production amounted to 51,455 tons ore, yielding 3,687,300 lb. copper, also $1.04 per ton in gold and silver. Up to February, 1919, when shipments to the Mammoth smelter ceased, the output approximated 70,000 tons.

Reported in 1919 that Shasta King mine was closed down, the lease to the Mammoth Copper Co. having expired.

In September, 1919, T. W. Lawson, is reported to have advised shareholders "that the present company is in debt, and getting deeper in debt instead of getting out." He recommended that the property be sold to a new company, organized under laws of Virginia, "where the taxation is less severe." The proposed capital to be 1,000,000 shares, par $5, compared with Trinity Copper's 240,000 $25 shares. Each shareholder is to receive one new share for each share that he surrenders, while he may purchase new shares at $2 each. Another property is to be acquired, and part of its earnings can be used "to make a thorough exploration of all Trinity's enormous ground." Lawson also said that he is regretfully compelled, as president of Trinity Copper, "to so radically change my views of its future. At the start-off, I made large profits. Since then, in the many stock market campaigns, which were started because of favorable outlook for the property, I have lost heavily." If Trinity cannot make profits with copper above 20 cents, as it was when operations were under way, it is time the property was closed down for all time.

STOCKWELL GOLD MINING SYNDICATE **CALIFORNIA**

Address: 304 Grant Bldg., Los Angeles.

Officers: C. L. Mullholand, v. p., El Monte, Cal.; V. E. Stockwell, sec., 304 Grant Bldg.; Harris Trenholm, supt., Trona, Cal.

Inc. Jan. 20, 1917. **Cap.,** 1,000,000 shares. Company reports operating expenses for 3 months, $3,413, and gross earnings for same period, $2,940.

Property: 4 claims, unpatented, 8 miles N. E. of Trona, Cal., said to show a quartz vein in granite and porphyry. Ore is gold, silver assaying about $15 per ton.

Development: by tunnels, total workings about 1.000'.

Equipment: includes a 25 h. p. hoist and a 35-ton cyanide mill.

Management, Dec., 1919, reports that mine has been operating about 3 months.

TRINITY GOLD MINING & REDUCTION CO. **CALIFORNIA**

Practically defunct for years. See Vol. XIII.

TUNGSTEN MINES CO. **CALIFORNIA**

General office: 58 Sutter St., San Francisco, Cal. **Mine office:** W. R. Lindsay, supt., Bishop, Inyo county, Cal.

Officers: F. M. Townsend, pres.; R. A. Orrett, sec., with R. A. Kinzie, V. Klinker, H. T. Thompson, F. W. Griffin and J. C. McKinstry, directors.

Cap., $3,000,000; shares $10 par.

Property: a group of claims, purchased 1915 from A. J. Clark, situated in a narrow gulch known as Deep Canyon, 7 miles west of Bishop. The scheelite-bearing garnet rock occurs in granite. (U. S. Geological Survey Bulletin 640-L, by Adolph Knopf, describes the district.)

Development: by 2 tunnels, one on each side of the new mill and connected therewith by 700' tram line.

The 300-ton mill, built 1916, is equipped with Allis-Chalmers rolls, trommels and tables.

No record of production is available.

TUOLUMNE GIANT GOLD MINES CO. **CALIFORNIA**

Address and names of officers not available. In August, 1919, stock was advertised by Jas. H. Blagge, 332 Security Bldg., Los Angeles.

Cap., $1,000,000; $1 par.

Property: two groups of claims, Tarantula and Gold Ridge, in Tuolumne county, said to adjoin the Eagle Shawmut on the north. Tarantula group has 7 claims and a mill-site; Gold Ridge group has 3 claims and 4/8 section of patented agricultural land; total area about 300 acres. The Tarantula has a 1,300′ tunnel and 700′ winze with levels at 100′ intervals. The Gold Ridge has a shaft 118′ deep, and samples from vein said to average $5.25 gold per ton.

Equipment: 20-stamp mill on Tarantula and 10-stamp mill on Gold Ridge, hoists, compressors, etc.

Evidently plans to reopen properties. Said to have been examined by Thos. A. Wetzel and F. W. Royer.

TWENTY-ONE MINING CO. **CALIFORNIA**

Address: Allegheny, Sierra county, Calif.

Property: a gold quartz mine in the Alleghany district that has been prominent in recent years on account of apex litigation with the Sixteen-to-One Mining Co. In October, 1919, the latter was awarded $93,000 for trespass.

UBEHEBE COPPER MINES & SMELTER CO. **CALIFORNIA**

Mail returned from former office at 956 Rockefeller Bldg., Cleveland, Ohio. **Operating office**: Tonopah, Nev. **Mine office**: Lone Pine, Inyo county, Calif.

Officers: At last accounts, John Salisbury, pres., St. Francis Hotel, San Francisco, Calif.; Henry G. Merry, v. p. and cons. engr.; J. J. Griffith, sec.-treas.

Inc. 1907 in Nevada. **Cap.**, $3,000,000; shares $1 par.

Property: 50 claims, 1,000 acres in the Butte Range, 48 miles from Thorpe on the Bullfrog & Goldfield railway, said to show vein of 8 to 50′ width, in granite and limestone, carrying copper ore with gold-silver values. Property advertised 1907 as a mountain of gold-silver-copper ore nearly 2,000′ high.

Development: by an 80′ shaft and 145′ tunnel, with some work on other holdings. The company has done annual assessment work, but contemplates no further extensive development until the financial situation improves, and means of transportation are devised. Was a promotion in 1907 of Pearce Hill & Co. of Baltimore, Md. Property said to have merit if systematic development carried out. Idle for years.

UNION DEVELOPMENT CO. **CALIFORNIA**

Address: 713 Iowa Loan & Trust Bldg., Des Moines, Iowa.

Property: the Blazing Star mine ½ mile E. of West Point, Calaveras county. A 2′ quartz vein was developed by a 400′ shaft, which was being reopened in 1917; no recent news available.

UNION HILL MINES **CALIFORNIA**

Company disincorporated and property taken over by Idaho-Maryland Mines Co., which see.

UNITED GREENWATER COPPER CO. **CALIFORNIA**

Office: Tonopah, Nev. **Mine office**: Dale, via Amboy, San Bernardino county, Calif.

Property: Company was operating the Supply mine and owned the O. K. mine. This group is developed by shafts of 800′ and 1,100′. Had a 50-ton cyanide plant which was enlarged in 1915. Reported to have treated 60 tons of ore daily in 1915, averaging $14 per ton. Milling costs were 75c per ton.

No returns since.

UNITED STATES EXPLORATION CO. **CALIFORNIA**

Office: 617 Pacific Bldg., San Francisco. **Mine office**: Granite Basin, Plumas county, Calif.

Officers: O. P. Posey, pres.; C. N. Miller, sec. and mgr.

Inc. 1904, in Nevada. **Cap.**, $1,000,000; shares $1 par; promotion stock, 300,000 shares.

Property: the Pepin mine. Report of E. C. Reed, mining engineer, gives

value of $20.50 for 240′ of ore-shoot. Vein said to average 2′ wide. Machinery on ground for 75-ton mill, including crusher, rolls, jigs, concentrators.

No new data received for several years.

UNITED TUNGSTEN COPPER MINES **CALIFORNIA**

Address: 401 Bradbury Bldg., Los Angeles, Cal.

Officers: Frank F. Peard, pres.-mgr., Hotel Maryland, Pasadena, Cal.; Dr. C. H. White, v. p.; Wm. K. Weaver, sec.-treas. Jos. Zanini, supt., Victorville, Calif.

Inc. 1916, in Arizona. **Cap.**, $2,000,000; $1 par; issued 1,527,201.

Property: 18 claims. 360 acres. in Morongo mining district, San Bernardino Mountains, 47 miles from Victorville, San Bernardino county, has been undergoing development, by tunnels for past two years.

Management reports ore reserves of 10,000 tons and that a 25 to 50-ton mill will be built.

UTACALA EXPLORATION CO. **CALIFORNIA**

Address: Morris P. Kirk, pres.-mgr., Salt Lake City.; Geo. H. Ryan, supt.

Property: a zinc mine 9 miles from Darwin, Inyo county, and 34 miles from Keeler, the nearest railroad point, said to have the largest known deposit of hydrozincite, averaging over 40% zinc and 12% moisture. The greatest thickness of ore so far disclosed is over 25′. A small calcining plant, 10 to 12 tons daily capacity, reduces the moisture to 1½%, thus making a saving in truck and railroad freights. Rate of shrinkage in calcining averages 22%.

UTICA GOLD MINING CO. **CALIFORNIA**

Utica mine closed permanently in 1918; see Vol. XIII for full description; but the Gold Cliff at Angels, Calaveras county, is being worked to depth of 1,900′, supplying 225 tons of good ore daily for the 40-stamp mill.

VALDOR DREDGING CO. **CALIFORNIA**

Office: R. H. Elliott, Hobart Bldg., San Francisco. **Mine office:** Milan A. Senger, supt., Junction City, Cal.

Officers: Bulkeley Wells, pres.; R. H. Elliott, v. p.; A. D. Snodgrass, sec.-treas., with T. D. Harris and Jafet Lindeberg, directors.

Inc. March, 1916, in California. **Cap.**, $200,000; shares $100 par; all issued. Annual meeting, third Tuesday in February.

Property: placer claims, near Junction City, Trinity county, Cal. Gravel contains gold and metals of the platinum group.

Equipment: one 7 cu. ft. close connected, electric driven dredge.

Production: 1917, 1,494,860 cu. yds. at cost of 5.01 cents per cu. yd.; 1918, 1,602 255 cu. yds. at cost of 5.89 cents per cu. yd.

Dredging started late in 1916. Costs are low.

VICTOR LAND & MINERAL CO. **CALIFORNIA**

Address: Angels Camp, Calaveras county, Cal. Company received a permit from California State Corp. Commission to sell 200,000 shares at 50c per share. Management states that it has a gold mine, with 410 acres of ground fully equipped with machinery, etc.

VICTOR POWER & MINING CO. **CALIFORNIA**

Office: J. H. Sharpe, 1025 Hearst Bldg., San Francisco. **Mine office:** Knob, Calif.

Officers: J. H. Sharpe, pres.; A. Bonick, v. p.; A. A. Barber, sec.-treas.; with H. L. White, directors.

Inc. Oct. 1907, in California. **Cap.**, $500,000; shares $1 par.

Property: 3,400 acres in Harrison Gulch, Shasta county, Cal., including the Midas, Gold Hill, Bonanza, Bull Moose, and other mines. The first-named is credited with a gold yield of $4,000,000.

Geology: quartz vein in diabase and slate,, dipping 74° and pitching N. W. The orebody is 12″ wide and 200′ long, ore averaging $22 per ton.

Development: by 1,200′ vertical shaft, and tunnels. Workings total 45,000′. Results late in 1919 were said to be very good.

Equipment: includes 250-h. p. Diesel engine, 70-h. p. electric hoist, 90-

h. p. compressor, three 20 h. p. pumps, and reduction plant using 4 Gibson mills and concentrators.

Ore reserves are given, June, 1919, as 30,000 tons of $15 ore. The management in the past has done too little development work, pursuing a "day to day" policy and not maintaining sufficient ore reserves. The company was unfortunate in having had its stock promotion handled by an "investment securities" firm on Broad St., New York, which ran the stock up to $5.25, when one of the firm skipped.

WALKER CONS. MINING CO. **CALIFORNIA**

Address: J. R. Walker, pres., Salt Lake City.

Property: paralleling that of the Walker Mining Co., said to have extensive orebodies shown by an 800′ tunnel and numerous surface workings. Diamond-drilling was to be started in October, 1919.

WALKER MINING CO. **CALIFORNIA**

Subsidiary of the Anaconda Copper Mining Co., through the International Smelting Co.

Office: 618 Kearns Bldg., Salt Lake City, Utah. Mine near Portola, Plumas county, Calif.

Officers: J. R. Walker, pres.; O. M. Kucks, v. p.; J. B. Whitehill, sec.-treas., with C. A. Walker and B. R. Howell, directors. V. A. Hart, mgr.

Inc. 1913, in Arizona. **Cap.,** $1,250,0000; $1 par; all issued. Also 100,000 $1 pfd. shares issued. Stock listed on the Salt Lake Exchange. In 1918, the Anaconda Mng. Co., through its subsidiary, the International Smelting Co. exercised its option on control of the company. As reported, the deal called for 630,000 shares at $1 per share.

Property: 38 patented lode claims, 2 placer claims, heavily timbered, elevation, 7,100′, in an unorganized district, 19 miles N. W. of Portola, on the Western Pacific Railroad.

Geology: the claims show diorite largely overlain by volcanic tuff; the diorite showing fissuring and alteration for length of several claims.

Development: the property has been explored to a depth of 346′ by 2 shafts, and drifts from these shafts have opened an orebody 800′ long, average width 16′, and averaging 4% copper. Diamond-drill holes indicate an additional length of vein of 900′. A 3,500′ crosscut tunnel is being driven to cut the vein, then follow the vein 1,200′ to the shaft, developing property to a depth of 800′. The tunnel was 2,250′ long in August, 1919.

Equipment: the mine has a 120-h. p. steam plant, large hoist, compressors, etc. An aerial tram, 8.2 miles long, carries supplies from, and concentrates to the railroad. Auto-trucks are also used.

The mill capacity was doubled in 1917, and now treats 200 tons daily. It employs ball-mills and flotation machines. Recovery is well over 90%. In November, 1917, electric power from the Great Western Power Co. superseded steam. Employs 200 men.

Gradually this is becoming one of the most interesting of California copper mines.

WERINGER MINES CO. **CALIFORNIA**

Officers: Jos. Weringer, pres. and mgr., Woody, Kern, Cal. F. J. Weringer, v. p.; Erwin W. Owens, sec., Nat'l Bank Bldg., Bakersfield, Calif.; Otto Kamproth, treas., with E. H. Woody, Paul Fox and Amasa P. Peak, directors.

Inc. Dec. 17, 1914, in California. **Cap.,** $500,000; $1 par; 293,543 issued. Secretary is transfer agent. California Corporation Commission granted authority to sell 100,000 shares at 50c in 1915.

Property: the Greenback mines, 68 claims on R. R. land, with 2,200 acres mineral and water rights in sections 1, 2, 3, 10, T. 28 S., R. 29 E., situated 22 miles from railroad at Oil Center. Mine said to show contact metamorphic deposit a mile long in granite and porphyry, running N. S. and S. W. and dipping 45° to 85°. Orebody, 100′ wide, carries copper, molybdenite, wolframite, with manganese-iron ore. Ore said to average 5% copper, 4 oz. silver and $1.50 in gold. Property reported on by W. J. Adams, W. H. Storms, H. W. Turner, D. M. Folsom, C. H. White and other engineers.

Development: aggregating 1,600′ by 200 and 230′ incline shafts, connected at 200′ depth. Latest work on 140′ level. Ore reserves: 10,000 tons claimed, 1,000 tons on dump valued at $150,000.

Equipment: 20-h. p. gasoline hoist, 75-h. p. engine, compressor, etc. A 100-ton mill was started in April, 1917. It includes jaw crusher, 6″x22″, Hardinge ball-mill, Dorr classifier, K. & K. flotation machine, and Oliver filter.

Has not replied to requests for information.

WESTERN MERCURY CO., INC. **CALIFORNIA**

Address: 68 Post St., San Francisco and Cloverdale, Cal.

Officers: Andrew Rocca, Jr., pres.-treas.-supt., Cloverdale; J. G. De Forest, v. p.; L. B. O'Farrell, sec., with C. A. Shurdtleff, H. L. Johnston, E. C. Miles and Jos. Schorr, directors. Annual meeting, second Monday in May.

Inc. April, 1919, in Cal. **Cap.,** $300,000; $1 par; assessable; outstanding 231,528.

Gross earnings for past year reported as $142,401, with operating expenses of $83,419.

Property: 13 claims, one patented, 260 acres, in Macaymas mining district, 12 miles E. of Cloverdale, Sonoma Co. The orebody is characterized by ledges of thinly stratified chert, inclosed by sandstone. Chert strata vary from ½″ to 3″ in thickness; ore averages ½% mercury.

Development: tunnels with 2,000′ of workings. Ore reserves reported as 30,000 tons, with 20,000 of this blocked out.

Equipment: includes gravity tram from mine to mill, and a furnace with daily capacity of 85 tons.

Production: in 1918 amounted to 1,267 flasks of mercury, and more than this in 1919.

See p. 183, Quicksilver Resources of Cal., Bull. 78 of Calif. State Mng. Bureau.

WESTERN MINES CORPORATION **CALIFORNIA**

Described in Vol. XIII as operating the Gwin mine, but company was merely a selling organization and did not operate the mine, which has been idle for many years past. Unable to get recent information on company; probably dead. See Gwin Mine & Development Co.

WEST END CHEMICAL CO. **CALIFORNIA**

Subsidiary of West End Mining Co. of Nevada.

Inc. 1920. **Cap.,** $3,000,000; shares $1 par.

Property: 2,300 acres leased from the Federal Government and 680 acres patented, on Searles Lake, San Bernardino county. Townsite is known as Westend, on the Trona railroad. Brine from the lake is to be treated for extraction of potash, borax, and other salts.

Equipment: 5-mile narrow-gauge railroad, telephone, telegraph, power, and pipe lines, road, pumping plant on lake, testing plant at Westend, laboratory, machine-shop, office, bunk and boarding houses, and camp fully equipped with sewerage, water, and lighting system.

WESTON JUDKINS CO. **CALIFORNIA**

Address: Mariposa, Cal. P. W. Judkins, C. H. Weston and I. L. Dearborn, owners of a gold mine in the Colorado mining district, near Mariposa. Mine is being worked by lease. Ore is said to average $8 per ton. Developed by 250′ shaft. Equipment includes a 10-stamp mill.

WHITE GULCH MINING CO. **CALIFORNIA**

Office: 263 12th St., Oakland; C. C. Powning, supt., Bagby, Cal.

Property: the Virginia quartz mine, 8 miles from Bagby, Mariposa county. The vein varies from a seam to many feet in width with serpentine footwall and diabase hanging-wall.

Development: 750′ shaft, with 5 levels.

Equipment: includes a Fairbanks-Morse hoist and 35-h. p. motor, 50-h. p. Ingersoll-Rand compressor; 3 miles of power line; track, cars, pipe, buildings, etc. Also a 10-stamp mill with crusher and amalgamating plates and 50-h. p. gas engine. In 1917, 22 men were employed and the mill was treating 30 tons daily.

WHITE KNOB COPPER & DEVEL. CO., LTD. **CALIFORNIA**

Address: 42 Cedar St., New York.

Officers: John P. Smith, pres.; A. H. Carlisle, v. p.; Arthur Kennedy, sec.; E. H. Kelly, treas., with W. W. Cohen, directors.

Cap., $6,000,000; $4,000,000 common and $2,000,000 7% cumulative preferred stock. Company is a holding company controlling through ownership of $1,200,000 of the capital stock, the Argonaut Consolidated Mining Co., a dividend payer, which controls the Argonaut Mining Co., at Jackson, Amador county, Calif., which see.

Dividends: were resumed in 1914, with payments of 25c per share on preferred stock, November, 1914; 10c in February, May, August and November, 1915; 10c, February, May, August and November, 1916; 25c in 1917 and 20c in 1918.

WHITE PINE MINING CO. **CALIFORNIA**

Address: F. A. Crampton, 207 Oregon Ave., Santa Monica, Cal.

Officers: F. A. Crampton, pres.; D. M. Hewey, v. p.; C. H. McCarter, sec.-treas.; also directors.

Inc. Aug. 5, 1915, in Nevada. **Cap.,** $1,000,000; shares $1 par; non-assessable. 725,000 issued. Annual meeting, first Wednesday in January.

Income from ore sales in 1916 was $18,000 and expenses $47,000.

Property: the Green Monster Extension at Goodsprings, Nev., idle at present. Mine examined by J. N. Nevius, O. B. Suhr and F. A. Crampton.

Production: in 1915, 10 tons of copper and 35 tons zinc ores.

WHITE ROCK MINE **CALIFORNIA**

Address: Frank R. Sweasey, principal owner, Humboldt Bank Bldg., Market St., San Francisco.

Property: one of the largest magnesite mines in the State, in Pope Valley, 20 miles E. of rail at Rutherford, Napa county. The mine is at an elevation of 1,200′, and 500′ above the works. The main vein, 15′ wide, in serpentine, has distinct walls, dips 35°, and ore carries 45% MgO and 1.5% FeO and is much in demand for refractory purposes, as it is low in lime.

Development: by a main 500′ tunnel and 5 levels above it, showing 350′ of backs. Ore persists below the tunnel-level. Some open-cut work is done. Reserves are considerable.

Equipment: distillate engines, Chicago Pneumatic compressors, machine-drills, smithy and screening plant at mine, 5,000′ aerial tram of 20-ton hourly capacity, 11 vertical calcining kilns using coke, of 6 to 7 tons daily capacity of roasted ore, crusher, bins, motor-trucks, and camp for all employees.

Production: normally 3,500 tons of crude, or 1,700 tons of calcined magnesite per month.

WILLOW VALLEY MINING CO. **CALIFORNIA**

Office: 443 Holbrook Bldg., San Francisco. **Mine office:** Nevada City, Calif.

Officers: M. Dozier, pres.; J. L. M. Shetterley, v. p.; C. E. Reith, sec.-treas.; A. W. Hoge, C. F. Kinsey, R. W. Bender, directors. A. W. Hoge, supt.

Inc. May 18, 1915, in California. **Cap.,** $1,000,000; shares $1 par. Annual meeting in May.

Property: 9 claims, 4 patented, 125 acres, in Nevada City district, Nevada county, has several veins, containing gold and silver ore, which occur in granodiorite and slate and dip from 20° to 70°. Developed by shaft and tunnel to depth of 800′.

Equipment: includes electric power, compressor, pump, tramway, stamp mill, etc. Developing only, 1916-19. No later returns and does not reply to letters sent them.

WILSHIRE BISHOP CREEK CO. **CALIFORNIA**

Bishop, Kern county, Calif. Operates a mine formerly owned by Rocky Point Cons. Mines Co., now absorbed by Cons. Wilshire Mng. Co., which see.

YANKEE JOHN DEVELOPMENT CO. **CALIFORNIA**

Address: 501 Peoples Bank Bldg., Pittsburg, Pa.

Officers: W. L. Clark, pres.; G. B. Preston, v. p.; W. T. Drill, sec.-treas., with A. H. Bowman, A. M. Host and H. T. Morris, directors.

Inc. 1913, in Delaware. **Cap.,** $1,000,000; $1 par. Listed on New York Curb.

Property: 6 claims, 6 miles W. of Redding, Shasta county, said to show quartz veins in andesite and rhyolite.

Development: by 2 shafts, 50′ and 200′ deep, with 1,500′ of workings.

Equipment: includes a gasoline hoist, compressor, and a 40-ton mill. Management gives ore reserves as 6,300 tons of $20 ore.

YELLOW ASTER MINING & MILLING CO. **CALIFORNIA**

Office: Dr. Rose L. Burcham, sec., 839 Citizens Bank Bldg., Los Angeles. **Mine office:** Randsburg, Kern county, Cal.

Officers: Albert Ancker, pres.; Arthur Asher, v. p.; Rose L. Burcham, sec.; V. H. Rossetti, treas.; H. L. Bennett, asst. sec., with R. H. Raphael and E. L. Kenny, directors.

Inc. Nov. 16, 1897, in Nevada. **Cap.,** $1,000,000; shares $10 par; 86,761 issued; reorganized, April 30, 1917, in Nevada, with capital of $1,500,000; shares $1 par; 1,077,600 issued. Annual meeting, May 16.

Statement for 1916 shows a revenue of $437,197, less $313,970 for operations, and $53,473 for improvements.

From 1898 to October 31, 1917, revenue totaled $8,725,588, of which $1,245,789 was distributed.

Dividends: have been irregular for many years. Paid $38,000 in 1916; $35,000 to October, 1917.

Property: 47 patented and 6 unpatented claims, water rights and placer areas, totaling 796 acres, mostly at Randsburg, Kern county, Cal., and one mile from Johannesburg on the Santa Fe Railroad.

Geology: vein occurs in granite, schist, and porphyry. Main orebody is from 30′ to 40′ wide, with schist hanging-wall. Ore is low grade, averaging $3.21 per ton during 20 years. Gold is easily extracted.

Development: is extensive, aggregating about 27 miles of tunnels, stopes, open cuts and other workings to depth of 750′. Open cut work has produced most of the ore in the past. Reserves estimated in December, 1916, by W. W. Hegeman, at 6,278,529 tons of $1.77 ore.

The mill was closed down November and December, 1917, but in 1918 treated 100,948 tons of ore, grade and recovery not given.

Equipment: 150-h. p. and smaller hoists, 150-h. p. compressor, machine drills, steam shovels, pumping stations and several miles of water pipelines, 250-ton (per hour) screening plant, 100-stamp mill (back to back design, each 50 stamps driven by 150-h. p. motor), copper plates, steam boilers and engines, 3 oil-burning locos., sixty 3-ton side-dump steel cars, machine shops, assay office and the Rand Mercantile store. Recent additions are costing $250,000. A cyanide plant may be erected to treat 1,000,000 tons of tailing stored. Power is supplied by the Southern Sierra Power Co. So far, $747,972 has been spent in plant on the property.

Production: from 1898 to October 31, 1917, there was mined 2,713,384 tons, yielding $8,725,588, equal to $3.21 per ton. The cost was $2.44 per ton.

Recent returns are as under:

Year	Tons	Value per ton	Cost per ton
1917*	98,105	$2.84	$1.80
1916	152,827	3.31	2.08
1915	166,446	3.14	1.83
1914	147,793	3.02	1.86
1913	131,481	3.03	2.22
1912	151,746	3.53	2.00
1911	162,683	2.52	1.71
1910	186,370	2.50	1.57

* 10 months.

Present daily capacity of the mill is 450 tons, but when the screening plant is working, up to 700 tons will be treated.

Yellow Aster has passed through much litigation in the past, but is now clear of further trouble in that respect. The secretary reported August, 1919, that the mine was so badly handled during 1917 and 1918, that the company does not wish to give any details. Work was stopped on January 18, 1919, excepting for development by 10 or 12 men under direction of the secretary, and some work on a silver vein.

YOSEMITE DREDGING & MINING CO. **CALIFORNIA**

Address: J. W. Neill, Snelling, Cal.; or 159 Pierpont St., Salt Lake City, Utah.

Property: 400 acres along the Merced river, near Snelling, Merced county, Cal. Gravel is up to 20′ deep, and is easily dug.

Equipment: a dredge with 3¾-cu. ft. buckets, screen, Hungarian riffles, 10 Neill jigs, and tailing elevator. Electric power is used throughout. A feature on this boat is the recovery of platinum.

Production: gravel is reported to yield up to 16c per yard, extracted at a cost up to 7c per yard. According to J. W. Neill in the Min. and Sci. Press of December 8, 1917, in the 22½ months preceding July 1 of this year, the boat dug 1,534,750 cu. yd. Besides the gold, there was recovered 41 oz. of platinum and nearly 1 oz. of osmiridium, valued at $3,438 and $25, respectively.

Property has been highly profitable for several years, and is in the hands of a capable metallurgist.

YUBA CONSOLIDATED GOLD FIELDS **CALIFORNIA**

Offices: 50 Congress St., Boston, Mass.; Insurance Exchange, California St., San Francisco, and Hammonton, Yuba county, Calif.

Property: extensive dredging areas on the Yuba river, California, on which 14 large dredges are operating. No. 16 and 17 have 18-cu. ft. buckets.

Production: years ending February 28:

Year	Yardage	Average, Cents	Total Yield	Cost, Cents	Profit
1918-19.....	.....	....	.....	...	.....
1917-18.....	15,460,000	18.42	$2,849,220	4.90	$2,090,691
1916-17.....	18,490,000	14.86	2,748,197	3.99	2,009,500
1915-16.....	17,750,000	12.02	2,133,528	4.27	1,374,868

Company maintains a large machine-shop, wherein its dredges are made and repaired, and also makes them for other companies. The engineering concern is known as Yuba Manufacturing Co., with works near Marysville, Calif. Yuba Consolidated, the largest gold producer in California, is a pioneer in big dredging practice, yet little or no information is obtainable.

ZENDA MINING CO. **CALIFORNIA**

Address: C. H. Clausen, Amalie district, Kern county, Calif.

Property: the old Zenda gold mine being reopened late in 1919, and said to contain a large tonnage of payable gold ore.

COLORADO

The description of mining companies and mines of this State are arranged alphabetically, since outside of the Leadville and Cripple Creek districts, the mines are scattered over many counties and many small districts. Leadville and Cripple Creek companies can be identified by the index, where the titles are grouped under these locality names.

The mineral production of the State shows a general decrease of output of all metals during 1919, as compared with 1918, when the yield was as follows: Copper, 6,190,000 lb.; gold, $12,705,000; lead, 66,000,000 lb.; silver, 6,900,000 oz.; and zinc, 86,550,000 lb.

ACCORD MINING & MILLING CO. **COLORADO**

Idle. No returns secured from Georgetown, Colo., for 4 years.

Cap., $250,000.

Property: 40 claims on Saxon mountain, 3 miles from Georgetown, Clear Creek county.

Development: by 900′ Cully tunnel, which company intended to ad-

vance an additional 2,100′ with expectation of cutting the American Sisters and Jo Reynolds system of veins on the East and the Capital Prize system on the West.

Property not unpromising, but company not in good financial condition at last accounts. Closely related to the Alco Mining & Milling Co.

AKRON MINES CO. **COLORADO**

Office: Whitepine, Colo. Jas. E. Dick, mgr.; Donald Dyrenforth, supt.

Property: 30 claims, 29 patented, 250 acres, in Tomichi mining district, Gunnison county, 11 miles north of Sargent. There are three fault fissure veins about 4′ wide in limestone and granite, course N.-S., dip 45° E., containing ore reported to average 7 oz. silver, 14% lead and 14% zinc.

Development: by 360′ shaft, and 4,200′ of tunnels, etc., totaling 8,000′ of workings.

Equipment: includes compressor, hoist, and electric power. An 80-ton concentrator being built in 1919.

Production for past three years reported as 129,853 lb. copper; 1,373,506 lb. lead; 1,317,641 lb. zinc; 43,141 oz. silver.

ALBRO EXTENSION M. & M. CO. **COLORADO**

Office: Dumont, Colo. O. H. Shaffer and Chas. Swanson, lessees.

Property: on Albro mountain, near Dumont, Clear Creek county.

Development: workings said to show an 8 to 12″ band of smelting ore and a large body of milling ore. A crosscut tunnel was driven 260′ to drain the old workings. Drifting had progressed 500′ at last accounts. Early in 1920 an aerial tram was to be erected to connect the Heliotrope mine with the Colorado & Southern Railroad.

ALCO MINING & MILLING CO. **COLORADO**

Idle.

Address: Georgetown, Ohio.

Inc. 1910, with same officials as Accord Mining Co.

Property: group of lode claims on Saxon mountain, near Idaho Springs, Clear Creek county.

Equipment: included hoisting plant.

ALICE GOLD MILLS CORPORATION **COLORADO**

Idaho Springs, Clear Creek county, Colo.

Company was declared defunct and inoperative on October 3, 1913. Mine and mill reported sold at Sheriff's sale, April, 1914.

ALLGROVE M. & M. CO. **COLORADO**

Mail returned, unclaimed, March 18, 1918, from Cardinal, Colo.

Officers: K. W. Hunt: pres.-gen. mgr.; Hudson T. Morton, v. p.; G. W. Nicholas, sec.-treas. Operated a lease on the properties of the Pine Grove M. & M. Co. and the Albion group, about 200 acres, 1 mile above Nederland, Boulder county.

Development: 300′ shaft with 2,000′ of levels, and the 2,400′ Alton tunnel, which has reached the bottom of the shaft. The Alton mill, remodeled in 1916, includes 15 stamps, a Monel slimer, Wilfley and Card tables, crusher and a 50-ton oil flotation unit.

ALLIED GOLD MINING CO. **COLORADO**

Office: 1216 Pearl St., Boulder, Colo.

Officers: H. F. Corfield, pres.-gen. mgr.; W. H. Jones, v. p.; H. C. Meade, sec.-treas.

Cap., $100,000; shares 25c par.

Property: 3 claims, the Congo Chief mine, on Idaho mountain, N. E. of Caribou, Boulder county. Company also developing the Buenaventura, a gold mine, in the Salina district, consisting of 4 patented and 2 unpatented claims.

Operations started on the Congo in 1917. The property is said to be an extension of the No Name lode and carries galena, native silver and chlorides in a fissure vein, 3 to 8′ wide. Ore at depth of 10′ said to assay $225 to $400 in silver and lead, and shipments to have returned 36 to 490 oz. silver, 18% lead and 1.12% copper.

Development: by 370′ shaft and some drifting.

Equipment: includes 35-h. p. electric hoist and 3-drill compressor. Company reports having enough money to last until May, 1920.

ALMADEN MINES CO. **COLORADO**

Property of the company, in the Lower Fall mining district, near Idaho Springs, Clear Creek county, sold in November, 1915, to satisfy a judgment of $27,596. Purchased by Geo. Neill, of Topeka, Kan., and J. A. Greenfield, of Bellaire, Ohio, principal bondholders and stockholders, who planned to resume operations in 1917, but apparently did not. The property is said to have been a good producer of silver ore in its day.

ALTA MINES CO. **COLORADO**

Office: Telluride, San Miguel county, Cal. Operations reported temporarily suspended owing to fire and shortage of labor.

ALTEZUMA GOLD M. & M. CO. **COLORADO**

A. L. Miller, mgr., Central Savings Bank Bldg., Denver, Colo.

Inc. in Arizona. **Cap.,** $5,000,000; $1 par; 2,500,000 shares in treasury.

Property: 4 claims, 2½ miles from Montezuma.

Ore: lead-silver.

Development: 4 tunnels, longest 190′ known as the Franco tunnel. Plans included the re-financing of company and driving the Franco tunnel an additional 200′, but have not been carried out. Idle.

AMERICAN DREDGING CO. **COLORADO**

Address: S. L. Bright, Breckenridge, Summit county, Colo.

Company has acquired several properties in the Breckenridge district, and was doing preparatory work in August, 1919.

AMERICAN METALS PRODUCING CO. **COLORADO**

Office: Central City, Colo. E. S. Moulton, pres.-mgr.; G. Whitney Adams, supt.-treas.

Cap., $100,000; $1 par, in 30,000 preferred and 70,000 common shares.

At last accounts operated a reduction plant at Blackhawk, Gilpin county, equipped with Moulton-Adams system to handle low-grade refractory ores. Plant treated custom ores.

AMERICAN MINES CO. **COLORADO**

Mail returned unclaimed, September 17, 1918, from Foster Bldg., Denver, Colorado.

Officers: A. E. Blakesley, pres.; E. M. Howell, v. p.; J. N. Caldwell, sec.-treas., with W. A. Burke, L. M. Beck, directors. J. W. Kirkbride, supt.

Inc. in Wyoming. **Cap.,** $1.500,000; $1 par; issued $1,300,000.

Property: one claim in the Gold Hill district, 12 miles north of Boulder, Boulder county, said to have an orebody 200′ wide, proven for a length of 600′, and assaying $4 in gold per ton.

Development: by 300′ tunnel. A 25-ton stamp mill installed, March, 1916. Idle.

AMERICAN MINING CO. **COLORADO**

Property: American Nettie mine, near Ouray, Ouray county, Colo.

Ore: gold in broad, flat shoots, in quartzite, about 7′ thick and proved for 700′ in length. These orebodies are believed to be the northerly continuation or downward faults of the Wanakah orebodies, which intersect the great monzonite porphyry dike running due east through the Nettie ground.

Development: 700′ tunnel and upraise.

Equipment: compressor, drills, and machinery.

Production: in gold since 1889, $1,500,000.

No late information available.

AMERICAN MINING & POWER CO. **COLORADO**

Name now Martin M. & P. Co., holding company of Martin M. & P. Co. of New York, which see.

Officers: S. G. Martin, pres., 40 Exchange Place, New York. S. L. Martin, v. p.; W. B. Jones, sec., 9 Park Place, New Rochelle, N. Y.

Inc. in Delaware. **Cap.,** $6,000,000; $1 par.

AMERICAN SISTERS MINES **COLORADO**

Office: Lawson, Colo. Robert Christenson, mgr.

Property: 13 patented and 14 unpatented claims, closed since 1904 on account of litigation. Credited with a total production of about $1,000,000, in lead-silver ore.

Bonded and leased by Denver investors, in 1918.

ANTI-PERIODIC GROUP **COLORADO**

Property, at Rain Gulch, Silverton, San Juan county, owned by Galena Mt. Gold & Silver Mng. Co., which see.

ANVIL LEASING CO. **COLORADO**

Address: Edw. Johnson, Mgr., Silverton, Colo.

Company has sub-leased the Emerald Lode property and is operating the Diamond, Topaz and Sapphire mines.

APEX COPPER CO. **COLORADO**

Office: 915 Colorado Ave., Colorado Springs, Colo.

Officers: J. J. Driscoll, pres.; Cab Johns, v. p.; A. T. Driscoll, sec.; J. O. Tufts, treas., with Dr. J. L. Lewis, directors.

Inc. in Colorado. **Cap.**, $2,000,000; $1 par; issued $1,200,000. Annual meeting, April 19. Transfer office, that of company.

Property: 8 claims, 6 patented, 80 acres, at Hayman, Park county.

Geology: fissure vein in granite. Ore consists of gold, silver, and copper sulphides in ore-shoots 25′ long.

Development: by 250′ vertical shaft and 800′ of tunnels.

Equipment: steam hoist and 3-drill compressor. Building a 50-ton flotation plant, at last accounts.

ARAPAHOE MINING & MILLING CO. **COLORADO**

Last address: Colorado Bldg., Denver, Colo.

Officers: Thos. B. Everett, pres., treas.-gen. mgr.; Chas. J. Jordan, v. p.; Harry A. Stewart, sec.; Will McLeod, mgr.

Inc. in Colorado. **Cap.**, $1,000,000; $1 par. Treasury stock offered to the public at 3c a share in blocks of 300 shares with a bonus of 20% and guarantee of refund out of initial earnings.

Property: consisted of 4 mining claims near Idaho Springs, 2 millsites and water rights in Wisconsin mining district, Gilpin county; a contract with miners of Wisconsin district for daily supply of 50 tons of ore at $3 per ton and a long lease on Rocky Mountain 75-ton concentrating mill at Blackhawk, Gilpin county. Management claimed it would "take no chances in the mining business," but intended sub-leasing mining claims and doing only a custom-milling business with expected net earnings of $150 per day, to be divided among the stockholders in return for their confidence in the management.

No recent information.

ARCUBELL GOLD MINE CO. **COLORADO**

Address: Box 127, Georgetown, Colo.

Officers: J. J. Culley, pres.-treas.; J. S. Armstrong, v. p.; W. G. Bell, sec.

Property: 20 claims, about 215 acres, in Clear Creek county, reported to show gold and silver values in a fissure vein, in granite, with dip of 30°, and N. E.-S. W. course. Company reports assays between $10 and $30 per ton.

ARGO MG. DRAINAGE TRANSP. & TUNNEL CO. **COLORADO**

Office: 79 Milk St., Boston, Mass. **Mine office:** Idaho Springs, Clear Creek county, Colo.

Officers: Chas. C. Parsons, pres.; H. W. Robinson, sec.; R. E. Schirmer, treas.-gen. mgr.; L. S. Stewart, supt.

Inc. 1893, in Colorado. **Cap.**, $100,000. Is controlled through ownership of entire stock issue, by Argo Mining & Tunnel Co., Ltd., and property described thereunder.

Balance sheet for fiscal year ending August 31, 1916, showed an operating loss of $2,151, compared with a net profit of $1,112 in 1915, the decrease being due to inactivity of several properties and subsequent slackening of transportation business.

No later reports available.

ARGO MINING & TUNNEL CO. **COLORADO**

Office: 79 Milk St., Boston, Mass. **Mine office:** Idaho Springs, Clear Creek county, Colo.

Officers: F. A. Schirmer, pres.; Chas. C. Parsons, v. p.; Chas. G. Schirmer, sec.-treas., with F. Hargreaves, C. P. Woodbury, J. A. Caldwell and H. W. Davis, directors; R. E. Schirmer, mgr.

Inc. 1909, in Delaware. Cap., $1,250,000; $5 par; issued, $952,325. Debentures, $150,000 authorized; $135,000 issued. Company succeeded Argo Transportation & Tunnel Co., Ltd., which succeeded Argo Tunnel & Mining Co., Ltd., which succeeded Newhouse Tunnel Co., Ltd. Owns the entire stock issue of Argo Mining, Drainage, Transportation & Tunnel Co., which holds direct title to the tunnel.

Property: the Argo or Newhouse tunnel, 21,968′ long, with nearly 20 miles of workings, is perhaps the most celebrated mining tunnel in existence. It starts at Idaho Springs and passes under Russell gulch and Quartz hill, with terminus in the Gunnell vein. The tunnel has double tracks, of 18″ gauge, laid with 30-lb. rails. For the first 12,000′ the tunnel is 9′ high and 10′ wide, balance being 8′ high and 6′ wide. Grade is 5″ per 100′. The tunnel was begun January, 1894, and completed November 18, 1910, and provides drainage, transportation, ventilation and air service for drilling operations.

The mines under which this tunnel passes are estimated to have produced about $75,000,000 in metallic values, and the tunnel cuts sundry veins of ore carrying gold, silver, lead and copper, and several laterals have opened various orebodies of greater or less promise. The tunnel connects with the Concrete, Tremont, Prize, Burroughs, Kansas, Golden Edge, Gem, Sun & Moon, Old Town, Pozo, Saratoga and Gunnell shafts at depth of 1,600′.

During 1916, the Tremont, Burroughs and Gem mines were the sole shippers. Development work by lessees on the Concrete and Pozo-Gilpin proved disappointing and was discontinued.

Equipment: includes 5 locomotives, handling 53-ton cars each. Transportation charge for waste work through the tunnel is 17c per ton, and on ores from 40c to $1.25, according to values. Ore is turned over to the Argo mill, whose charges are from $3.50 up, including sampling and treatment.

During 1918 company was reported to have handled 19,700 tons of crude ore, paying producers $328,347, but later was forced to close down owing to the increased cost of power and mine supplies.

ARGO REDUCTION & ORE PURCHASING CO. **COLORADO**

Office: Idaho Springs, Clear Creek county, Colo. Chas. G. Schirmer, pres.; R. E. Schirmer, treas.-gen. mgr; G. H. Seibird, mill supt.

Inc. July, 1912, in Colorado. **Cap.,** $150,000; $100 par; issued $112,000.

Property: a 100-ton custom mill at the portal of the Newhouse, or Argo tunnel. All ore is purchased outright on the weight and assay value. Treatment consists of stamps, followed by tables, tube-mills, and flotation machines. No production figures are available.

ASPEN MINE CO. **COLORADO**

Property: the old Aspen mine at Silverton, Colo. Controlled by American Smelting & Refining Co. Operated by lessees who made small but steady shipments to the Silver Lake mill in 1917.

ASPEN SILVER-LEAD MINES CO. **COLORADO**

Office: J. J. Yeckle, pres.-gen. mgr., Commonwealth Bldg., Denver, Colorado.

Property: 8 claims, about 150 acres, at Aspen and Alma, Park county. The Alma property, known as the Border Ruffian mine, is located near Mt. Bross and adjoins the Dolly Varden mines. Samples taken from old workings were reported to give a silver content of 50-to 100 oz. and 50 to 70% lead.

ATLAS MINING & MILLING CO. **COLORADO**

Office: Ouray, Colo.

Officers: C. H. Austin, pres.; C. C. Carson, v. p.-sec.; A. B. Shipman, treas., with C. H. Wagner, Wm. Story, Jr., and Chas. D. Loper, directors. Jas. A. Lannon, supt., Sneffels, Colo.

Inc. Feb., 1904, in Colorado. **Cap,** $2,000,000; $1 par; 1,921,000 outstanding. Authorized bond issue $50,000; all outstanding. Annual meeting in August.

Property: 28 claims, patented, 204 acres in Mt. Sneffels district, Ouray county, includes the Atlas & Crown Point mines. Ore, which occurs in 3′ fissure vein in andesite, is a complex sulphide, carrying grey copper, gold, silver and lead. Average assays are reported to run 9 oz. silver and 0.05 oz. gold per ton.

Development: by a 2-mile tunnel to depth of 1,500′ with a total of 20,000′ of workings.

Equipment: includes electric power, air compressor, tramway and 150-ton 20-stamp mill with table and flotation concentration, giving a 90% recovery. Management expects to solve further treatment of complex ores and increase recovery to 95%. Employs 75 men.

Production: 30,000 tons in 1913, 35,000 tons in 1914, 40,000 tons in 1915, and 36,734 in 1916. Management estimates 50,000 tons of ore blocked out. In November, 1917, it was reported that the operating profit for the previous year was $50,477, the largest in its history.

Owing to the shortage of men, all available labor was used in developing the mine during 1918, while the mill was busy retreating tailings. Additions to equipment and excellent ore developed are said to insure a profitable return.

AUGUSTA METAL MINING CO. **COLORADO**

Address: C. L. Arzeno, 9 E. 5th St., Covington, Ky.

Officers: C. L. Arzeno, pres.; Harry Levi, v. p.; Alf. E. Reinauer, sec.-treas., with G. T. McDuffie, C. R. Farbach, Chas. H. Adams and B. S. Oppenheimer, directors.

Inc. in Colorado. **Cap.,** $100,000; par $1; reduced April 30, 1918, from $2,000,000 shares; $1 par.

Property: about 130 acres, patented, on Augusta mountain, 10 miles north of Crested Butte, Gunnison county, at an elevation of 12,625′, shows a fissure vein containing gold, silver, lead and zinc, with general average said to be $10 per ton. Vein is in diorite. Course, S. W.-N. E., with dip 70° S. E.. Has been worked spasmodically since 1880.

Development: by 320′ vertical shaft and several tunnels, longest over 3,000′. The property is idle since 1908 and surface equipment, including a 60-ton mill, has been destroyed by snowslides. Output to date, $200,000.

AZTEC MINES CO. **COLORADO**

Property: the O. K. mine at Central City, Colo. A. H. Frost, pres., and J. R. Hastings, sec., Winona, Ont., Canada. Operated in a small way, by Henry R. Eilmann, lessee, in 1915-16. Mine showed narrow fissure vein, carrying gold and copper. No recent information.

BACA MINING CO. **COLORADO**

Property known as the Baca Land grant, originally belonged to Senor Don Luis Mana Baca as a gift from a King of Spain. The present owners opened the land to prospectors in July, 1914. B. T. Tipton, mgr., Crestone, Saguache county, Colorado.

Property: 35,000 acres of mineral land, including 23 partly prospected mines near Crestone, on the D. & R. G. R. R. The largest mines of the group are the Eastern Star, Sunset, Julia D., Queen Esther, Von Moltke, Great Western and Independent, the latter being the only one developed by the company.

Geology: ore occurs in 8 well-defined contact veins, along dikes and in true type fissure veins, in pockets and shoots; country rock is altered granite and schistose gneiss, cut by intrusive dikes of porphyry, phonolite and iron-stained quartz, containing gold, silver, lead, copper and zinc. Mother Lode said to be traceable for 12 miles on surface. Smelter assays ran $18 gold, 500 oz. silver and 8% zinc.

Development: considerable amount of old workings, shafts and cross-cuts. There is an unlimited water supply. Shipments made to the Pueblo smelter. Property has been worked by prospectors and lessees under 2 to 5 year leases.

Miners receive free timber, water and assay services and pay 10-15% royalty on ore extracted.

BACHELOR KHEDIVE MINES CO. **COLORADO**

Address: Box 1,139, Denver, Colo.

Officers: Henry A. Dubbs, pres.; Henry Lyne, v. p.; J. S. Williams, sec.; M. E. Austin, treas., with W. J. Kirsher, T. J. Hyland and W. B. McDonald, directors. C. A. H. de Saulles, gen. mgr., Denver.

Inc. in Colorado. **Cap.,** $1,000,000; $1 par, all oustanding. Annual meeting, first Monday in October.

Property: 11 claims, patented, 83 acres at Ouray, is a silver producer. Operated by lessees. Ore sales, 1916, totaled $9,365, with net receipts of $3,200, and in 1918 were $27,735, with net receipts of $5,281.

BALD EAGLE MINING & MILLING CO. **COLORADO**

Office: 307 Guardian Trust Co., Denver, Colo.

Officers: W. M. McGaugh, pres.; Clement Crowley, sec.; Chas. J. Scheuerman, treas.

Inc. Sept. 20, 1916, in Colorado. **Cap.,** $100,000; $1 par.

Company offered 10,000 shares, December, 1916, at 25 cents a share,, stating that the next 15,000 shares would be sold at 50 cents. The company's prospectus stated that it held an option on the claims, but did not give bond price, while the president, in a letter, stated the Bosser interests were owned.

Property: 3 claims, a millsite and placer claim, totaling 40 acres in the Ward district, Boulder county. Claims said to have two veins, one of them opened in five places and uncovered for a width of 22′, the other 4′ wide. Ore is refractory and carries sulphides with gold.

Development: a 75′ shaft with a drift at 30′ depth and another 28′ drift at the 75′ level.

Company claimed to have 1,000 tons of $40 milling ore on the dump and to be able to treat same at a total cost of $4 a ton, if a 50-ton mill had been erected.

The development on the property is, in our opinion, insufficient to prove or disprove its value and the stock represents an equity in a blind pool, with an option to purchase unproven claims at a price not named.

No recent information available.

BALD MOUNTAIN MINES CO. **COLORADO**

Office: Breckenridge, Colo.

Officers: C. A. Quist, pres.; J. F. Mall, sec.; L. L. Jones, treas.

Inc. in Colorado. Company holds lease and bond and is operating the Carbonate, Golden Edge, Little Tommy and New Era properties on Mt. Baldy. Besides running high in lead, the ore is reported to assay from 18 to 30 oz. silver and 1 to 3 oz. gold per ton.

BANNER STATE GOLD, SILVER & COPPER MINING CO. **COLORADO**

Office: 45 E. 42nd St., New York City. A. G. Sullivan, pres.

Inc. 1908, in Colorado. **Cap.,** $500,000; $1 par; none outstanding.

Property: one patented claim in Bobtail Hill Lake district, Gilpin county. Not operating, but 300′ vertical shaft planned.

BARSTOW MINE **COLORADO**

Office: 42 Broadway, New York. **Mine office:** Ouray, Ouray county, Colo. Works at Ironton, Ouray county, Colo. J. H. Fennessy, trustee. Property under bond and lease to C. R. Wilfley in 1917.

Property: 27 claims, patented, 199 acres mineral land with 5-acre mill site in Red Mountain district. 11 miles from D. & R. G. R. R. and the Silverton R. R., operating in the summer, is 1 mile away. Ore found in fissure vein in andesite with N. W. strike and dipping 75°, is reported as 8′ wide and carries 0.75% copper, 2.5% lead, 4% zinc.

Developed: by 2 shafts, 425′ and 145′ deep, and 2 tunnels, 3,200′ and 3,300′ long. Total length of underground workings, 10,300′, reported to have developed 17,000 tons of ore with 8,000 tons in sight. High-grade gold ore was found in July, 1919, and four cars sent to Durango by September, yielded $700 net each to the lessees, Lundberg & Curtis.

Equipped with 2 hoists, electric compressor, 6-drill compressor, frame stamp mill and concentrator with 2 Blake crushers, 9x15″, 40 stamps, 20 Wilfley tables, 2 slime tables and buddles.

The spar vein of this property was leased September, 1916, to Engineers Corporation of Boulder, Colo., who work it for fluorspar. This vein, carrying 3′ of fluorspar, cuts across the Barstow vein. The deposit was struck at 1,100′ in depth and was reported to widen out to nearly 10′ of almost pure grade.

BASSICK MINING & REDUCTION CO. **COLORADO**

Office: Querida, via Westcliffe, Custer county, Colo. Harry S. Thayer, supt. Operating the old Bassick mine under a long-term lease. The mine was discovered in 1877 and worked continuously until 1904, when fire halted operations. Disagreements between the owners prevented further development up to 1918. The ore occurs as pipes and bands of sulphides in an andesitic agglomerate. A 100-ton flotation plant has been planned.

Property, a famous one geologically, described in many text books and reports.

BATES LEASING CO. **COLORADO**

Address: Central City, Colo. Is not incorporated.

Property: Bates mine in Chase Gulch, Gilpin county, which had been idle for 28 years.

Ore: occurs in pyrite and chalcopyrite in shoots about 3′ wide, carrying gold, silver and copper. Milling concentrate averages 1.23 oz. gold and 7.80 oz. silver; smelter returns average 2.50 oz. gold, 14 oz. silver and 2.94% copper. The ore is treated at the Polar Star mill, at Blackhawk, leased by the company, and concentrate shipped to Globe smelter at Denver.

Development: consists of 100′ winze sunk from 400′ level and drifting from it. Closed down June 30, 1918.

BECKY SHARP MINE **COLORADO**

Office: Central City, Russel Gulch district, Gilpin county, colo.

Mine is owned by Old Town M., M. & T. Co. of Idaho Springs, Colo. Leased to Hughes & Treewit of Idaho Springs and sub-leased to John Mollard, H. T. Giller and E. V. Ingels.

A talcose ore from 3 to 6′ wide, with shoots from 6 to 12″ wide, was found by drifting 75′ from a shaft of 400′ depth. The ore averaged 4 oz. gold, 8 oz. silver and 2.85% copper. Shipments to the Pueblo smelter in September, 1919, assayed from $40 to $80 per ton.

BELLEVUE CHAMPION MINE **COLORADO**

Address: S. G. Hamblin, Idaho Springs, Colo.

Located in upper Clear Creek county, Colo. Early in 1919, it was reported that the production during the previous year averaged $2,500 a month. Three groups of lessees are mining silver ores that average $100 per ton. Main tunnel is 1,200′ long.

BELMONT WAGNER MINING CO. **COLORADO**

Subsidiary of Tonopah Belmont Development Co.

Office: Telluride, Colo. J. K. Kitto, sec.-treas., 500 Bullitt Bldg., Philadelphia, Pa.

Officers: Clyde A. Heller, pres.; Wm. M. Potts, v. p.; F. Bradshaw, gen. mgr., Hobart Bldg., San Francisco; John M. Fox, supt., Telluride, Colo., with M. B. Cutter, J. C. Fraley, R. G. Park, S. D. Sinkler, T. W. Synnott, C. B. Taylor, and J. M. Wagner, directors.

Inc. Sept., 1917, in Delaware. **Cap.,** $1,000,000; $1 par. Annual meeting first Tuesday in May, at Philadelphia. Transfer office: 500 Bullitt Bldg., Philadelphia.

Property: consists of 81 claims, 26 of which are patented; 2,000 acres, located in Gold King and Turkey Creek basins, San Miguel county, Colo.

Geology: a fissure vein, mineralized as a whole, running S. E.-N. W. at 60°, surrounded by San Juan tuff and breccia, and containing silver, lead, gold and copper values.

Development: mine is worked by tunnels totaling 20,000′. Overhand stoping and waste fill methods used.

Equipment: uses a 300-ton flotation mill with 7 units, 1,200 cu. ft. compressor and three tramways. Electric power used. Owing to labor conditions mine was closed late in 1918, but reopened in 1919, and in October, 150 men were employed. No production figures for 1918 or 1919 available.

BELZORA-BASSICK MINING CO. **COLORADO**

Office: Lansing, Mich., and Ohio City, Colo.

Officers: Geo. D. Wilcox, pres.; John T. Hall, v. p.; L. W. Toles, sec., with E. A. Richards, A. A. Stoddard and Mr. Morgan, directors.

Inc. in Colorado. **Cap.**, $1,500,000; $1 par.

Property: about 235 acres in the Gold Brick district, Ohio City, Gunnison county, Colo. There are two ore deposits, one averaging 170′ by 3′ by 470′, the other 35′ by 2′ by 400′, both of which consist of sulphide ore containing lead and zinc. Mine is developed by tunnels almost 4,000′ long. During 1917 and 1918 only test runs were made yielding $1,500; operations temporarily suspended due to labor conditions and high development costs.

BENACK MINING CO. **COLORADO**

Address: M. Fleming, 700 Fleming Bldg., Des Moines, Iowa.

Company formed to operate the Ouray group of claims, 50 acres, 7 miles S. E. of Ouray, Colo.

Development: by tunnel, said to have opened up an orebody for 400′ and to have developed 17,967 tons of shipping ore and a larger tonnage of milling ore, ranging in value from $10 to $25 per ton.

Latest reports show that shipments totaled 29 cars sent to the Salida smelter, which averaged 57 oz. silver, 13% lead, 2% copper, 5% zinc, and yielded $42 per ton.

BENGAL TIGER-GORDON MINE **COLORADO**

Formerly operated by Twin Lake M. & M. Co., now dead.

BESSIE-CORA MINING CO. **COLORADO**

Address: Ralph Roseberry, supt. Owns a group of claims, including Silver-Wave, at Montezuma, Summit county, Colo.

Ore: silver-lead, in paystreak, 2½′ wide and proven for about 100′ in Silver-Wave ground.

Development: by tunnel, winze and drifts.

Equipment: aerial tram, air-compressor, and electric power. From latest reports employed about 15 men.

BEZANT GOLD MINING CO. **COLORADO**

Office: Central City, Colo.

Officers: O. J. Duffield, pres.-mgr.; G. H. Putman, v. p.; L. A. Duffield, sec.; C. C. Hendrie, treas., directors.

Inc. August, 1908, in Colorado. **Cap.**, $500,000; shares $1 par; 435,000 outstanding. Dividends to date, 50c. per share.

Property: 3 claims, one patented, 14 acres, has a quartz fissure vein in granite and porphyry.

Development: by a 500′ shaft and about 6,000′ of drifts and crosscuts, said to have cut 3 veins, all showing gold, silver and copper values.. Equipment: includes complete electrical plant, 50-h. p. electric hoist, etc. Plans building a mill. Management claims to have a large tonnage of pitchblende-uranium ore blocked out.

Unwatering of the mine was attempted October, 1917, but according to later announcements, company expected to resume work May 1, 1919. It was reported that British capital was interested.

BIG FIVE MINING CO. **COLORADO**

Office: Majestic Bldg., Denver, Colo. Mine at Idaho Springs, Colo.

Officers: H. G. Sanderson, pres.; M. C. Daniels, v. p.; Wm. H. Smith, sec.-treas.

Inc. in Wyoming, June 1, 1912, as a reorganization of the old Big Five Tunnel Ore Reduction & Trans. Co. **Cap.**, $750,000; $1 par; issued 400,579. Bonds outstanding, Dec. 31, 1918, $207,000. Cash on hand, Dec. 31, 1918, $5,786.

Property: company's principal enterprise is the Central tunnel, over 9,000′ long, at Idaho Springs, developing several claims. The Edgar vein

showed up better than the others under development; receipts from Edgar ore during 1917-1918 were $342,797. Also owns 1,500 acres in San Juan and Clear Creek counties, and the Frances property, now idle, in Boulder county, Colo.

Equipment: includes storage battery locomotives capable of hauling 40 cars of 2½ tons capacity from the mine to the mill, a distance of 4 miles.

BIG TOAD MINING & MILLING CO. **COLORADO**

Office: 237 First Nat'l Bank Bldg., Denver, Colo.

Officers: A. E. Chapman, pres.; W. J. H. Miller, v. p.; C. L. Dickinson, sec.; J. L. Hunter, treas.-mgr., preceding with Victor Neuhaus and Emil Affolter, directors, at last accounts.

Inc. Oct. 12, 1916, in Colorado. **Cap.,** $500,000; $1 par; 240,000 shares. outstanding.

Property: 17 claims, 300 acres near Alma, Park county, held under 5 year bond and lease. Purchase price, $50,000, to be paid at the rate of $10,000 yearly; first payment was due Sept., 1917. Claims are on the Eastern slope of Mt. Bross, and are said to show 2 veins on the surface carrying gold, silver and lead. In April, 1918, Fred Cobb, operating the Dante mine on Bull Hill, Cripple Creek, under a sub-lease from the Big Toad Mining & Milling Co., reported that he had opened a new ore shoot, 2 to 6″ wide of fluorite and quartz, showing calaverite and assaying as high as 20 oz. gold per ton. In Sept., 1919, company resumed operations on its own account.

Development: consists of 250′ tunnel to be driven 500′ and an old shaft.

Equipment: includes mill and 4,200′ aerial tram. Treasury stock was sold in 1917 to equip a 100-ton mill. Reports received late in 1918 showed the new mill had been working to capacity.

BIRMINGHAM MINING CO. **COLORADO**

Mine office: Empire, Clear Creek county, Colo.

Early in 1918 this company was reported to have a bond and lease on the Big Forty property. The tunnel is near Empire in Clear Creek county.

The Big Forty combination has over 100 claims, and cuts several properties that have been good producers. Edward L. Harris was said to be in charge of developments.

BLACK BEAR MINING CO. **COLORADO**

Mine office: Telluride, Colo.

Inc. about 1894. Ike Navala, supt.

Property: 30 claims, includes Black Bear mine in Ingraham basin, Telluride, San Miguel county, showing gold, silver, lead and zinc values in an 8′ quartz vein; the ore is concentrated. Mill returns average about $5.50 per ton, gold bullion recovered running 30% of the total. Developed by shafts and equipped with electric plant and aerial tramway, connecting with the Smuggler mill at Pandora.

Property was idle for many years; operations resumed the latter part of December, 1914. Announcements during 1918 showed that drifting on the lowest level opened a streak of free gold.

Shipments: averaged 170 tons daily in 1916. Mining and milling costs totaled $2.50 per ton.

BLACK CLOUD MINING CO. **COLORADO**

Address: R. H. B. Little, lessee, Salina, Colo.

Property: Black Cloud mine and mill at Salina, Boulder county, Colo., Vein contains gold-bearing quartz, developed by shaft and several levels. Equipment includes air compressor, electric power and a 20-stamp mill.

BLACK METAL REDUCTION CO. **COLORADO**

Office: 2009 13th St., Boulder, Colo. Is a private partnership, consisting of Ira M. DeLong, pres.; W. B. Stoddard, mgr., and John B. Ekeley.

Property: a plant for the production of pure tungstic acid from the 60% tungsten concentrates of the district. Reported in 1917, to have $35,000 invested in plant; $25,000 in merchandise and stocks and $9,100 cash in bank.

BLACK METALS MINES CO. **COLORADO**

Mine office: Rollinsville, Gilpin county, Colo. Nelson Franklin, mgr.

Property: the Tip Top mine, and a large custom mill at Rollinsville;

also reported to operate other properties. During 1917, company produced 1,223 tons of tungsten concentrate and paid a 20% royalty to the owners.

Developed by a 150′ shaft. Produced a considerable amount of tungsten ore in 1918.

BLISTERED HORN MINE — **COLORADO**

Owned by C. J. Carpenter, John Waldron and Andrew Lejune, supt., Tin Cup, Gunnison county, Colo.

Property: shows several veins of gold-silver-lead ore developed by 2,900′ tunnel, drifts and raises. The veins are from 2-12′ wide and ore is of good milling grade. Was reported under development in 1919.

BLUE BIRD MINES — **COLORADO**

Includes the Western Slope, Mexico, and Santa La Saria claims, located near Bluebird, 2 miles N. E. of Cardinal, Boulder county. Ores carries silver sulphides and bromides assaying about 20 oz. silver, 8% lead, 2% copper, and some gold.

Developed by over 3,000′ of tunnel work, and a connecting tunnel at a lower level.

BLUE RIVER MINES & REDUCTION CO. — **COLORADO**

Mine office: Yuba Dam Flats, Breckenridge, Colo.

Inc. in Colorado by a group of Denver capitalists to operate the Fox Lake and adjoining lode mines on Yuba Dam Flats, north of Breckenridge, in Summit county.

BOB LEE CONSOLIDATED MINING CO. — **COLORADO**

Probably dead. H. H. Mitchell, sec.-treas., 65 Independence Bldg., Colorado Springs, Colo., wrote, 1917: "Company lost its property through excessive taxation. Deed has been given and title quieted."

See Vol. XII for description of property.

BONANZA DEVELOPMENT CO. — **COLORADO**

Mine office: Idaho Springs, Clear Creek county, Colo.

Officers: George Taylor, pres., Norton, Kan.; C. E. Angell, v. p., Independence, Kansas; Mr. Arbuckle, treas, Cleveland, Okla., with Frank Hellig and C. L. Jaynes of Idaho Springs, directors.

Property: company formed in 1918 to operate the five mines of the Bonanza group, known as Bonanza Chief, Gold Nugget, Mary Pickford, Junction Tunnel, and Cabin, covering about 20 acres on north slope of Albro mountain. Also reported to have a three years' option on the Chicago Belle group of 5 patented mines covering 25 acres.

Development: Bonanza group, by 90′ tunnel and several surface shafts and cuts; Chicago Belle group has two shafts, 85′ and 250′ deep. Early in 1920 the Pioneer tunnel, 950′ long, was driven 800′ further and a 6 to 18″ streak of $10 to $46 ore was cut. Surface ores of group show values of $12 to $60 per ton.

Equipment: steam and gasoline power, compressor, etc.

A report that company had transferred assets and property to a Massachusetts concern of same name in 1919, can not be verified.

BOREAS GOLD MINING CO. — **COLORADO**

Inc. in Colorado, Sept., 1918. **Cap.,** $50,000. A close corporation.

Property: at Boreas, in Summit county, 39 miles from Denver, on the C. & S. railroad. The mine is reported to contain gold-bearing sulphide quartz.

BOREN GULCH GOLD MINING CO. — **COLORADO**

Office: 625 Denham Bldg., Denver Colo. Mine at La Plata, Colo.

Officers: Dr. Geo. H. Holoran, pres.; E. M. Becker, sec.; S. N. Francis, v. p.-gen. mgr.

Cap., $1,000,000; $1 par; in treasury 400,000 shares. No debts.

Property: 23 claims, operated through 3 tunnels, longest over 815′. Mine contains a large surface blanket vein, about 20′ wide, crossing entire property, with gold, silver, and copper values. Some milling ore was opened in Oct., 1919.

BOREN GULCH MINING CO. — **COLORADO**

Reorganized, 1916, as Boren Gulch Gold Mng. Co.

BOSTON MINE LEASING CO. **COLORADO**

Office: 60 Congress St., Boston, Mass. **Mine office:** Idaho Springs.

Officers: Lombard Williams, pres.; Arthur Langley, v. p.; Horace H. Stevens, sec.-treas., with N. W. Jordan and J. C. Hershey, directors; J. C. Hershey, mgr.; J. F. Clark, supt., at last accounts.

Inc. June, 1915, in Colorado. **Cap.,** $100,000; shares $1 par; all outstanding.

Gross earnings from ore sales in 1916 were $30,000; operating expenses, $15,500, plus royalty of $7,500. This compares with receipts from ore sold in 1915, $30,196, of which $12,000 was distributed in dividends. The 1916 earnings were used to retire company notes. In Dec., 1917, a 2½% dividend was declared payable.

Property: a lease on a large portion of the property of the Edgar mine below level of Central (Big Five) tunnel at Idaho Springs; also option and lease of all other property eastward owned by the Big Five Mining Co., and traversed by veins of the Edgar mine; also 47½% interest in Roy & Co. lease above the level of the tunnel. Leases are for five years.

Ore: occurs in fissure veins in schist, strike E.-W., with dip 65° S.; consists of lead and zinc sulphides, containing gold and silver. Smelting ore, from a 2′ width of the vein, said to average: gold 0.78 oz., silver 21 oz., copper 1%, lead 13.8%, zinc 5%. Orebody 350′ long, ore 8″ to 5′ thick, averaging $20 per ton. No ore blocked out.

Development: a 65° incline shaft, 100′ deep and tunnels with 1,100′ of drifting on the vein. The Central tunnel of the Big Five Co. cuts the main vein 2,460′ from portal and 800′ below surface.

Equipment: hoist, pump and compressor. Power was bought from the Big Five Mining Co.

No recent information is available. Presumably idle.

BOSTON-SIERRA MADRE MINE INDUSTRY CO. **COLORADO**

Property sold for taxes in 1914 to L. E. Armstrong. Fully described, Vol. XI, Copper Handbook.

BOULDER CANON TUNGSTEN CO. **COLORADO**

Office: Boulder, Colo.

Officers: Geo. V. Bland, pres.; F. B. Steeg, v. p.; Leo Ryan, sec.; Thos. Leahy, treas.

Inc. May, 1918, in Colorado. **Cap.,** $60,000; $50 par

Company operates a custom mill for concentration of tungsten ores with an output of three tons of concentrate per 24 hours.

BOULDER COUNTY METAL MINING ASSOCIATION **COLORADO**

Office: 1934 Fourteenth St., Boulder, Colo.

Officers: L. A. Ewing, pres.; J. W. Palentine, v. p.; L. E. Girard, treas.; W. R. Lewis, sec., with Eugene Stevens, E. B. Hill, Wm. Todd, Guy Adams, M. A. Long, A. W. Widdifield, J. W. Pherson, E. E. Dunston, T. Mohr, J. R. Wolff, N. G. Olsen and Guy Miller, directors.

An organization maintained since 1907 to conduct an information bureau regarding the mines of Boulder county, as well as the fostering of a general interest in the progress and protection of the industry, on the part of mine-owners, operators, merchants, residents, visitors, and all concerned.

Connected with Colorado Metal Mining Association of Denver, which see.

BOULDER COUNTY MINES & TUNNEL CO. **COLORADO**

Address: J. G. Clark, Boulder, Boulder county, Colo.

Company was organized in Oct., 1919, to drive a tunnel connecting Caribou Hill and Idaho mountain with Boulder County mountain, and develop known orebodies.

BOULDER ORE SAMPLING CO. **COLORADO**

See Chamberlain Ore Sampling Co.

Office: 814 Pearl St., Boulder, Colo. On March 8, 1919, company reopened the Chamberlain plant. Reported to have handled 400 tons in first month of operation.

BOULDER TUNGSTEN PRODUCTION CO. **COLORADO**

Office: Boulder, Colo.

Officers: J. G. Clark, pres.; N. H. Brown, v. p.; Fred N. Totman, sec.-treas.; R. L. Alexander, supt.

Inc. Dec., 1911, in Colorado. **Cap.,** $1,500,000; $1 par. Commenced operations Jan. 1, 1912. During 1916, company sold $400,000 worth of tungsten. March, 1918, a bond issue of $500,000 was reported authorized, presumably for development and the purchase of crude tungsten ores to meet market demand.

Property: 37 claims, 165 acres, in the Grand Island mining district, 2 miles from Nederland, Boulder county, said to show 4 to 10% tungsten ore in veins, a few inches wide.

Development: by tunnels; main tunnel in over 1,400′ and 400′ below upper workings.

Equipment: 40-ton concentrating mill. In 1917, a refinery for the treatment of tungsten ores was erected, said to be the largest and most complete of its kind in the United States. During 1919, mine was closed on account of low price of tungsten.

BOWEN GROUP **COLORADO**

E. T. Elliott, mgr., Del Norte, Colo.

Property: 7 patented claims, 200 acres, at Summitville, Rio Grande county, said to show fissure veins in porphyry; ore contains gold, silver and copper, averaging about $10 per ton. Developed by drifts and tunnels; greatest depth 350′. Property has been idle for years, but management planned to drive a 300′ tunnel in 1919.

BRANT INDEPENDENT MINING CO. **COLORADO**

Office: Pitkin, Gunnison county, Colo.

In May, 1919, property reported sold at foreclosure sale to unknown interests through Senator Heterington.

Officers: R. B. Anderson, pres.; R. J. Edwards, v. p.; A. P. Nelson, sec.-mgr.; M. J. Ostergard, treas., with M. Woolley, J. W. Hickman, A. T. Hammer, G. E. Crowell and Geo. Zapf, directors.

Inc. April 12, 1906, in Arizona. **Cap.,** $5,000,000; $1 par; 4,635,000 shares issued. Bonds, $150,000, 8% authorized, $87,000 issued. Dividends to date, $8,174. Annual meeting, second Tuesday in January.

Property: 96 claims, partly patented, of about 1,056 acres, in Box Canyon and Quartz Creek districts of Gunnison county. Four mines, the Camp Bird, I. X. L., Gold Ridge and Roosevelt, opened up and proven by Camp Bird shaft 200′ deep; I. X. L. shaft 60′ and 90′ crosscut and the Gold Ridge tunnel, which follows vein for 130′. Ore occurs in fissure veins 6 to 20′ wide in diorite and granite, said to carry 8% copper and $20 gold per ton. The Camp Bird mine has been operated under lease by other parties.

Crosscut tunnel, started in April, 1911, to drain and open the entire territory at depth, had been driven 2,000′ up to October 1, 1917, when litigation put an end to work. In May, 1919, arrangements were made to resume operations, with A. P. Nelson in charge.

Equipment: includes hydro-electric plant of 400-h. p. capacity, completed in 1915, 4-drill air compressor, 50-h. p. motor and drills. Quartz creek runs through the property. Mine is only a few feet from D. & R. G. R. R. and county road.

BRIGHT DIAMOND MINING & MILLING CO. **COLORADO**

Office: Ouray, Colo.

Officers: G. H. Beebe, pres.; J. T. Roberts, Jr., sec.-treas., with J. A. Matthews, L. P. Smith, Samuel McCurdy, Stuart Hancock and J. T. Roberts Sr., directors.

Company was organized to operate the properties formerly owned by Wanakah Mining Co.

Property: the Bright Diamond, Ironclad and Memphis groups, north of Ouray, Ouray county. Operations in past have been intermittent, the 200-ton matting furnace having a capacity far in excess of ore supply of the district.

New organization had not commenced development up to December, 1919.

BROWN MOUNTAIN SMELTING CO. **COLORADO**

Reorganized, 1916, as the Ouray Smelting & Refining Co., which see.

BULL DOMINGO MINING CO. **COLORADO**

Address: Louis Wagner, pres., West Cliff, Custer county, Colo.

Company was reorganized in 1918. It has equipment from the old Geyser mine, capable of working to a depth of 3,000′. Mine was a big producer years ago. Ore carries silver, lead and zinc. Reported to have leased the Bull Domingo mill from the Passiflora Co.

BURLINGTON-BOULDER MINING CO. **COLORADO**

Address: E. L. Lilleberger, sec., Ottawa, Iowa.

Officers: W. K. Farmer, pres.; A. D. Bly, v. p.; E. L. Lilleberger, sec.; C. E. Seal, treas., also directors.

Property: in Boulder county; reported under development in 1919.

BUTTERFLY MINE **COLORADO**

Office: Ophir Loop, Telluride, San Miguel county, Colo. Paul Hardin, mgr.

Property: near Ophir Loop; is developed by drift tunnels. East drift was recently advanced 200′, part of this distance being in pay ore.

CADIZ MINING CO. **COLORADO**

Office: 220-2 1st Nat'l Bank Bldg., Denver, Colo.

Officers: F. C. Wood, pres.; B. H. Graves, v. p.; J. H. Bender, sec.; S. M. Walker, treas.-gen. mgr. Mines are at Rico, Ouray Co., and at Black Hawk, Gilpin Co.

Inc. Sept., 1916, in Colorado **Cap.**, $100,000; par $1; 31,000 outstanding.

Property: at Rico, A. B. G., Sydney, D. V. G. groups and Wabash and No. 7 claims, comprise 38 claims in all, aggregating 460 acres. It was reported that 6,000 tons of ore blocked out, ran 18% lead, 15% zinc and 15 oz. silver. At Black Hawk, Gilpin county, the company has the Polly group, worked through a 700′ tunnel, which was reported to have cut veins of fair grade ore.

Late in 1917 it was reported that a lease and bond for $25,000 on the Manaska group of claims at Rico, owned by G. W. Burns, was secured. In 1918, the Lilia D. property of this section was also taken over.

CALEDONIAN MINING & MILLING CO. **COLORADO**

Office: Silverton, San Juan county, Colo. G. A. MacKenzie, mgr. Early in 1918, company commenced operations on the Peerless-San Juan mine, in Minnie Gulch, Silverton. This property had been inactive for many years due to litigation.

Equipment: consists of 75-ton mill, crusher, triplex rolls, ball-mill, flotation machine, and four Wilfley tables.

CALHOUN CONSOLIDATED MINES CO. **COLORADO**

Probably defunct. See Vol. XII. Mine at Central City, Colo.

CALLIOPE CONS. MINING CO. **COLORADO**

Office: 410 Foster Bldg., Denver. **Mine office:** P. O. Box 493, Ouray, Colo.

Officers: S. W. Schroeder, pres., 503 Downing St., Denver; L. J. Ford, v. p.; C. A. Larson, sec.-treas., Denver; preceding, C. F. Ogrem and A. A. Durson, directors. R. W. Davis, Jr., supt.

Inc. Feb. 9, 1914, in Colorado. **Cap.**, $100,000: par $1; outstanding 49,525 shares. No bonds. Annual meeting, February 9. On Feb. 9, 1920, it was proposed to increase the capital to $1,000,000; $1 par.

Property: 10 patented claims at Dexter Creek, Ouray, Colo. Developed by 2,800′ tunnel. The ore deposit is a quartz vein carrying gold, silver, lead, copper and zinc.

Reported, 1918, that company had installed a compressor, 75-h. p. transformer and rock-drills.

CAMP BIRD, LTD. **COLORADO**

Office: No. 1 London Wall Bldgs., London, E. C. 2; and Ouray, Colo.

Directors: F. W. Baker, chairman; L. Clerc, F. A. Govett, F. H. Hamilton, A. S. Elmore, and O. de Rivaud. J. A. Agnew and L. Chevrillon, technical committee. A. A. Kelsey, sec.

Inc. Sept. 8, 1900, in England. **Cap.**, £1,100,000, increased to £1,350,000 in Dec., 1909, and in July, 1911, to £ 2,100,000, consisting of 750,000 7% cumulative participating preference shares of £1 each, 649,625 issued, and 1,350,000 ordinary shares of £1 each; 1,100,051 issued.

Dividends: on pref. shares were paid semi-annually. On ordinary shares the first dividend paid in 1902-03 was 20%, last one paid Nov. 30, 1915, 5%; total 210%. In July, 1919, a distribution of 9d (18 cents) was made.

Accounts for fiscal year ending June 30, 1918, showed a profit of £53,275, making, with balance forward, a sum of £74,745, of which dividends, on 7% pfd. shares only, absorbed £45,473. Balance carried forward was £29,272. An income of £67,394 was derived from Santa Gertrudis shares. Balance sheet of June 30, 1918, showed assets of £1,831,863.

The year ended June 30, 1919, yielded a revenue of £87,864, of which £67,453 was from Santa Gertrudis dividends, and £15,276 from income tax recovered. The profit was £69,664, plus £29,272 brought forward, making £98,936 available. Two preference dividends absorbed £45,474, leaving £53,467 to be carried forward. Current assets exceeded liabilities by £1,267,741, this including investments of over £1,060,000.

Company's holdings in Santa Gertrudis, Ltd., Mexico, are 960,135 shares, or 64% of the issued capital; and control of the Camp Bird Tunnel, Mining & Transportation Co, which see. A large interest is also held in the Mexican Corporation, Limited, which see.

Early in 1919, it was announced that Santa Gertrudis, Ltd., had acquired control in El Bordo mines of the Pachuca district, Mexico. It is estimated that these mines have an assured reserve of 253,000 tons of ore, from which a profit of $2,142,000 is anticipated.

Property: the company was formed in 1900 by F. W. Baker and John Hays Hammond to acquire from Thos. F. Walsh the Camp Bird gold mine, near Telluride, Colo. Purchase price was $5,000,000. This property returned handsome profits for 10 years, when the lower levels showed signs of impoverishment. Other properties were then sought with the idea of making the company a mines-investment organization. The Santa Gertrudis silver mine was floated in this way and holdings acquired in the Messina.

Geology: the Camp Bird mine is at an altitude of 11,000′ and 8 miles from rail, which necessitated hauling supplies and concentrates over a mountain road, making operating costs comparatively high. The Camp Bird orebodies occur in a fissure vein in andesite. The ore has for its base hematite and is associated with iron, zinc and lead sulphides; it occurs in streaks, being less persistent and narrower with depth, and less regular in its relation to the walls. Stoping width was 5 to 8′. The mine was exhausted by mid-1916, so milling was suspended until the exploration work under way opens more ore. See Vol. XIII for other details.

Production: from April 30, 1903, to June 30, 1916, was 820,730 tons treated, yielding £4,778,591, at an expenditure of £1,798,227, leaving a profit of £2,980,363.

Until something is found in the mine, Camp Bird will have to depend upon dividends from Santa Gertrudis for future revenue, also from The Mexican Corporation, Ltd., and other interests. Investors wishing to study the financial results of the Camp Bird-Santa Gertrudis connection should read "A Post-Mortem," in the "Mining and Scientific Press" of Feb. 6 and May 24, 1919. In part, it said: "The [Santa Gertrudis] mine has yielded dividends aggregating £731,250 on a capital of £1,500,000, of which the Camp Bird company owns 81%. If we place 81% of the estimated remaining profit to the credit of that company and add 81% to the dividends distributed, we get the sum of just about $6,000,000 as the realizable money to be obtained by the Camp Bird company on the operation. On the other side, the Camp Bird company paid £922,131, or $4,481,550, for the 81% interest. Thus the principal will be returned plus about 25%. A silver mine should pay at least 10% per annum to warrant the risk incurred; in eight years the company should have received 80%; it will take three years more to exhaust the ore resources; thus 30% more is needed.

The mine should have yielded at the end of 11 years at least twice the amount of money paid for it, that is 200%, instead of 125%, disregarding the refinements of amortization. It was expected to do much more than it has done. The estimate, at the time of the flotation, stated that the ore in reserve amounted to 1,150,000 tons, from which a profit of £1,650,000, or $7,019,999, was assured, with undefined prospects of finding more ore and winning more profit. Evidently the mine will yield the amount of profit estimated as being assured when it was acquired, but no more. In short, the expectation of favorable development in depth has not been fulfilled. It was likely to be falsified by reason of the conditions under which the mine was appraised."

Camp Bird Tunnel, Mining & Transportation Co.

(Subsidiary of Camp Bird, Ltd.)

Operating officials: W. J. Cox, gen. mgr.; T. H. Woods, supt.; J. B. Glasser, purchasing agent and accountant.

Up to June 30, 1919, Camp Bird, Ltd., had invested in and advanced to this company the sum of £110,862. Its business is the further development of the mine.

Development: the mine is opened by tunnels and shafts. No. 3, the main working shaft, is 1,003′ deep below No. 3 level, and opens the 9th level at the 1,000′ point. Where cut on No. 9, the main vein was 14′ wide, but only 12″ was pay-ore. It was considered that good ore would be found below this, but the shaft had really reached its limit of economical operation, so it was decided to drive an adit 10,700′ long, to strike the lode 450′ deeper than any existing workings, and 800′ below the main ore-bearing ground.

The new low-level adit tunnel by which systematic exploration in depth was planned, reached the Camp Bird vein on June 1, 1918, at 11,000′ from the portal. It was extended 72′ west of the vein to confirm its identification. A drift, 2,043′ long, was driven east along the vein to a point beneath No. 3 shaft, permitting raising to the ninth level, giving natural ventilation. This was completed by Oct., 1919, being started at the 1,760′ point. On this deep level the Camp Bird vein has increased to 8′ in width, half quartz, carrying sulphide, including spots of galena. At the point of intersection there was no value in the vein, but during raising to No. 9 level several shoots of $25 to $35 ore were cut. These are being developed, and offer encouragement for opening a profitable productive area, which can be opened fast with good ventilation. According to the last annual report of Camp Bird, the situation might be termed as fairly encouraging.

CAPITAL MINING & TUNNEL CO. **COLORADO**

Georgetown, Clear Creek county, Colo.

Property: the Ætna mine, developed by 5,200′ tunnels, said to show sulphide ores running up to 18 oz. gold, 35 oz. silver, 55% lead and 5% copper.

Equipment: includes electric as well as steam power compressor, 200-ton concentrator. The mine is operated by lessees.

During 1917, extensive development was reported on the Aetna vein, the west drift being extended 1,556′, or a total length of 3,400′. In the Davenport mine the vein is reported cut at 375′ in the lower east drift. Bruce & Co., Pearson & Co., and Oklun Bros., were said to be the principal shippers.

CARBONATE GROUP **COLORADO**

Mine office: Mt. Baldy, Breckenridge, Summit county, Colo. Mine owned by George E. Moon, Breckenridge, but operated under bond and lease by Boston capital, headed by Samuel Klous. The ore was reported to carry 40 to 60% lead, ½ to 3 oz. gold, and 15 to 20 oz. silver per ton.

Developed through tunnel 250′ vertically above the timber-line. Several carloads of 25-oz. silver and 1-oz. gold ore were ready for shipment in July, 1919.

CARBONERO MINE **COLORADO**

Operated under management of G. B. Pickett, of Carbonero Leasing Co., Ophir, San Miguel county, Colo. Lower tunnel is in 2,700′. Part of mine subleased to Ruttila-Brown Leasing Co. Late in 1918, the Tomboy Gold Mines Co. was reported to have purchased a share in the mine.

CARIBOU METALS CO. **COLORADO**

Address: T. J. Clark, Boulder, Colo.

A reorganization, 1918, of the Degge-Clark Mining, Milling & Refining Co., Boulder, Boulder county, Colo. Cap., $2,000,000.

Property: 1,500 acres, including the Caribou silver mine, (formerly worked by the Caribou Mines & Mills Co.), at Caribou, S. of Nederland, Boulder county, Colo, said to have produced $7,000,000. Due to the interlacing cross veins, with consequent inability to determine extra lateral rights, the No Name, Sherman, Columbia, Kalamazoo, Federal, Socorro and Spencer claims have been combined to make the Caribou Metals group. Company is also said to hold title to 1,000 acres of patented timber and mineral lands north of Caribou Park, carrying tungsten ore.

Geology: ore occurs in a fissure vein, varying from 3-12′ in width, with pay-ore 6 to 36″ wide, showing argentiferous galena and silver glance. This vein dips to north and crosses veins to the northwest. The main cross vein is the No Name lode, intersecting the Caribou on angle of 42°.

Development: in original claim by 7 shafts, along the main lode, main shaft being 1,040′ deep; also by a 700′ tunnel.

In 1919, 15 sets of lessees were said to be at work in the Caribou group.

CARIBOU MINES & MILLS CO. **COLORADO**

Office: Cardinal, Boulder county, Colo.

Inc. in 1916. **Cap.,** $200,000. Company purchased from the trustee in bankruptcy the holdings of the Cariman Mining & Milling Co., in the Cardinal district of Boulder county.

Property: the Caribou and Poorman groups of claims, former producers. Also the Boulder County tunnel, projected as a great development, drainage and transportation tunnel from Cardinal toward the Caribou workings. The tunnel is in about one mile. In the 80's the Caribou mine is said to have been considered the best silver producer in Colorado.

Equipment: at last reports included the 100-ton Caribou mill, the 100-ton Cardinal mill and a cyanide plant. Company not operating in 1919.

CARNOTITE REDUCTION CO. **COLORADO**

Address: G. B. Pickett, mgr., Gateway, Mesa county, Colo.

Property: carnotite-bearing claims in the Gateway district. Ore was shipped, and a reduction plant was to be erected in 1919.

CARRIBEAN TRUST CO. **COLORADO**

Mine address: Ophir, San Miguel county, Colo. Geo. L. Bingham, mgr. A high copper concentrate is reported produced by treating the ore in a flotation plant.

CARTER MINING CO. **COLORADO**

Mine office: Volunteer Mountain, Ohio, Gunnison county, Colo. W. D. Murdie, mgr.

Property: 800 acres on Volunteer Mt., less than 4 miles from Ohio, Gunnison county.

Equipment: 3 Pelton wheels driving compressor, dynamo, and 20 stamps. Company is reported to have found the old Volunteer vein, which was lost due to a fault. This big vein in granite carries a copper-iron sulphide ore.

CASHIER GOLD MINING & REDUCTION CO. **COLORADO**

Office: P. O. Drawer 46, Warren, Pa. **Mine office:** Central City, Gilpin county, Colo.

Officers: Wm. Muir, pres.; F. M. Lockwood, sec.; E. E. Allen, treas.-mgr.; with H. P. Stone, M. A. Bliss, J. T. Meals, E. J. Lesser, W. P. Volgamore and F. L. Bensinger, directors. Wm. Auger, supt.

Cap., $1,000,000; $1 par; 733,614 issued.

Property: includes the Pittsburgh, Meeker and Brooklyn mines, carrying chalcopyrite and tetrahedrite, principal values being in silver, running up to 700 oz. per ton. The Pittsburgh mine is developed to depth of 1,000′, by shafts, drifts and upraises. Equipped with boiler, pump, hoist and drills. Early in 1918 a 50-ton mill was reported erected and in operation on the Pittsburgh mine.

Average assays run 3.64 oz. gold, 7 oz. silver and 6.10% copper. Plan

sinking shaft to the 1,200′ level for which purpose $30,000 was voted at directors' meeting in May, 1918. Has been a small but steady producer for years.

CATASTROPHE MINE **COLORADO**

Mine office: Boulder Falls, Boulder, Colo. I. N. Blair, mgr. In March, 1918, mine was being operated under bond and lease by I. N. Blair, G. M. Newmeyer, and L. K. Guiler. Reported that mine was producing ferberite ore assaying 25% tungstic oxide in 1918-19.

CENTRAL CONS. TUNNEL MINING & MILLING CO. **COLORADO**

Office: 511 Exchange Bldg., Denver, Colo.

Officers: J. F. C. Sievers, pres.; Dr. G. P. Howard, treas.; Frank E. Wire, sec.

Inc. 1917, in Colorado, with 5,000,000 shares.

Property: 38 patented claims, 130 acres, and a bond and lease on the 4,000′ Burns-Moore tunnel, Idaho Springs, Clear Creek county. In March, 1919, company was reported to have struck ore in surface workings averaging 2 oz. gold per ton.

CHAMBERLAIN ORE CO. **COLORADO**

See Boulder Ore Sampling Co.

Office: 43rd St. and Galapago Ave., Denver, Colo. W. J. Chamberlain, Denver, gen. mgr.

Property: sampling mills at Georgetown, Breckenridge, Black Hawk, Idaho Springs, and Denver. In March, 1918, the mills were closed, due, it was reported to high operating costs and scarcity of ore. The Boulder Ore Sampling Co. took over the Boulder plants.

CHAMPION MINING CO. **COLORADO**

Property: 3 patented lode claims, covering 25 acres, on Campbell Mountain, near Creede, Mineral county, Colo.

Development: the lower tunnel is 600′ long, with a short drift on the vein. Upper workings consist of 250′ crosscut tunnels with 200′ drift on vein. Ore assayed from 15 to 100 oz. silver. Operations were suspended in 1907, but reported resumed in 1918.

CHIEF MOUNTAIN MINING CO., THE **COLORADO**

Office: 810 Majestic Bldg., Denver, Colo. F. G. Dinsmore, pres.; S. H. Alexander, sec.

Inc. Jan. 1, 1918, in Colorado. **Cap.,** $5,000,000; par 1 cent.

Property: the Old Square Deal group of 73 claims, on Chief Mountain, near Frisco, Summit county. Gold, silver, copper, lead, zinc are found in a quartz fissure vein occurring in granite.

Development: by 850′ shaft and 2,300′ tunnel. Until recently property reported in litigation.

CHIPETA MINING, MILLING & SMELTING CO. **COLORADO**

Officers: John Zanett, pres., Ouray, Colo. Giacino Taller, v. p.; J. J. McCarthy, sec., with P. J. Bacca, William Rathwell, and J. Fecco, directors.

Inc. June, 1918, in Colorado. Fully capitalized by Sept., 1919.

Property: in the Bachelor district near Ouray, Ouray county. Ore in the Khedive mine carries lead and silver. The vein is to be opened by further development and machinery erected.

CHRISTMAS GOLD MINING CO. **COLORADO**

See Vindicator Consolidated Gold Mining Co.

CLEAR CREEK-GILPIN ORE CO. **COLORADO**

Office: Idaho Springs, Clear Creek county, Colo. W. E. Passmore, W. E. Renshaw, and E. L. Regennitter were reported Dec., 1918, to have taken over the old North American sampler at Idaho Springs. The district has needed a sampler, since the Chamberlain Ore Co. closed down.

CLIMAX MOLYBDENUM CO. **COLORADO**

Subsidiary of American Metal Co., Ltd.

Mine office: Bartlett Mountain, Climax, Lake county, Colo. John H. White, mgr.; Webster P. Cary, supt.

Property: about 600 acres, on Bartlett Mountain, on the boundary line

between Park and Summit counties. Mine is about 16 miles N. E. of Leadville on South Park Branch of Colorado & Southern R. R.

Geology: lode formation is thickly foliated quartz-porphyry and decomposed granite or alaskite granite, with disseminated stringers of molybdenite and a little iron pyrite. Molybdite, the yellow oxide, appears in considerable amount where oxidation has occurred.

Development: construction started July, 1917, and first shipment was reported Feb., 1918. Mining is done through two tunnels, the upper one 12,100′ above sea-level, was 830′ long in 1918. Near the portal crosscuts are driven at right angles for 400′ both ways. Another adit, 300′ lower down, is to be lengthened to 2,200′. In the lower one the E. W. contact dips 70° to the S. E. Mining is done by parallel shrinkage stopes 800′ by 25′ with pillars of the same width between. It is planned to carry stopes to surface and break down the intervening pillars. Company has developed 25 acres of patented ground. Purchase of property, development and erection of plant, called for expenditure of $600,000 to October, 1918.

Equipment: includes 4,700′ tramway and mill of 300 tons daily capacity.

Production: $500.000 worth of 70% molybdenite up to May, 1918.

In Dec., 1918, it was reported that company had taken over the entire property of the Molybdenum Products Co., at Buffehrs Spur, 2 miles from Climax. The Climax is the largest molybdenite mine in the world, its output being about 60% of the total production of molybdenum ore.

COLDWATER COPPER MINING CO. **COLORADO**

Mail returned, unclaimed, March 11, 1919, from Encampment, Wyo. Mine near Pearl, Larimer county, Colo.

Officers: Z. L. Baldwin, pres.; H. N. Backus, v. p.; Walter Phipps, sec.; Burr Lobdell, treas. and gen. mgr.

Inc. May 18, 1900, in Wyoming. **Cap.,** $1,000,000; shares $1 par.

Property: 5 claims, 52 acres, in the Pearl district of Larimer county, known as the Wolverine mine. Claims have 3 fissure veins in granite and diorite, of which 1, of 20′ estimated width, shows oxidized ores and native copper, with sulphides at a little depth, estimated to carry an average of 6% copper and 2.6 oz. silver per ton, opened by shafts of 90′ and 170′, bottom of principal shaft showing massive chalcocite and a little disseminated chalcopyrite, of high average grade. Idle several years.

COLE MINING CO. **COLORADO**

G. L. Cole, mgr., Springfield, Mo.

Reported in 1918, that company had commenced operations on the Broad-gauge lode on Griffith mountain. Also said to be interested in the Sub-treasury and other lodes on Brown mountain which have been dormant since the eighties.

COLOMA MINING CO. **COLORADO**

Address: Central City, Gilpin county, Colo.

Property: adjoining that of the Square Deal Company, near Central City. Ore carries gold, silver, copper and lead.

In 1915, litigation started between the Square Deal (which see) to determine title to the South Notaway vein. In the first trial the Coloma Co. won, but in appeal the Square Deal was adjudged the owner.

COLONEL SELLERS MINE **COLORADO**

Controlled by Empire Zinc Company, which see.

COLORADO BLUE BELL MINING CO. **COLORADO**

A promotion of W. M. Sheridan & Co., indicted by Federal authorities for many fake promotions in July, 1919.

COLORADO-CARR MINING CO. **COLORADO**

Mine office: Central City, Gilpin county, Colo. Harry L. Elman, mgr. Resumed operation in 1916, after many years of idleness. Mine was supposed to be worked out, but $2,000 shipments were reported in 1917.

COLORADO CENTRAL MINING CO. **COLORADO**

Address: Georgetown, Colo.

Officers: Henry Kroger, pres.; C. L. Woods, v. p.; E. S. Wiard, mgr.; Frank C. Dolbey, supt.

Property: 200 acres, represents a consolidation of all conflicting claims in litigation between 1887-96. Edward S. Wiard and associates formed a private syndicate, and secured property on lease with purchase option.

Company owns and operates a 450-ton mill, using flotation, and connected by electric tramway to the old dumps and Equator tunnel of the Colorado Central mine.

The ore dumps of the Marshall Tunnel, Ocean Wave, and other mines, aggregate 370,000 tons, which they are handling at rate of 350 tons per day by steam-shovel, since operations were started in 1918.

Ore carries galena containing gray copper, polybasite, dark ruby silver, and antimonial sulphides.

In May, 1919, a body of mill ore was reported opened in a drift in the Marshall mine, the ore being 8′ wide and averaging $40 per ton.

COLORADO CONCENTRATING CO. **COLORADO**

Controlled by Silver Mining & Reduction Co., which see.

COLORADO & CONNECTICUT GOLD MINING CO. **COLORADO**

Property reported turned over to National Finance and Holding Co., Toledo, Ohio.

Mine office: Lake City, Hinsdale county, Colo.

Property: 3 claims, 21 acres, known as the Dolly Varden mine, in the Galena district, carrying three 2′ fissure veins, opened by a 150′ shaft and a 738′ tunnel, with 1,900′ of workings. Ore is chalcopyrite, tetrahedrite and occasional argentite, assaying 9 to 19% copper, with occasional silver values; test shipments have given returns of 141 to 479 oz. silver and as high as $11 gold per ton.

COLORADO FUEL & IRON CO. **COLORADO**

General office: Boston Bldg., Denver, Colo.

Officers: J. F. Welborn, pres.; S. J. Murphy, v. p.; E. S. Cowdrick, asst. to pres.; J. Chilberg, v. p. and sales mgr.; S. G. Pierson, v. p. and gen. pur. agt.; J. A. Writer, sec.-treas.; L. B. Rogers and E. V. Cary, asst. secs.; A. D. Moss, asst. treas.; F. H. Bently, and J. B. McKennan, gen. mgr.

Inc. Oct 21, 1892, in Colorado. **Cap.,** $44,200,000 com., and $2,000,000 pfd.; of which $34,235,500 and $2,000,000 are issued. Funded debt outstanding Dec. 31, 1918, $5,835,000, general mortgage 50-year, $1,000 gold 5s., due Feb. 1, 1943; general mortgage 6s, $40,000; Grand River Coal and Coke, 1st mortgage, 6s. $846,000; Colo. Ind. Co. 1st mortgage 5s, $37,630,000. Total funded debt, $44,351,000.

Gross receipts for year ended Dec. 31, 1918, were $48,233,575, against $43,518,616 in 1917. Net income was $8,101,111, against $9,473,578. After deducting bond interest, taxes, sinking funds, depreciation, there was left $3,132,047. Excess profits tax was $400,000, and dividends, 3% common and 8% pfd. totaled $1,186,875, leaving $1,545,172 net.

For 9 months ended Sept. 30, 1919, gross receipts were $30,576,272, of which $3,191,407 was net. Other income made a total of $3,541,070. Interest, taxes, etc., were $1,968,433, so the surplus was $1,572,637. The gross was $6,500,000 below the same period of 1918.

Dividends: on pfd. at the rate of 8% per annum have been paid in full to Dec. 31, 1918; on common year ended July 1, 1902, 7%; July and Oct., 1917, ¾% each; and year of 1918, 3%.

Property: besides steel works and coal mines, company has iron mines in Colorado, New Mexico, and Wyoming.

Production: from the iron mines: 813,728 tons in 1912: 853,878 in 1913; 614,039 in 1914; 441,026 in 1915; 709,601 tons in 1916; 886,909 in 1917; 809,491 in 1918.

COLORADO-GILPIN GOLD & RADIUM MINING CO. **COLORADO**

Office: 517 Drexel Bldg., Philadelphia, Pa.

Officers: Wm. Wright, pres.-gen. mgr.; Hon. Edw. Hart, v. p.; R. R. Grumer, sec.-treas., at last accounts.

Property: the Wood mine, at Central City, Gilpin county, developed to depth of 350′ and reported to carry a vein, from 18″ to 2′ thick, containing gold and pitchblende.

Equipment: included power plant, compressor, etc. A notable shipment of 112 tons of ore, valued at $85,000 and estimated to contain 715 milligrams of radium, was sent to the Colorado School of Mines for the U. S. Bureau of Mines in 1916. Is a close corporation which refuses information concerning its operations.

COLORADO METAL MINING ASSOCIATION COLORADO

Office: 324 Tabor Opera House Block, Denver, Colo.

Officers: G. M. Taylor, pres.; G. O. Argall, v. p.; R. M. Henderson, v. p.; C. A. Chase, v. p.; G. E. Collins, treas.; M. B. Tomlin, sec.

Connected with the American Mining Congress. Is not a mining company, but an organization formed to protect the mining industry and to foster an interest in mining.

COLORADO METALS & CHEMICAL CO. COLORADO

Louis Shafer, mgr.

Controls the Fourth of July Group in Boulder county, Colo., together with the Cons. Copper M. M. & Sm. Co., and property is described under latter title.

COLORADO MINERAL SEPARATION CO. COLORADO

Office: Room 1115, 137 S. La Salle St., Chicago, Ill.

Officers: C. S. Funk, pres.; Jos. Weatherby, v. p.; E. R. Winn, sec.-treas., with Chas. C. Shedd, T. I. Crane, C. M. Rogers, and W. J. Louderback, directors.

Inc. July 30, 1914, in Delaware. **Cap.,** $500,000; $100 par; all outstanding.

Has license from Electric Ore Separator Co. of New Cumberland, Pa., to use the Weatherby electric separating process in the Leadville district. Company has a plant at Breckenridge, which is inactive for lack of suitable ore.

In 1919, a subsidiary leased the Emile placer and the John J. claim, both in French Gulch, near Breckenridge, Colo., from the Long Island Mining Co. Prospecting was begun, but bed rock had not been reached at 44′. It was also reported that operations on the lode mine were started in order to supply zinc-lead ore for the Old Union mill, owned by the company and located in French Gulch.

COLORADO MINING AND DEV. CO. COLORADO

W. S. Leebrick, pres.

Property: Little Mattie mine, Idaho Springs. Reported sold to John B. Fowler and M. G. Hanson for $41,000, but sale contested in District Court.

COLORADO MINING LAND & INVESTMENT CO. COLORADO

Idle. **Office:** Walsenberg, Colo. Mine near Hillside, Freemont county, Colo. E. L. Neely, pres. and mgr.

Inc. 1911, in Colorado. **Cap.,** $750,000; shares $1 par.

Property: 110 acres, owned partly in fee and partly leased, said to show gold, silver, copper and lead which assayed to $30 per ton.

COLORADO PAYROCK SILVER MINES CO. COLORADO

Address: E. C. Bennett, sec.-treas., Kenmark Hotel, Denver, Colo.; Ernest Le Neve Foster, supt.

Cap., $250,000; 50c par.

Property: the Payrock mine at Silver Plume, Colo., an old mine "that has produced millions."

Shares advertised at 20c. in 1917, but no recent sales reported.

COLORADO PITCHBLENDE CO. COLORADO

Office: Central Savings Bank Bldg., Denver, Colo. **Mine:** Jamestown (Jimtown), Boulder county, Colo.

Officers: J. T. Barnhill, pres.; J. H. Hardy, v. p.; I. F. Brinn, sec.-treas.; with E. T. Wooley, W. H. Smart, D. W. Long and W. G. Davis, directors, at last accounts.

Inc. 1918, in Colorado. **Cap.,** $100.000; 5c par; 1,360,000 were in treasury; non-assessable. Company asked $2 per share on initial sale of stock.

Property: about 40 claims, nearly 400 acres, in Jamestown, 16 miles northwest of Boulder. Mines include Blue Jay, Emmett, Brownspar, and Argo

groups. In 1919, company was said to control the Golden Age mill at Springdale, near Boulder, and planned to erect a mill at Denver to refine uranium and radium ores.

Ore is a sulphide, containing fluorite associated with small amounts of uranium, gold, silver, lead, and iron. Analysis shows 70% fluorspar, 0.1% uranium oxide, 2% lead, and 6% iron.

Development: by two shafts, 450′ and 110′ deep, and 15 tunnels.

Equipment: mill with capacity of 80 tons of crude fluorspar per day; company planned a 1,000-ton mill and a 16-mile railroad to connect the mine with Boulder. The shaft-house and hoist were burned in July, 1919.

Copious advertising made mining men skeptical. The Mining Bureau of the Denver Civic and Commercial Association, and the Manufacturers Association of Colorado, each sent an engineer to examine the property. These sent reports estimating $9.14 to $11.45 per ton profit on a 1,000 ton daily output. Later reports show that the gross production per ton would be: gold, silver, and lead $1.04; fluorspar, $3.81; uranium oxide and radium, $7.09, total $11.94.

The "Mining and Scientific Press" has denounced the flamboyant statements made about this company and severely criticised the promotion. A little later the City Bank and Trust Co. of Denver was closed by the State Bank Examiner who found a $70,000 shortage, due to its having honored drafts presented by J. T. Barnhill, president of the Colorado Pitchblende Co.. The cashier fled, but subsequently gave himself up; but Barnhill is still at large. Thus ends the ambitious scheme to sell shares in a company that was to extract radium from fluorspar.

COLORADO SUPERIOR MINING CO. COLORADO

Office: Telluride, Colo. Believed to be controlled by Smuggler Union Mining Co.

Officers: J. H. Jasberg, pres.; Bulkeley Wells, v. p.; John E. Porthan, sec.-treas., Ely, Minn.; Isaac Nevala, gen. mgr., with O. J. Larson, directors.

Cap., $1,000,000; shares $1 par; 561,635 outstanding. Bonds authorized $250,000 (8%); issued, $156,100.

Latest report, year ended Sept. 30, 1916, showed total receipts $259,324, of which $257,477 was from ore sales; total disbursements, $191,664, which left a net operating profit of $67,659. Current quick assets, $18,361, with current liabilities of $15,621. Current assets in excess of current liabilities were $8,932.

Property: 322 acres, patented or applied for, near Telluride, in San Miguel county, at an altitude of 12,500′.

Ore: sulphides of lead and zinc containing gold and silver in a vein averaging 10′ in width and supposed to be a continuation of the Argentine vein in the neighboring Tomboy mine. Company owns the Black Bear Mining Company.

Development: to depth of 1,100′ by shaft, 500′ from N. W. end of property, and crosscuts totaling 5,100′ of workings.

Ore was treated at the Smuggler Mng. Co.'s mill. Ore milled during 1916 amounted to 48,450 dry tons, with average assays per ton of 0.226 oz. gold, 2.49 oz. silver, 3.23% lead and 5.77% zinc.

Ore reserves were estimated at 100,000 tons, which averaged better than $5 per ton, with 75,000 reported blocked out, July 31, 1917.

Equipment: included electric hoist, 2 compressors and a 250-ton flotation unit.

Production: for 1916, 7,055 oz. gold, 68,306 oz. silver, 2,354,459 lb. lead, 2,233,536 lb. zinc and 15,509 lb. copper.

Lead concentrates averaged 1.81 oz. gold, 18.47 oz. silver, 48.88% lead, 4.90% zinc, 1% copper; zinc concentrates: 0.27 oz. gold, 6.95 oz. silver, 6% lead, 23.96% zinc.

Recovery ran from 40% for zinc to 75% for lead. About 6,548 tons of concentrates were produced. Concentration ratio was 7.4 to 1.

The Black Bear mine controlled by this company, was reported to be producing 180 tons daily in 1918.

COLORADO TUNGSTEN GOLD & SILVER CO. COLORADO

Address: Morton & Co., 15 State St., Boston, fiscal agts. **Mine office:** Nederland, Colo.

Developed by a 65′ shaft which showed ore but not in paying quantities. Mine abandoned.

COLORADO-UTAH MINES OPERATING CO. COLORADO

Mail returned unclaimed, June, 1919, from Lake City, Colo.

Officers: Arthur S. Larsen, pres.; A. B. Smith, supt.

Inc. in Utah. **Cap.,** $100,000 shares 5c. par; increased Sept. 15, 1917, from $30,000.

Property: the Golden Fleece mine, near Lake City, Hinsdale county. Equipped with 100-ton mill. Company deepened shaft to 800′ and cut stations on No. 6, 7 and 8 levels. Presumably idle.

COLORADO VANADIUM CO. COLORADO

Address: F. G. Carpenter, pres., and Frank Gardner, mgr., Saw Pit, Colo. Mine near Fall Creek station, Telluride, San Miguel county, Colo.

Equipment: includes a compressor, pipe-lines for drills, and a 2-bucket 2,300′ aerial tram. In May, 1919, company reported shipping a car of ore daily to the Primos Chemical Co. at Vanadium, Colo.

Company also has claims on Bear Creek side of San Miguel river, and leased the Summers mill at Sawpit, which was remodeled to treat vanadium ores, until the new mill to be erected at Fall Creek was completed in Nov., 1919.

COLUMBIA SILVER & GOLD MINING CO. COLORADO

Office: Tabor Block, Denver, Colo.

Officers: S. B. Brigham, pres.; with L. S. Ordway, P. L. Hanson, C. R. Braiser, and C. B. Demarest, directors.

Cap., $25,000; $1 par.

Property: 25 acres, in Jackson mining district, Clear Creek county, adjoining Little Mattie, Newton, and Black Eagle mines. In Sept., 1919, the Star tunnel was being driven to cut the Columbia vein.

COLUMBUS MINES CO. COLORADO

Office: 905 First Nat'l Bank Bldg., Denver, Colo. Jas. Doyle, pres.

Inc. in Colorado. **Cap.,** $50,000.

Property: 3 claims in California district, La Plata county, Colo. Development work was started in 1916; in 1918, work on crosscut tunnel was being prosecuted.

COMBINATION MINING & MILLING CO. COLORADO

Office: 520 Quincy Bldg., Denver, Colo. Frank Straub, sec.

Cap., $100,000; 1 cent par.

Property: in 1916 company took over the Gilpin Orion mines of 40 acres on Bob Tail hill, Gilpin county; also owns 147 acres in La Plata mining district, Grand county, which is developed by a 700′ tunnel. Ore carries gold, silver, copper, and zinc. The company also has over 3,000 acres of oil lands under lease in Wyoming.

In July, 1919, company stated that an Eastern syndicate was about to underwrite a block of shares, proceeds of which would be used in operating in Gilpin county.

COMMONWEALTH MINING CO. COLORADO

Louis G. Davis, mgr.

Property: in 1917, company secured the Magnolia mine and Eddy mill at Montgomery, six miles north of Alma, Park county, Colo. Also reported in control the Lee Goss, Peru Extension, Populist, Prospect, Palmetto, Columbia, Logansport, and Chicago mines.

Geology: Archean granite is overlain by successive beds of Cambrian quartzite, Silurian "white limestone," and Carboniferous or "blue limestone." Quartzite is divided by an intrusive flow of white porphyry. Orebodies occur as veins and masses, cutting all these rocks.

In the Magnolia, a shoot 8′ thick, 12′ high, and running $30 per ton was opened. Company has aerial tramway, 3,800′ long and a 500-ton cyanide mill.

COMMONWEALTH TUNGSTEN GOLD & SILVER CO. COLORADO

Office: Morton & Co., 15 State St., Boston, Mass., fiscal agents. **Mine office:** Nederland, Colo.

Officers: Walter F. Howard, pres.; Geo. L. Wilson, sec.-treas. Both the above, Guelherne M. Luiz and William H. Brown are trustees. Chas. E. Ulmer, supt., Nederland, Boulder county, Colo.

Inc. Nov. 20, 1917, in Massachusetts, under declaration of trust. **Cap.**, $500,000; $1 par.

Properties: the tungsten mines held under lease at Nederland, Colo., include the McKenzie, with a 500′ tunnel; the Big Six, with a 150′ shaft, and the St. Elmo, with a 265′ shaft. Silver mines leased at Beaver, Colo., are the Beaver with a 120′ shaft, and the Happy Home, with a tunnel 300′ long. All are old properties with extensive openings, and are reported to have pay ore. Company reported to be trying to raise money to develop its property and build mill at Nederland, at last accounts.

CONGRESS GOLD & COPPER CO. COLORADO

Directors: J. B. Ross, pres.; Guy W. Mallon, v. p.; Frank L. Ross, sec.-treas., mgr.

Inc. April 16, 1908, in Colorado. **Cap.**, $500,000; shares $10 par. Bonds, $100,000 authorized, at 6%; all issued.

Property: 3 claims, 20 acres, the Congress and Arlington lodes at Red mountain, in San Juan county, and the Midway lode in Ouray county. Property is 12 miles south of Ouray and 12 miles north of Silverton. The Congress is a famous old mine worked 1884-93, said to have produced about $400,000 worth of ore, averaging 18% copper and 11 oz. silver per ton, with small gold values. The mine, idle for some years, through litigation, has been leased since 1912.

Development: 400′ shaft with about 1,500′ of workings, showing chalcocite, reported by company to average about 5 to 10% copper, 10 oz. silver, and ½ oz. gold per ton. Mine has electric equipment, including hoist and compressor plant.

In May, 1919, operations were suspended, but company expected to resume when the price of copper reached a profitable figure.

CONGRESS MINE COLORADO

Mine in Enterprise Mining district, Gilpin county. Operated by the Toronto Mining Co., Denver, Colo., which see.

CONQUEROR MINING REDUCTION & POWER CO. COLORADO

Address: F. H. Hamblin, Worcester, Mass.

CONSOLIDATED COPPER M., M. & SM. CO. COLORADO

Mine office: Eldora, Boulder county, Colo.

Officers: C. C. Munson, pres.; W. H. Hoke, v. p.; M. P. Givens, sec., 325 Bannock St., Denver, Colo.; M. L. Ericson, treas.

Inc. Oct. 16, 1899, in Colorado. **Cap.**, $2,000,000; shares $1 par. Annual meeting, second Tuesday in September. Consolidation with Colorado Metals & Chemical Co. reported in 1914.

Property: 27 lode claims, partly patented, 150 acres known as the Fourth of July group, 3 additional tunnel claims, a placer claim and a 160-acre timber claim, giving total holdings of about 600 acres, at the southern base of Arapahoe peak, in the Grand Island district. Said to have 4 contact deposits, with phonolite on one wall, of which 1, under development, was said to average about 7′ in width, and to carry up to 60′ of sulphides, of concentrating grade, including galena, chalcopyrite, bornite and chalcocite, all auriferous and argentiferous.

Development: at last reports was by 3 shafts, deepest 360′, and the Fourth of July tunnel, of 4,800′ length. Had steam power, a 6-drill Leyner 2-stage air-compressor and necessary buildings. No recent returns received.

CONSOLIDATED LEASING CO. COLORADO

Address: Dr. C. E. Kohler, pres., Columbus, Ohio; William Harpel, mgr.

Property: a lease on holdings of the Swarthmore Cons. Mng. Co.

(which see), near Eldora, Boulder county. A 25-ton mill was erected late in 1919.

CONSOLIDATED MINES DEVELOPMENT CO. COLORADO

Office: 717 Majestic Bldg., Oklahoma City, Okla. Mine at Alice, Colo.

Officers: L. T. Samuelson, pres.; J. A. Best, v. p.; W. C. Bickford, sec.-treas., with W. G. Harper and W. G. Luckenga, directors. W. G. Harper, mgr.

Inc. in Colorado, **Cap.**, $1,500,000; $1 par; 850,000 outstanding. Annual meeting, second Monday in October.

Property: 10 claims, 2 patented, 102 acres, in Upper Clear Creek and Argentine districts, Clear Creek county, said to show a quartz vein in granite, 6′ wide, running N. E.-S. W. and to assay $18 in gold, silver, and copper.

Development: by tunnels, 1,100′ and 400′ long, said to prove 200,000 tons of ore.

Equipment: 7-drill compressor, electric power and a flotation unit. A 100-ton mill was planned. No recent reports.

CONSOLIDATED REALTY & INVESTMENT CO COLORADO

Office: Boulder, Colo.

Officers: T. V. Wilson, pres.; D. A. Degge, sec., with M. Maury and J. A. Webber, directors; W. W. Degge, mgr. Transfer office: Boulder.

Inc. Dec., 1909, in Colorado. **Cap.**, $1,000,000; $1 par; 866,700 outstanding.

Financial statement to December, 1916, showed total receipts of $25,672, with disbursements of $25,336.

Reported to have a blanket deposit of gold running about $18 per ton.

No recent record of operations.

CONSOLIDATED SPECIE PAYMENT MINING CO. COLORADO

See Specie Payment Gold Mining Co.

CONTINENTAL MINES, POWER & REDUCTION CO. COLORADO

Office: 919 Equitable Bldg., Denver, Colo. **Mine office:** Lombard, Clear Creek county, Colo.

Officers: Henry I. Seemann, pres.-gen. mgr.; Cyrus Locker, v. p.; Wm. H. Warinner, 2nd v. p.; A. W. Craig, sec.-treas.

Inc. Nov. 7, 1905, in Colorado. **Cap.**, $5,000,000; $1 par; issued $4,370,761. Annual meeting, first Wednesday in November.

Property: 182 claims, 70 patented, 2,000 acres, in the Lincoln mining district, said to show 75 fissure veins and contact deposits, ranging in width from 2′ to 75′. Country rock is gneiss, schist and granite, with porphyry dikes. Vein system claimed to be proved to depth of 1,000′ and traceable 4 miles. Ores are sulphides, reported by management to carry 1 to 7% copper, 1 to 35% lead, from a trace to 6% zinc, 1 to 200 oz. silver and $5 to $500 gold per ton.

Development: by shafts of 135′, 150′ and 200′ and a number of tunnels of 100′ to 2,000′. The Seemann tunnel, now idle, is about 4,000′ long. The mine has approximately 4 miles of workings, with about 1 mile in ore, estimated by management to show 300,000 tons of ore in sight. Most of the work is now being done on the Lombard vein and through 4 tunnels, 800′, 1,500′, 1,600′ and 3,800′ long.

Equipment: includes electric power, 150-h. p. at mine and 150-h. p. at mill, 25-h. p. hoist and 7-drill air-compressor. There are about 20 buildings.

The mill has 20 stamps, one 8x12″ crusher, 3 Card tables, 3 Wilfley tables and 2 sizers, capacity 100 tons per day. Company planned continuous development and was to add an oil flotation plant to the mill, increasing its capacity to 200 tons per day, and selling commercial current. In July, 1919, the president reports that nothing was being done on account of the lack of money.

CONTINENTAL MINING CO. COLORADO

Office: Silverton, Colo.

Officers: Jos. Bordeleau, pres.-treas.-mgr.; F. B. Brown, v. p.; W. A. Way, sec., with M. J. Heller, supt. and J. H. Slattery, directors.

Inc. in Colorado. **Cap.**, $1,500,000; at $1 par; 23,000 shares in treasury. Transfer office: Silverton. Annual meeting in December.

Property: 18 claims, about 150 acres, located in the Eureka mining dis-

trict, San Juan county, said to show quartz vein in fissure carrying gold and silver. Company spent $8,000 on development work in 1916.

Development: by vertical shaft and tunnels. Tunnels are 3,000′ long with 4,000′ of development, having a depth of 500′. Ore-shoot said to be 1,500′ by 350′ and 200,000 tons blocked out. Average assays were reported to be $18.

Equipment: electric hoist and electric pump.

No recent returns.

COPPER CREEK MINING CO. **COLORADO**

Office: 1723 Champa St., Denver, Colo.

Cap., $100,000, divided into 1,000,000 shares at 10c par; 500,000 shares to be left in treasury.

Property: said to consist of 560 acres, 26 miles from Denver. Reported developed by vertical 354′ shaft, cutting a copper bearing dike.

COPPER KING MINES PRODUCTS CO. **COLORADO**

Mail returned June, 1919, from former address, Copperbow, via McCoy, Eagle county, Colo.

Officers: Wm. Kelly, pres., Hutchinson, Kan.; Andrew B. Crichton, v. p., Johnstown, Pa.; J. R. Wood, sec.-treas., 2140 S. University Ave., Denver, Colo., with E. E. Lloyd and J. N. Wyman, directors; W. H. Wagner, mgr.

Inc. in 1914.

At last reports company was using a 50-ton electrolytic mill to experiment on a 50,000 ton deposit of copper oxide ore. Believed to be idle.

CORRY CITY MINES **COLORADO**

Mine office: Silver Plume, Clear Creek county, Colo. William Copper, mgr.

Early in 1919, it was reported that operations would be started driving the Desch tunnel 100′ and operating the Neshotah mill.

CRAWFORD MINING CO. **COLORADO**

Address: Warren Prosser, supt. Mine located in Red Mountain district, Ouray county. In 1918, several large bodies of silver, lead and copper ores were reported opened. Shipments were expected as soon as the Red mountain branch of Silverton Northern R. R. was opened.

Property: known as the Genessee mine, and formerly leased by James M. Hyde of San Francisco.

CREEDE EXPLORATION CO. **COLORADO**

Address: J. Gordon Hardy, mgr., Creede, Mineral county, Colo.

Company holds a lease on most of the Amethyst vein below the Nelson tunnel. The Commodore, Reno, White Star and Consolidated mines are all on this Amethyst vein and company is reported to have unwatered the Berkshire shaft and to be unwatering the Commodore. Vein carries "liberal" values in gold with silver and lead.

CREEDE UNITED CO. **COLORADO**

Address: Creede, Mineral county, Colo.

Reported in 1918 that company was extracting a small amount of milling ore from the Happy Thought mine and treating it at the Humphreys mill.

CROWN PRINCE CONSOLIDATED MINING CO. **COLORADO**

Office: 934 Gas & Electric Bldg., Denver, Colo. **Mine office:** Empire, Clear Creek county, Colo.

Officers: M. H. Block, pres.; J. E. Rinehart, v. p.; Thos. Williams, sec.; Wm. G. Krape, mgr. and treas., with Daniel Erickson, directors.

Inc. June 9, 1910, in Arizona. **Cap.,** $3,500,000; shares $1 par; outstanding, 3,433,014.

Property: the Mint mine, 17 claims, 85 acres, near Empire. Gold-silver ore occurs in veins and is claimed to average from $6 to $12 per ton.

Development: by 75′ shaft and tunnels, longest 1,025′, with total underground workings of 7,000′. Equipment includes electric hoist.

Production claimed to have been $200,000 in the past. Operations in 1918 reported to consist of drifts on veins in which only low values were found as levels had not yet reached ore-shoot.

CRUCIBLE STEEL CO. OF AMERICA **COLORADO**

The company stated, in April, 1919, that it had disposed of all of its mining properties in Colorado. It is believed that the Nederland tungsten mines are being operated by D. Waren, J. J. Allen, B. Dawson, and A. V. Echternacht, who leased the mines when owned by the Crucible Steel Co.

CUMBRE MINING CO. **COLORADO**

Company has been dissolved.

Address: C. L. Colburn, 530 Equitable Bldg., Denver, Colo.

Had lease and bond on the Carpenter and 86 placers, consisting of 90 acres, near Breckenridge, Summit county.

DANA MINING CO. **COLORADO**

Office: Boulder, Colo.

Officers: Jas. B. Simpson, Boston, pres.; A. S. Coan, Boulder, v. p.; . M. McClure, sec-treas.

Property: the Hoosier group of mines at Summerville, Boulder county, worked slightly in the past and having a 600′ tunnel at roadside level. In June, 1918, present company is reported to have driven a 90′ crosscut, 300′ from portal, disclosing silver and gold ore.

DEGGE-CLARKE TUNGSTEN MILL **COLORADO**

Boulder, Boulder county, Colo. W. W. Degge, v. p.-mgr. Operated a 100-ton concentrating mill in Boulder Canyon.

Reported succeeded in 1918 by the Caribou Metals Co., Colo., which see.

DENBIGH SILVER-LEAD MINES CO. **COLORADO**

Address: 85 Devonshire St., Boston, Mass.

Officers: W. Roch, pres.; J. F. Lindel, v. p.; G. A. Haskell, treas.; J. N. Reynolds, sec., all of Boston, Mass., with H. F. Wells and J. E. Berry, of Boston, J. J. Mendell of Manchester, Mass., and W. H. Perry of Beverly, Mass., directors. H. S. Bushnelle, mgr.

Inc. in 1916, in Colorado. **Cap.**, $1,000,000; $1 par; all issued Listed on Boston Curb. Indebtedness, $20,000.

Property: leases and bonds for $250,000 on the properties of the Whiting Mining & Milling Co. and of the Terrible Dunderberg Mining & Power Co. These mines are one mile from Silver Plume, Clear Creek county. Properties have been worked for 40 years and comprise 43 patented claims, about 300 acres. The company controls a number of old-time producing mines, and the dump from the Seven-Thirty, Mammoth, Brown and Dunderberg workings, known as the "Big Slide in Brown gulch."

Ore: silver, lead and zinc occurring in a fissure vein in granite and schist. Vein dips 70° N. and strikes N. E. The sulphide pay-ore in each mine occurs in shoots, each over 250′ long, and streaks of varying size.

Development: by a working tunnel with 7 levels above it and 7 below it, reached by a 70° shaft, 600′ deep. Method of working is by shrinkage stoping. Total extent of workings is about 5 miles. A winze 70′ below deepest workings is in $50 ore for the entire length.

Equipment: includes hoist, pump, and 100-h p. compressor. Both water power and electricity are used. The 75-ton mill contains crushers, rolls, jigs, and tables, and can, it is said, treat the ore at a cost of $1 per ton. The manager estimates $39,000 needed to complete the new shaft, repair mill, and do other work.

Recent operations include a 3-compartment raise from the 14th to tunnel-level, a distance of 490′, which when completed, will be the main working shaft. A double drum, motor-driven hoist will be installed. For the first 7 months of 1919, about 1,000′ of stoping had been done.

Owners claimed that the mine has a production record of $10,000,000, all from high-grade ore, and that the property now has 100,000 tons of $10 ore left. During 1918, output was three cars per week. This ore came from development work only, as no actual mining had commenced. In October, 1919, shipments were being sent to a mill at Idaho Springs.

H. C. Bonnevie has reported on both the mine and the treatment of the Big

Slide ore. Property believed to have attractive possibilities in depth and in virgin ground, provided that funds are sufficient for the plans outlined.

Average net value of concentrates shipped in 1918, was $53.25 per ton, and production was one ton of shipping ore, averaging $106.21 per ton, to each 7 tons ore mined.

The 1917-18 market campaign of Thos. W. Lawson of "Frenzied Finance" fame, sent the stock to $2¼ with a gradual decline to 20c in May, 1919, after the "campaign" had ended. In October, 1919, Mr. Lawson issued a statement claiming that he dropped the stock because 400,000 shares that had been tied-up in a Trust Co. pool, were being unloaded in the form of receipts, and claimed the company was on the verge of bankruptcy, with $25,000 in debts. His reorganization committee formed the Denbigh Mining Corporation to take over the property, old stock exchangeable for new on payment of 10c a share. This was, it is said, approved by the stockholders, but a meeting of them was called by Henry F. Wells, for December 3, 1919, to consider the corporation affairs. This director claimed that the property has 300,000 tons of ore that will yield "at least $1,000,000 net profit."

DENVER-BOULDER TUNGSTEN PROD. & DEV. CO. COLORADO

Address: 514 Mining Exchange Bldg., Denver, Colo.

Officers: D. S. Young, pres. and supt.; G. P. Howard, v. p. and treas.; F. E. Wire, sec.

Inc. in Colorado. **Cap.**, $100,000; par 10c.

Property: 10 claims on Lee Hill, Boulder county, containing tungsten ore with gold value. Early in 1919 the company closed down to await tariff legislation. Management reported that it had lots of ore, but no market for it.

DENVER MINING & MILLING CO. COLORADO

Mine office: Wortman, Lake county, Colo.

Officers: Hinsdale Smith, Springfield, Mass., pres.; D. A. Roller, Equitable Bldg., Denver, Colo., sec.

Inc. in Colorado. **Cap.**, $100,000; par 10c.

Property: 100 acres, patented, at Wortman, Lake county; held under long-term lease and option.

Reported that a mill has been erected and is turning out lead and zinc concentrates. Company claims to have $200,000 worth of ore blocked out.

DETROIT & COLORADO MINING CO. COLORADO

Mortgage on property foreclosed by its bondholders, 1918. Has been idle 10 years because of litigation and has now lost its property. See Vol. XIII.

DEVIL'S HEAD COPPER MNG. & DEV. CO. COLORADO

Office: 700 Commonwealth Bldg., Denver, Colo.

Inc. in Colorado.

Property: consists of 13 adjoining claims and two millsites, 15 miles from Sedalia, Douglas county.

Development: by a 300′ tunnel, and a second crosscut tunnel recently started is 175′ long. Ore is a sulphide and reported to assay $75 to $100 per ton. Company plans extensive development.

DIAMOND CONSOLIDATED MINING CO. COLORADO

Address: Silver Plume, Clear Creek county, Colo. Organized in 1919.

Property: the Diamond Tunnel, Carey City and Meshote mines, near Silver Plume, whose production is said to total $1,000,000 in silver and lead. Old dumps contain 200,000 tons said to assay up to 7 oz. silver per ton. The mill has recently been remodeled and in July, 1919, was making 40 to 50 tons of concentrate per week.

D. L. & W. MINING & REDUCTION CO. (THE) COLORADO

Office: 604 Iowa Bldg., Sioux City, Iowa.

Officers: Geo. W. Harris, pres.; Fred H. Free, v. p.; H. R. Dealy, sec.-treas.; Ed. L. Dealy, mgr., with E. Lustfeld, directors.

Inc. 1917, in Colorado. **Cap.**, $200,000; shares 20c par; 650,000 outstanding.

Property: 16 patented claims, 200 acres in Eureka mining district on

Kendal mountain, in Swanzie gulch, running down to corporate limits of Silverton, San Juan county. Property includes the Lackawanna mine.

Geology: a fissure vein in porphyry, with a N.-S. course, dipping 80°. Ore occurs in 5 shoots, and is complex containing gold, silver, lead and copper, the average value being around $17 per ton for the combined metals.

Development: by 1,200′ tunnel, with total underground workings of 5,000′, at a maximum depth of 750′.

Equipment: includes electric hoist and 4,000′ tramway leading to a siding on Silverton-Northern line. In 1919, development was being continued, and a large body of ore was opened up ready for stoping.

DOLLY VARDEN MINES COLORADO

Owned by the Louisiana-Colorado Mining Co., which see.

DORA CONSOLIDATED MINING CO. COLORADO

Address: Silverton, Colo.

Officers: E. P. Ricker, pres. and gen. mgr.; with Joseph Boyce, resident director.

Property: 26 claims and 8 millsites, patented, 300 acres, near Silverton, San Juan county, formerly known as the Hercules Consolidated. Total output since the late seventies is said to be over $10,000,000.

Geology: claims show fissure veins traversing a complex area of schists, quartzite and granites, overlying San Juan tuffs, in turn overlain by andesite and sedimentaries. There are traversed by dikes of diorite, etc. A large amount of smelting ore said to be exposed.

Development: 6 crosscut tunnels, one 2,400′ long, giving a depth of 1,500′. Workings total 30,000′. Reported shipping in 1918.

DOUGLAS MOUNTAIN COPPER CO. COLORADO

Office: 209 Chamber of Commerce Bldg., Denver, Colo.

Officers: R. J. Morris, pres.; Robert Pherson, v. p.-gen. mgr.; V. C. Walters, sec.-treas.

Inc. in Colorado. **Cap.**, $1,000,000; $1 par; 640,000 shares in treasury.

Property: 31 claims, 600 acres, together with lease and bond on Bromide mine, 4 claims, 40 acres, located 70 miles from Craig, Moffat county, Colo., and within 10 miles of Utah, in the Escalante hills. Ore contains chalcocite and bornite. Vein is reported to show 20″ to 6′ of ore that will average 25% copper.

Development: Sutton group, by tunnels, 700′. Company reports 8,000 tons of ore blocked out averaging 12% copper. Bromide mine by shaft 249′, and 3 levels, 1,300′.

Equipment: hoist, compressor; a 20-ton reverberatory smelter planned at the Sutton mine.

DOYLE CONSOLIDATED MINES CO. COLORADO

Mine office: Mancos, Montezuma county, Colo.

Officers: Hon. Jas. Doyle, pres.; Earl P. Hopkins, v. p.; E. R. Marden, sec., 1426 U St., Washington, D. C.; D. T. Thompson, treas., with Wm. W. Fry and J. J. Butler, directors; R. J. Doyle, mine supt.; R. C. Morrison, mill supt.; C. F. Doyle, engr.

Inc. Oct. 21, 1907, in Arizona, as consolidation of the Mancos Mining & Development Co., the Cliff Dwellers Gold Mining Co. and the White Quail Copper Co. **Cap.**, $10,000,000; $1 par; issued about 3,000,000.

Property: 31 claims, in 3 groups of about 300 acres in Rush basin, part of the California mining district, Montezuma and La Plata counties, in southeastern Colorado. Claims are in a high part of the Sierra La Plata, 3½ miles from La Plata city and 4 miles from the Colorado Southern railroad. The White Quail property contains a copper-bearing "dike" of monzonite-porphyry, said to be 150′ across and to average 2½% copper and $4 gold across its entire width. Other claims cover about a mile of the apex of the Sundown (or North Star) vein, a flat dipping fissure in red quartzite, carrying milling ore with gold and silver values. Company developed properties for several years, through Columbus tunnel. Had 10-stamp mill in 1910 and erected a new 150-ton mill, operated July, 1912. Company advertised for lessees in 1914.

Property has thus far failed to fulfill the extravagant claims and promises of the White Quail promoters or their successors. More recent information not obtainable.

DROPNER MILL'G., MIN'G. & TRANS'N. CO. **COLORADO**

Office: Georgetown, Colo.

Officers: H. E. Crist, pres.; E. Larson, v. p.; Thos. Rendahl, sec.-treas. and supt.

Cap., $3,000,000; $1 par; 200,000 shares in treasury.

Property: 23 unpatented claims, 300 acres, Upper Union mining district, Clear Creek county. Deposit is a contact vein between porphyry and granite, showing gold, silver, copper, and traces of platinum and molybdenum.

Development: by 3 tunnels, 650′, 100′ and 100′ long. No shipments reported.

DRUID GOLD MINING CO. **COLORADO**

Office: 420 Equitable Bldg., Denver, Colo.

Officers: W. N. Vaile, v. p.; C. A. Chisholm, sec.-treas.; Geo. E. Collins, E. M., mgr., with H. N. Berry, directors.

Inc. in Colorado. **Cap.,** $1,000,000; $1 par; all issued.

Property: 11 claims, 95 acres, in Russell mining district, Gilpin county, has a complex system of fissure veins, carrying gold, silver, lead and copper in Archean schist. Developed by 1¼ miles of underground workings, including 1,200′ tunnel and several shafts, deepest 650′. Equipped with steam hoists.

Production: in 1914, 457 tons smelting ore and 369 tons crude milling ore; in 1915, 259 tons smelting ore and 220 tons crude milling ore. Gross earnings for 1916 were $11,569 from ore sales, and operating expenses were $11,953. Property operated continuously since 1904. Late production figures and balance sheet not obtainable.

DUMONT MINING & MILLING CO. **COLORADO**

Address: Dumont, Colo.

Officers: George Wight, pres.; Ernest Wight, v. p., both of Denver; C. W. Sercher, sec. and mgr., Dumont, Colo.; Simon Batterman, treas., and Robbie B. Sercher, director.

Inc. Jan. 27, 1917, in Colorado. **Cap.,** $100,000; $1 par; 51,000 issued.

Property: 6 patented claims, 30 acres, known as the Syndicate property; also the Kokomo Pioneer mill at Dumont and the Pioneer Gold mining property and mill at Empire, Colo.

Ore: lead-bearing quartz in fissure vein in granite schist. Vein is 4′ to 14′ thick, runs E.-W. and dips at 15° to 45°. Ore has an average value of $7.45 per ton.

Development: by McClelland and other tunnels, 100′ to 900′ long, with total of 4,500′ of work, and a depth of 1,000′ said to block out 30,000 tons of ore.

The 50-ton Pioneer mill started work in the summer of 1917 to treat syndicate and custom ore, but no returns furnished us.

DUNKIN MINING CO. **COLORADO**

Address: Breckenridge, Summit county, Colo. Owns the Dunkin mine, worked under long-time lease by O. K. Gaymon, Theo. H. Knorr and W. W. Wharton of Breckenridge, and J. A. Summer of Salt Lake City.

Property: on Nigger Hill, 1½ miles from Breckenridge, Summit county, shows lead-sulphide ore carrying good gold values. Several rich pockets of ore were reported found in 1914-15 and to have netted the lessees $15,000, $30,000 and $35,000. The Wolftone vein, under development, is said to carry lead-carbonate ore, valued at $40-$50 per ton, at a depth of 500′.

Development: to depth of 600′ by shaft, tunnel and crosscuts. During 1918, development was mainly around the Dunkin shaft, where at 100′ a high-grade iron-silver ore deposit was reported opened.

DURANGO SMELTER **COLORADO**

Owned by San Juan Smelting & Refining Co., which is controlled by the American Smelting & Refining Co., at Durango, La Plata county, Colo.

DURIAS MINE **COLORADO**

Address: G. W. Gordon, Foster Bldg., Denver, Colo.

Property: 5 acres, unpatented, at Springdale, Boulder county, Colo. Ore is said to contain lead, silver, gold, copper, also some platinum, palladium, and germanium. Vein is in granite.

Development: by 2 tunnels, 80′ and 100′ long, and shaft 50′ deep. Said to have shipped good ore in past. Under a 30-day option to the Colorado Pitchblende Co., of Denver, at last accounts.

EAGLE MINE **COLORADO**

Address: C. M. Glasgow, St. Louis, Mo.

Property: on Kerber creek, 2 miles E. of Bonanza, in Saguache county. In August, 1919, the mine was to be unwatered to depth of 500′. An examination in 1918 revealed a fair tonnage of manganese-silver ore, assaying 10 oz. per ton. A power line has been connected up, and a 50-ton mill was being erected.

EAGLE MINING & MILLING CO. **COLORADO**

Property sold to Empire Zinc Co., of Colorado, which see.

EAGLE PASS MINING & MILLING CO. **COLORADO**

Address: M. S. MacCarthy, mgr., 628 First National Bank Bldg., Denver, Colo. Mine 3 miles from La Plata, Colo.

Inc. May 6, 1913, in Colorado. **Cap.,** $250,000; shares $1 par.

Property: 3 claims, 1 patented, 30 acres, said to show ore carrying gold, silver and lead in fissure veins in limestone and porphyry. Developed by 1,000′ tunnel. Only assessment work done for years. In October, 1919, the upper levels were leased for a year. A prospect.

EAGLE ROCK TUNGSTEN PRODUCTION CO. **COLORADO**

Mail returned, March, 1919, from Eagle Rock, Colo. Operated, at last reports, by 40 sets of leases.

Property: 150 acres in the Boulder tungsten district; was reported to carry ore assaying 2-3% in tungsten.

Had a 75-ton mill and sampling plant, at last accounts.

EGYPTIAN MINING CORP. **COLORADO**

Address: Sunshine, via Boulder, Colo.

Cap., $50,000.

Property: 6 claims, at Sunshine, 8 miles from Boulder, Boulder county, Colo.

Development: by 100′ shaft and considerable drifting; also by a 150′ tunnel with crosscuts to parallel veins. Three orebodies developed by tunnel and crosscuts are 24″, 10″ and 36″ in width, respectively, the ore carrying gold and silver in sulphide, the values ranging from $20 to $40 per ton. There is also a 24″ body of milling ore assaying 26 oz. gold per ton, and in addition, a streak of high-grade sylvanite and a streak of medium value were reported. Such rich ore, if in commercial amount, will pay a good profit above mining costs, but no production figures are obtainable.

ELECTRO COPPER CO. **COLORADO**

Address: W. H. Rathbun, pres., Minneapolis, Minn.

Property: the Bailey copper mine at Copper Spur, near McCoy, Eagle county. Ore is malachite in granular sandstone. A leaching plant was proposed in September, 1919.

ELK MINING & MILLING CO. **COLORADO**

Address: Silverton, Colo. J. J. Cusick, v. p.-mgr.

Property: 325 acres on Red Mountain, near Gladstone, San Juan county, said to show several veins in andesite from 2′ to 7′ wide, the ore carrying 9% copper, $2 gold and 4 oz. silver.

Development: by tunnel driven at a depth of 1,200′. Management installed new machinery in 1917 and expected to drive tunnel 1,000′; also planned to erect a concentrating mill.

ELK MOUNTAIN MINING & MILLING CO. **COLORADO**

Owns the Wilfley mine and mill in the Kokomo-Robinson district, north of Leadville, Summit county, Colo.

Ore occurs as replacements in limestone and carries silver, gold, lead and zinc. In summer of 1917 it was reported that a vein 4′ to 10′ wide had been

opened, assaying as high as 1,000 oz. silver per ton. No recent information is obtainable.

EMPIRE STATE MINES & RED. CO. **COLORADO**

Mine office: Eureka, Colo. William Akers, supt.

Company formed in 1919, to develop holdings near Eureka, San Juan county. Plans call for erection of a 50-ton mill to treat lead-zinc ores. Fred Kurz and William Gooch are associated with Mr. Akers.

EMPIRE ZINC CO. **COLORADO**

Company is a subsidiary of the New Jersey Zinc Co., 160 Front St., New York City. A. S. McMillan, pres.; John Davis, sec.-treas.

Office: 703 Symes Bldg., Denver, Colo. Owns and operates the following properties:

Small Hopes Mine, Leadville, Colo. Two operating shafts; the Emmett, 800′, and the McCormick, 500′ deep. Produces zinc, lead and iron sulphides; also some zinc carbonate.

Eagle Mines, Gilman, Colo. Two operating mines in Battle Mountain district, formerly owned by Eagle M. & M. Co. Ore is mainly zinc-iron sulphide and is treated by a roasting and magnetic separation treatment. Mill has a daily capacity of 150 tons. Formation is considered similar to that at Leadville. In September, 1919, there were 75 men employed on development. By new mine connections mining costs will be reduced. Reserves are estimated at 2,000,000 tons of 15% zinc ore, with lead and iron values.

Canon City Mill, Canon City, Colo. Combined magnetic and wet mill designed to treat complex sulphide ores. Ores for this mill are purchased from outside producers. A complete ore-testing plant is also maintained. The treatment works operated steadily in 1919.

Kelly Mine, Kelly, New Mexico. Company reported to have added 45 claims to their holdings, purchasing same from the Tri-Bullion Sm. & Dev. Co., N. M. Equipped with steam power plant and 100-ton concentrator, in which is treated a complex zinc, iron, lead sulphide ore. This property has been a large producer of zinc and lead carbonates. The ores occur in irregular replacements and shoots in flat dipping limestones. The Linchburg group of claims, the South Percha mines, and the Grey Eagle group, are all being developed.

Cleveland Mine, 10 miles north of Silver City, New Mexico, in Pinos Altos district. Equipment consists of mill using raw magnetic separation of 125 tons daily capacity and 400-h. p. power plant equipped with Diesel type of crude oil engines. The mine is connected with the railroad at Silver City by a 9-mile narrow-gauge mule tram. Ore is zinc sulphide, occurring in metamorphosed limestones cut by intrusive dikes.

Hanover Mines, Hanover, New Mexico. Equipment consists of mill of 125 tons daily capacity using raw magnetic separation and 400-h. p. power plant equipped with Diesel type of crude oil engines. Ore is principally zinc sulphide associated with hornblende, serpentine and other metamorphic minerals, occurring as irregular-shaped masses in limestone near igneous contacts.

The Republic mine, Hanover, N. M., was bought for $500,000, Jan., 1920.

San Xavier mine, 20 miles south of Tucson, Ariz. Is idle, though camp and plant are kept in order. The oxidized zone has produced a considerable tonnage of copper, lead and zinc carbonates. The sulphide zone shows a large tonnage of low grade zinc ore of a very complex nature.

Potosi Mine, 20 miles west of Arden, Nev. Equipment consists of sorting house and calciner. Ore is zinc carbonate occurring in a crushed limestone zone, as very irregular replacements. The calcined ore is hauled 20 miles to the railroad in auto trucks. In 1918, it was reported that development work had opened up a good grade of silver ore.

The Colonel Sellers mine, in California Gulch, near Leadville, Lake county, Colo., is worked out, and operations were discontinued in 1917. No production figures are available.

EQUITY CREEDE MINING CO. **COLORADO**

Office: 107 W. 3rd St., Pueblo, Colo. **Mine office:** Charles Hollister, mgr., Creede, Colo.

Officers: Frank Taylor, pres.; Geo. D. Weston, v. p.; B. E. Watkins, sec.; E. E. Withers, treas., with Chas. A. Ballreich and E. H. Morse, directors.

Reorganized March 6, 1915, in Colorado. **Cap.,** $1,200,000; $1 par; outstanding, 600,000. Annual meeting, second Wednesday in March.

Property: 20 claims, 9 patented, 323 acres, 7 miles N. W. of Creede, in the King Solomon mining district, Pueblo county. Claims are on the Amethyst lode and on two other contact veins, all carrying gold and silver. Shipments for 1918 averaged $20.17 per ton.

Development: by tunnels, 860′, drifts, 400′ and 225′ and 100′ shaft; greatest depth of workings is 800′; total workings are 1,585′.

Equipment: compressor, 100-h. p. semi-Diesel engine. Company planning to erect a mill.

Production: to 1918 totaled 33 cars, netting $22,611.

EUREKA MINE — COLORADO

George Grabmaier, mgr. Mine is located near Central City, Gilpin county, Colo. Company planned the installation of a flotation mill. A 3′ body of ore is reported opened.

EVANS-WINN SYNDICATE — COLORADO

Address: Mark G. Evans, Breckenridge, Summit county, Colo.

Property: the Emile placer claims, on which a lead-zinc vein was exposed by dredging operations. The syndicate is sinking a shaft to develop this vein.

EVERGREEN GOLD & COPPER MINES CO. — COLORADO

Reorganized as the Evergreen Mines Co., which see.

EVERGREEN MINES CO. — COLORADO

Office: 408 Empire Bldg., Denver, Colo. **Mine office:** Apex, Gilpin county, Colo.

Officers: J. L. Tapp, pres.; Geo. E. Bell,, v. p.; Wm. C. Hollister, sec.-treas.; preceding with W. J. Tapp, E. F. Krewinghaus, M. C. Shaffer, Edwin Ettinger, J. C. West and A. M. Roth, directors. Etienne A. Ritter, cons. engr.; Shad Reid, supt.

Inc. Sept. 17, 1914, in Colorado. **Cap.,** $2,000,000; $1 par; outstanding a little over 1,000,000 shares. Notes authorized and outstanding, $75,000. Annual meeting, third Tuesday in August. Company is a reorganization of the Evergreen Gold & Copper Mines Co.

Property: the Evergreen mine with 11 claims, 3 patented, 70 acres, in the Pine mining district.

Geology: the property shows Archæn gneiss and crystalline schists, cut by pegmatite, with an eruptive rock called "evergreenite." This dike is 3 to 12′ in width, bounded on either side by ore-bearing contact zones of about 50 to 80′ width. The ore deposit is unusual, carrying secondary bornite disseminated irregularly through monzonite.

Development: by tunnel and 350′ shaft, which was being sunk , 1919, to 550′. Two ore-shoots were found on the 100′ level, 1 on the 200′ and a new one south of this on the 350′ level. Main orebody is 15′ to 18′ thick. There are 4 known ore shoots, carrying chalcopyrite, bornite and covellite, estimated by management to average 3.5% copper, 2 to 8 oz. silver and 50c to $4 gold per ton. The upper workings show some malachite and tetrahedrite. Underground work amounts to over 4,000′. A shoot of bornite ore 5′ thick was cut on 200′ level in 1919.

Equipment: includes electric power with a 45-h. p. hoist and 4-drill air compressor. A 100-ton mill has one No. 4 Telsmith gyratory crusher, Marcy mill, Dorr classifier, and 2 Card tables.

Flotation plant installed and began operations August, 1916. Concentrates gave average value of $110 a ton from $5 crude ore.

No production figures are available.

FAIRFIELD MINE — COLORADO

G. H. Thowenell, mgr. Property situated at head of Russell gulch, near Central City, Gilpin county. Mine was idle for ten years, until taken over by

Eastern interests in 1919. A quartz streak carrying free gold is reported to have been cut in new development work.

FARNCOMB HILL GOLD DREDGING CO. **COLORADO**

Office: Breckenridge, Colo.

Officers: R. W. Foote, pres.; Harvey Riddell, sec.; C. M. Snider, treas.

Cap., $300,000.

Property: a large acreage in Swan Valley, near base of Farncomb Hill, Summit county. The holdings are being operated under lease by the Tonopah Placers Co. A dredge, capable of digging 4,000 cu. yd. every 24 hours, is at work.

Company is reported to have paid $84,000 in dividends during 1918, which is at the rate of 28% on the capital.

FARWELL MOUNTAIN COPPER CO. **COLORADO**

Probably dead. Described in Vol. XII. Mine in Routt county, Colo.

FIFTY GOLD MINES CORPORATION **COLORADO**

The corporation was in the bankruptcy court at Denver since 1910. In July, 1919, a deed was recorded at Gilpin, conveying from G. A. Bierbaum to the Gilpin Giant Mines, all the holdings of the Fifty Corporation. This included the mill and all equipment. The Fuller-MacCulloch Co. is said to be backing the Gilpin Giant Mines Co.

Property: 55 patented claims, including the Gregory, Bobtail, and other mines, near Black Hawk, Gilpin county.

FOREST QUEEN GROUP **COLORADO**

Option on this group was secured, 1918, by the Mogollon Mines Co., New Mexico, which see.

FRANK HOUGH MINING CO. **COLORADO**

Office: 830 Equitable Bldg., Denver, Colo. **Mine:** Lake City, Hinsdale county, Colo.

Inc. 1907, in Colorado.

Property: on Engineer mountain, has a 2,500′ tunnel, developing a large body of copper sulphides, including bornite, with assays up to 27% copper, 47 oz. silver and $5 gold per ton. Mine shipped several hundred tons of high-grade silver-copper ore, under former ownership.

Equipment: includes 800-ton shipping bins.

Production: estimated at 250,000 lb. fine copper in 1909, and 600,000 lb. in 1910. Property considered promising, but was closed down in 1912 because of destruction by fire of its surface equipment. Presumably idle, 1916-19.

FREEDOM MINING & MILLING CO. **COLORADO**

Address: W. F. Wittich, gen. mgr., 1148 California St., Denver, Colo.

Property: 39 claims, 780 acres, near Westcliffe, Custer county, Colo.

It was planned in 1919 to incorporate in Colorado, with 1,600,000 shares, $1 par. Manager claims that mine has a tunnel run on a true fissure vein 30′ wide, in a porphyry-quartz dike that will cut 30 contact fissures. Mine said to contain copper, silver, gold, platinum, tin, nickel, and cobalt, which makes one wonder why the rest of the metals were not included.

FRENCH GULCH DREDGING CO. **COLORADO**

H. J. Reiling, Denver, Colo., mgr; F. Z. Hund, supt. Company has a dredge operating at French gulch, about 2 miles east of Breckenridge, Summit county. The machine is working on a channel 400 to 500′ wide and digging 38′ deep. Said to produce $1,000 in bullion per day.

FULLER, MacCULLOCH CO. **COLORADO**

Address: Central City, Colo.

Property: the Becky Sharp, Iron, and Old Town mines, near Central City, Gilpin county.

In June, 1919, company secured a 3-year lease on the U. P. R. mill at Central City. The mill has a capacity of 120 tons per day, but was to be enlarged to 200 tons and a flotation unit added. About 34 men employed. Reported to be financing the Gilpin Grant Mines, which acquired the property of the Fifty Gold Mines Corporation.

GALENA MT. GOLD & SILVER CO. **COLORADO**

Address: Silverton, Colo.

Officers: H. Lazarus, pres.; A. S. Popper, v. p.; N. S. Lazarus, sec.-treas.

Inc. 1907, in Colorado. **Cap.,** 120,000 shares; 111,000 outstanding

Property: the Anti-Periodic group of 7 claims, 6 patented, about 45 acres, near Galena Mountain, San Juan county. Has a gold and copper-bearing fissure vein in porphyry and trachyte. Ore is a sulphide said to assay from $8 to $100 per ton.

Development: by about 1,800′ of underground workings. Company has produced $18,000 worth of ore.

GARFIELD MINING CO. **COLORADO**

Office: Garfield, Colo., and 503 K. of P. Bldg., Indianapolis, Ind.

Officers: C. O. Patten, pres.; Walter Johnson, v. p.; Fletcher Johnson, sec.-treas., with C. A. Chambers, C. W. Means, E. J. Chambers, and John Harcourt, directors. E. W. Fisher, mgr.

Inc. April 1, 1918, in Colorado. **Cap.,** $10,000; 1 cent par; 775,000 issued.

Property: 19 claims, 17 patented, in Garfield county, Colo. Mine has a 10′ vein, dipping at 70°, said to be in limestone and carrying 20% zinc. As most of the ore carries zinc, it will have to be milled. Reserves are given as 1,000,000 tons.

Development: by tunnels, 1,000′ and 2,000′ long, and 6,000′ of workings. Greatest depth is 1,600′.

Company has expended $20,000 on development, and received $10,000 from sale of ore. Plan installing a 50-ton concentrator and flotation mill. A shaft to connect upper and lower tunnels was being sunk at last reports.

Production: total output 900 tons, average grade $20 per ton. Shipments are made to Ohio Smelting Co. at Salida, Colo. Prior to present company's purchase, the property was idle for 12 years. Management is developing property, but shipping only easily mined ore.

GEM CONSOLIDATED MINES CO. **COLORADO**

Address: W. E. Renshaw, or Richard White (Receiver), at Idaho Springs, Clear Creek county, Colo.

Inc. Jan. 1, 1907, in Colorado. **Cap.,** $5,000,000; shares $1 par.

Property: a millsite and 10 patented claims, showing a vein traceable 3 miles, carrying sulphide ores said to assay 10 oz. silver and $18 gold per ton, with a little copper. Mine has about 5 miles of workings.

Equipment: includes 550-h. p. hydro-electric plant, 4 hoists, good for 3,000′ depth, and an 18-drill compressor. Buildings include a machine-shop, carpenter shop, smithy, etc., and a 100-ton stamp mill. Several sets of lessees reported developing and producing at a profit. Ore is treated at the Newton mill, Idaho Springs, operated by W. E. Renshaw. No recent returns.

GEORGETOWN TUNNEL TRANSPORTATION CO. **COLORADO**

Offices: Transportation Bldg., 608 South Dearborn St., Chicago, Ill., and Georgetown, Colo.

Officers: C. G. Breitenbach, pres.-treas.; E. H. Pratt, v. p.; C. A. Basse, sec.; J. H. Robeson, cons. engr., Denver, with M. B. Dittenhoefer, L. F. Shane and C. G. Earnest, directors.

Inc. in Colorado. **Cap.,** $5,000,000, divided into 600,000 shares common, 400,000 pfd.; par $5; fully paid.

The company is a transportation project, whose purpose is to provide power, drainage, light, ventilation, as well as an outlet for the ore and waste rock of the many mines within working distance of its course. The project is similar to Argo, or Newhouse tunnel at Idaho Springs, Colo. The tunnel will cut at great depth the veins and ore deposits that traverse Democrat, Columbia, Republican, Brown, and Sherman mountains at Georgetown.

Property: company owns the following properties free from debt or mortgages and all patented: Georgetown tunnel, right-of-way, 3,000′ wide and 16,000′ long; Bard Creek, U. S. water rights; Century Pipe-Line & Power Plant; Royal Tunnel millsite; Royal mining claims; Georgetown Tunnel sites No. 1, 2,

and 3; Hildebrand mill site; the Chicago, Mayfield and Clara B., lode mining claims; one-sixth interest in the Cliff mining claim; and 76 thirty-year contracts with mining companies, switching yards, etc.

Equipment: power-plant, 4-drill air compressor, and 20-ton mill in course of erection, 1919.

Development: in March, 1919, tunnel was 2,000′ long, and had entered the Clara B. ground, on which the vein showed ore 4 to 8″ wide, reported to assay 800 to 1,000 oz. silver, 50% lead, 22% zinc, and traces of gold and copper.

Driving on Clara B. was under way early in 1920.

GIANT-ECLIPSE CONSOLIDATED MINES CO. **COLORADO**

Address: P. O. Box 488, Salida, Chaffee county, Colo. Clyde H. Jay, pres. and gen. mgr.; F. L. Ream, sec.-treas.

Inc. Sept. 21, 1909, in Colorado. **Cap.,** $800,000; $10 par; 72,000 issued. Annual meeting, third Friday in January.

Property: 11 claims, 101 acres, in Monarch district, Chaffee county, showing contact deposits of lead-iron, copper, and zinc ores between granite, limestone and quartzite. Deposit runs N.-S. and dips at 45°. Orebody developed for 50 to 150′ width, 1,400′ length and 1,400′ depth, claimed to carry 12 to 35% zinc, 3 to 25% lead, 1 to 3 oz. silver and 80c to several dollars per ton in gold. Zinc occurs in ore and as clean zinc carbonate. Mine has tunnels aggregating several thousand feet. Company claims to have developed 10,000 tons of low-grade zinc ore, and a large body of limestone.

Equipment: includes electric hoist, compressor, and two trams, one an aerial, for ore, the other, 800′ long, for lime rock, to carry from mine direct to railroad cars.

Production: $1,000,000 production since 1878; 500 tons zinc carbonate carrying $20 to $40 per ton, shipped from July, 1916, to March, 1917. Company expected large shipments of limestone to begin in 1919.

GIBSON HILL MINING CO. **COLORADO**

Mail returned unclaimed, 1919, from former address: Pueblo, Colo.

Inc. Oct., 1916, by B. M. Gill and C. R. Morris, of Pueblo, to operate the New York, S. Lambert, and L. C. Owens claims near Breckenridge, Summit county.

Development: by tunnels. New York group said to contain large veins of gold, silver, and lead ore. Idle.

GILLIGAN MINE **COLORADO**

In 1918, J. W. Walker and M. L. Thomas were reported to have taken over this mine under bond and lease. Mine was worked in 1870-72. In 1884, a 1,600′ tunnel was completed, cutting the vein 1,100′ from portal and at 600′ depth on dip. Vein, 4 to 5′ wide, strikes E.-W., and dips steeply to the north. It traverses silicious sedimentary rocks, quartzites, and shales, dipping 45° N. W. Orebodies appeared to be persistent in quartzite.

Present operators are reported to have re-opened and repaired the old tunnel and are breaking ore averaging 25 oz. silver per ton.

GILPADO MINING CO. **COLORADO**

Office: 512 Equitable Bldg., Denver, Colo. **Mine address:** Harry T. Willis, supt., Central City, Gilpin county, Colo.

Officers: Forbes Rickard, pres.; Armory Eliot, v. p.; S. May, Jr., sec. treas., with H. Coonley, A. N. Burbank, directors.

Inc. 1909, in Colorado. **Cap.,** originally $250,000, increased to $500,000; $1 par; all outstanding.

Property: Chase mine, 5 patented claims, about 20 acres, in Central City district, said to show a fissure vein in granitoid gneiss. Ore is a silver-bearing copper sulphide, with gold values occurring in shoots 18″ to 24″ thick, and said to assay 1½ to 4 oz. gold and 13 oz. silver per ton.

Development: by a 570′ shaft and about 5,000′ of underground workings.

Equipment: includes a compressor and steam hoist.

In October, 1916, company resumed work, unwatering the Running Lode

mine below Blackhawk. In 1918, $15,000 was spent on development. No record of shipments since 1917.

GILPIN-EUREKA MINES CO. **COLORADO**

Address: Central City, Gilpin county, Colo. Is a reorganization of the Gilpin-Eureka Mining & Milling Co. E. L. Clark, gen. mgr., and N. E. Isbell, cons. metallurgist.

Development: main shaft 720′ deep to be sunk to 1,000′. In reopening old workings good gold-silver-lead ore was encountered. The property is considered to be well situated.

Equipment: includes 10-stamp mill and concentrators, motor driven.

During 1918 it was reported that a bond issue of $40,000 was to be financed for the company by Platt Bros. Co. of Cincinnati, Ohio. The money was to be used for a flotation plant.

GILPIN GIANT MINES **COLORADO**

Address: G. A. Bierbaum, Gilpin, Colo.

Property: the 55 claims and equipment of the Fifty Gold Mines Corporation in Gilpin county. The Fuller-MacCulloch Co. is backing the new company. Mines were to be unwatered and the mill overhauled.

GILPIN MILLING & REDUCTION CO. **COLORADO**

Address: Central City, Gilpin county, Colo.

Officers: V. R. Jones, pres.; E. E. Jones, sec.; L. H. Guthrie, treas.

Inc. Nov., 1919, in Colorado.

Property: 5-acre millsite, water-right on North creek, and the 100-ton remodeled Hidden Treasure mill at Black Hawk. A patented process of the American Continuous Retort Co., claimed to extract all values, no matter how refractory the ore, will be used.

GILPIN MINES & REDUCTION CO. **COLORADO**

Officers: Albert Wagner, pres.; F. McLaughlin, v. p.; C. H. Yardly, sec.-treas.; C. T. West, asst. sec.

Inc. in Arizona. **Cap.,** 2,500,000 shares.

Property: 100 acres in Pine Creek district, northern Gilpin county.

Development: to a depth of 700′ by shaft.

Owing to lack of funds, mine has not been worked for some years.

GILPIN-ORION GOLD MINING CO. **COLORADO**

Merged with Combination Mining & Milling Co., of Denver, which has property in Grand county, Colo.

The Gilpin-Orion operated 40 acres on Bob Tail hill, Gilpin county.

GILPIN TUNGSTEN PRODUCTION CO. **COLORADO**

Address: 1712 Champa St., Denver. C. M. Kittredge, mgr.

Cap., 1,000,000 shares, 800,000 unissued.

Property: the Empress claims in Idaho Springs district, Colorado, and Sternberger tract in Gilpin county.

The Empress is opened by a 500′ tunnel to depth of 300′, showing good gold-silver-copper ore. Near the Sternberger the company has claims that contain silver and tungsten ore.

No recent information.

GILT EDGE MINES & SMELTING CO. **COLORADO**

Office: 919-920 Equitable Bldg., Denver, Colo.

Officers: Henry I. Seemann, pres.-gen. mgr., Box 1375, Denver, Colo.; Wm. H. Warinner, v. p.; A. W. Craig, sec.-treas., with E. M. Kirton, directors.

Inc. July 24, 1913, in Colorado. Cap., $1,500,000, to be increased later to $2,500,000; $1 par; outstanding, March 15, 1919, 1,011,253 shares. Annual meeting, fourth Thursday in July.

Property: 46 claims, about 300 acres, mostly patented, in Lincoln mining district, Clear Creek county.

Ore: gold-silver-copper in fissure veins in schist and porphyry, said to assay from $9 to $200 per ton. The Gilt Edge mine is said to have produced some rich gold ore.

Development: the Aurora tunnel driven at a depth of 1,000′; in Dec., 1918, this tunnel was in 500′. Total underground workings, 2,000′.

Output said to assay over $200 per ton.

GLOBE SMELTING & REFINING CO. **COLORADO**

Denver, Colo. Controlled by American Smelting & Refining Co., and described thereunder.

GOLD BELT MINING CO. **COLORADO**

Inc. in Colorado, February, 1919, by J. T. Cook, sec.; Wm. Mitchell, pres., both of Denver, and Louise Tressler, of Breckenridge. **Cap.**, $50,000.

Company formed to operate the six claims known as Tressler's group, about 62 acres, across the gulch of Farncomb hill, five miles from Breckenridge, Summit county. Part of the mine is leased to Harriman Brothers, who are shipping ore running $7.40 gold and up to 70 oz. silver. An air-compressor was to be installed, 1919.

GOLD BOND EXPLORATION CO. **COLORADO**

Address: W. L. Harraman, pres.; C. R. Cushman, sec., 417 Colorado Bldg., Denver, Colo.

The last meeting of shareholders was held on January 13, 1920.

GOLD CROWN MINING CO. **COLORADO**

Address: J. C. Ingersoll, mgr., Ouray, Colo.; B. G. Brinkman, owner of mine, Lafayette Bank, St. Louis, Mo.

Property: 45 claims, 40 patented, 450 acres, at Ouray, Ouray county, being worked under option.

Ore: is a mixture of quartz, calcite and ferro-manganese silicates, carrying iron pyrite with gold and copper, mainly as chalcopyrite.

Development: by 1,400′ shaft with 4,000′ of workings.

Equipment: includes 300-ton mill with flotation plant.

GOLD CUP MINING CO. **COLORADO**

Office: 50 Congress St., Boston, Mass. H. J. Stahl, supt., Central City, Colorado.

Officers: H. L. Winchester, pres.; W. D. Drake, v. p.; M. M. Cairnes, sec.; H. K. Dean, treas, with W. J. Troth, S. H. Hayden, L. M. Forbes, Seth A. Martin and S. S. Littlefield, directors.

Inc. July 24, 1914, in Colorado. **Cap.**, $500,000; $1 par; 357,864 outstanding. Listed on Boston Curb.

Property: 10 claims, 6 patented, in Quartz Valley district, Gilpin county, one mile from Central City. Developments show a fissure vein in porphyry, with N. dip and E.-W. course. Ore occurs as shoots from 2 to 6′ thick. Ore averages 2 oz. gold, 10 oz. silver, 50% lead, 4% copper.

Development: by shaft following vein down to 300′ level. Workings total 1,500′. Property worked in 1918, but with small force, on account of war conditions. Development in 1919 increased the shipments of high-grade ore.

Equipment: steam hoist, electric compressor and air drills; shaft-house, ore house and electric power throughout.

GOLD HILL MINING CO. **COLORADO**

Office: Boulder, Colo.

Officers: W. A. Jackson, pres.; U. S. De Moulin, v. p.; J. M. Page, sec.; W. W. Pollock, treas., with A. W. Glessener, G. W. Meser, C. A. Neal and W. H. Pruyn, directors.

Inc. in Colorado. **Cap.**, $2,000,000; $1 par; 1,000,000 issued Bonds authorized, $150,000; outstanding in 1917, $83,000.

Property: 74 claims, 43 patented, in Gold Hill and Central mining districts, Boulder county, said to carry gold-silver ore in a fissure vein in granite. Reported 4,000 tons ore reserves.

Development: by 4,660′ of tunnels and total of 25,000′ underground work to depth of 875′.

Equipment: includes 100-ton cyanide mill and 7 drill compressor. No recent information.

GOLD HILL UNITED MINES CO. **COLORADO**

Office: Bailey Bldg., 1218 Chestnut St., Philadelphia, Pa.

Inc. June 1, 1910, in Delaware. **Cap.**, $2,000,000; shares $1 par. Registrar & Transfer Co., New York, transfer agent. Listed on New York Curb.

Properties: in the Kerber Creek, Manitou and Hull mining districts, Saguache county. Doing assessment work only.

GOLD KING EXTENSION MINES CO. **COLORADO**

Offices: Gladstone, via Silverton, Colo.; or 701 Cooper Bldg., Denver, Colo. Is a reorganization of New Gold King mines.

Officers: H. S. Hadley, pres.; J. N. Nicholson and R. G. Gentry, v. p.'s; G. W. Kinney, treas.; G. D. Blound, sec.; W. Z. Kinney, mgr.

Property: Gold King group at Gladstone, San Juan county, about 150 acres, and six other claims, totaling 55 acres, between the Gold King group and Sunnyside mine. Company also purchased the Gold King mill and tramway. Mine under lease to Gold King Leasing Co.

Geology: fissure veins in andesite carrying irregular stringers of lead-copper ore with gold and silver values. Gold occurs free in white quartz associated with iron pyrite, galena, or blende.

Development: by 600′ shaft and 3,000′ tunnel.

Equipment: compressor, tramway, and 300-ton flotation mill which is in operation.

Production: mine credited with $6,081,279 net from 1895 to 1919, of which $1.750,000 was paid in dividends.

GOLD KING LEASING CO. **COLORADO**

At last report was operating under lease, the Gold King mine at Gladstone, San Juan county. Property was formerly owned by Gold King Cons. Mines Co., reorganized as New Gold King Mines. Late in 1918, property was sold to Gold King Extension Mines Co., which see.

GOLD QUEEN MINING CO. **COLORADO**

Idle. Considered a wild cat of the worst type. Claims on Barren mountain (so called for good cause), Chaffee county, Colo. For further information, see Vol. XII.

GOLDEN AGE MINING & RED. CO. **COLORADO**

Idle since 1897, when fire destroyed buildings. Mine was reported reopened, 1918.

Property: the Golden Age mine at Springdale, Boulder county, shows several parallel fissure veins traversing mineralized prophyry, and carrying low-grade, gold-bearing sulphide ore. Equipment includes a 120-ton flotation mill.

GOLDEN EAGLE GROUP **COLORADO**

Address: Salina, Colo.

Property: 5 claims, near Salina, about 8 miles northwest of Boulder, Boulder county, shows a network of fissure and contact veins with ore said to contain gold and silver tellurides.

Development: by 480′ shaft and 3,000′ of tunnels. Mine idle for some time.

GOLDEN EDGES MINE **COLORADO**

Patrick Magill, owner, Columbine, Colo. Mine located on Hahns Peak, Routt county, Colo.

Development: by 900′ tunnel. Developing in the expectation of cutting ore.

GOLDEN EMPIRE MINING CO. **COLORADO**

Address: Empire, Colo.

Officers: B. F. Richards, pres.; J. H. Cook, v. p.; E. D. Payne, sec.-treas. and gen. mgr.

Is a reorganization of an Arizona corporation, with Colorado holding company. Cap., $300,000; shares, 10c par; outstanding, Dec., 1918, $238,057; 619,432 shares in treasury. Transfer office: Empire, Colo. Annual meeting, first Thursday in October.

Report for year 1918 shows: Receipts from stock sales, $3,116; special assessment, $5,086; other income, $1,578; total, $9,780. Expenses were $9,710. Balance on hand was $128.

Property: 31 claims, 12 patented, comprising several groups in the

Upper Union mining district, Clear Creek county. Also has 3 mill-sites and water-rights.

Company owns the Denver City group outright and has a 10-year lease on the Tennessee of the Tennessee M. & M. Co., with an additional 10-year privilege; reported 1919, that it would purchase the Harrison and Conqueror groups outright. Company was planning in 1919 to secure the Marshall-Russell Tunnel group. (See Marshall-Russell Gold M. M. & T. Co.) Practically idle, 1918.

Ore: mines principally produce copper-iron sulphides, but the Denver City group was said to have produced lead, silver, gold, and zinc ore in 1919.

Ore reserves were estimated to be 20,000 tons available. Development, by 12 tunnels.

Equipment: includes a compressor, with electric and gasoline power, 3 mills, one a 10-stamp amalgamation-concentration mill with capacity of 40 to 60 tons per 24 hours; extraction is 85 to 92%. The second mill has about the same capacity and is equipped with crusher and rolls. Another mill, completed 1919, includes a standard ball mill, with flotation unit, having a capacity of 75 to 100 tons.

GOLDEN TRIANGLE MINING CO. **COLORADO**

Mail returned unclaimed, March, 1918, from Jamestown, Colo.

Officers: J. M. McGonigle, pres.; J. F. Schofield, sec.; H. F. Linnenbrink, treas.

Inc. Dec., 1916, in Colorado. **Cap.,** $250,000; $1 par; $125,000 outstanding.

Property: 2 unpatented claims on Porphyry mountain, Jamestown, Boulder county, said to show a deposit described as a junction of 20 fissures in granite-porphyry, dipping S. and E. Ore composed of quartz and fluorite, containing sulphides with gold, silver, copper, and molybdenum, assaying $22 gold and 0.3% MoS_2.

Development: by 300′ tunnel. Assessment work only done, 1916-1919.

GOOD MORNING GOLD MINING & INVEST. CO. **COLORADO**

Address: 1214 Elizabeth St., Denver, Colo. J. E. Bailey, pres.

Inc. December, 1904. **Cap.,** $2,000,000; 10c par.

Property: 9 claims in Sugar Loaf district, Boulder county. Company has started a transportation tunnel to connect with Livingston mines of U. S. Gold Corp. According to the president's report, it will be the largest transportation project in the district when completed.

Development: by tunnel. Veins said to carry telluride of gold. Plan to erect suitable plant.

GOVERNOR MINE **COLORADO**

William E. Stauffer, Breckenridge, owner.

Property: about 7 miles south of Breckenridge, Summit county, leased to Denver concern believed to be represented by William Mitchell, Breckenridge, Colo. Mine is said to have produced rich silver ore in the 80's. A winze, down 40′, is being sunk from main tunnel. Workings cut a vein of sulphide ore carrying gold, silver, zinc, but it was not treated profitably owing to the zinc and pyrite in it.

GRANITE TUNNEL CO. **COLORADO**

Mail returned unclaimed, 1919, from former address, Granite, Chaffee county, Colo. J. W. Aday, supt., at last accounts.

Property: about 20 patented claims known as the Yankee Blade and D. C. C. mines.

Development: by 1,815′ tunnel. Ore is heavily mineralized, carrying 1.2 oz. gold and 1.5 oz. silver per ton. A 50-ton mill is on the ground. Property not in operation.

GRAPHIC MINE **COLORADO**

Property: the Graphic mine at Magnolia, Boulder county.

Late in 1918 it was reported that O. A. Johnson and George Bermont, lessees, had struck ore 4′ thick, averaging 3.04 oz. gold per ton.

GREAT WESTERN MINE **COLORADO**

Armstrong and Vanetta, lessees. Mine near Lake George, Park county, Colorado.

Property: shows vein with gold-copper ore, developed by 218′ vertical shaft, 800′ of crosscuts and drifts. Equipped with steam power and air-compressor. Small shipments of sulphide ore have been made in past. No recent returns available.

GREAT WESTERN MINES SYNDICATE **COLORADO**

Address: Ward, Boulder county, Colo.

Company contemplated erecting a custom mill, using flotation, in 1919.

GUNNISON COPPER CO. **COLORADO**

Mine located at Whitepine, Gunnison county, Colo. John Robinson, mgr. Reported to have cut low-grade copper ore in new work in crosscut tunnel at last accounts.

HAHN'S PEAK GOLD MINING & MILLING CO. **COLORADO**

Office: Room 3, Algoma Bldg., Oshkosh, Wis. Mine at Hahn's Peak, Routt county, Colo.

Inc. Jan. 29, 1905, in Colorado. **Cap.,** $1,000,000; $1 par; 996,257 shares outstanding.

Officers: H. O. Granberg, pres.; C. A. Spencer, v. p.; Chas. Olsen, supt.; E. E. Meeleus, sec.-treas., with Dr. H. A. Wolter, M. A. Rasmussen, and W. E. Brown, directors.

Receipts for year ended December 31, 1918, were $1,559, compared with $17,000 in 1917.

Property: 25 claims, 248 acres, patented. **Development:** 406′ incline shaft and a 950′ tunnel in Royal Flush claim, said to cut 5 veins; also the 2,100′ Conundrum tunnel 430′ lower, cutting 12 veins, whose values are in gold and silver. Underground workings total 15,000′. Vein is in porphyry and has a 70° dip.

Equipment: includes gasoline engines, compressor, air drills, blower and 400-ton concentrating mill. Experiments with oil flotation process said to be favorable. Development work has been going on since September, 1915. Plan to connect mill and mine by rail, the locomotive to run for 1,540′ into the mine. Ore shipped in 1918, averaged $61 per ton.

Reported on by Arthur Lakes, Etienne Ritter, H. C. Beeler and others.

HAMLET MINING & MILLING CO. **COLORADO**

Address: C. T. Singleton, supt., Silverton, Colo.

Officers: J. S. Tucker, pres.; H. W. Fox, cons. engr.

Bonds: $150,000 issued in 1911.

Property: 19 claims, about 200 acres, known as the Hamlet mine, 8 miles from Silverton, in the Howardsville mining district, San Juan county.

Development: by tunnels, longest known as Mill tunnel, 500′ below 5th level of old mine workings, connected by raises with tunnel.

Ore: a complex mixture of copper-lead and zinc sulphides carrying good gold and some silver.

Equipment: includes steam power plant, compressor and conical mill with flotation unit, latter destroyed by fire, December, 1915. New plant built and fully equipped, 1917, was said to be making an 80% extraction. No recent report.

HAMPTON CONSOLIDATED MINES CO. **COLORADO**

Address: Russell Gulch, near Central City, Gilpin county, Colo. S. G. Hamlin, mgr.

Inc. in Colorado. **Cap.,** $3,000,000; $1 par. Company reported without funds and indebted to Chittenden estate for taxes, etc. The widow of W. H. Chittenden, organizer and moving spirit of the company, is practically the owner.

Property: 4 claims, patented, very close to the War Dance gold mine, and believed to carry an extension of the ore-shoot of that mine. The ore has bornite, tetrahedrite, pyrargyrite, pyrite and marcasite, said to assay 2.7 to 35% copper, 6 to 35 oz. silver and 0.16 to 5.4 oz. gold per ton.

Development: by tunnels, shafts, and over 3,000′ of workings. In Aug.,

1919, good ore was opened on the 600′ level, with shipments from that and the 400′ level.

Equipment: includes a 16-h. p. gasoline engine, electric hoist, compressor and 10 drills. Property believed to have merit.

HANNA MINING & MILLING CO. **COLORADO**

Letters returned from former address: Capitol City, Hinsdale county, Colo. Had copper-lead ores; equipped with steam and electric power and a 100-ton concentrator. Probably dead.

HARPER-LARSON DEVELOPMENT CO. **COLORADO**

Name changed, 1917, to Calliope Cons. M. Co., which see.

HENRIETTA COPPER MINING CO. **COLORADO**

Office: 1816 California St., Denver, Colo.

Officers: E. R. Moodie, pres.; N. M. Abbott, sec.-treas.

Inc. April, 1916, **Cap.,** $3,000,000; $1 par.

Company took over the holdings of the Henrietta M. & M. Co., formerly owned by the San Juan S. & R.

Property: about 6 miles N. of Silverton, San Juan county; developed by 6,250′ of workings, the main or No. 7 tunnel being 2,200′ long, and carrying auriferous and argentiferous copper ore. Work started May, 1917. First shipments in October, 1918, were of ore containing gold, silver and copper and reported to average $40 per ton.

HENRIETTA MINING & MILLING CO. **COLORADO**

Dead. Company suffered from a complication of bad luck and similar financial conditions. Succeeded, 1916, by Henrietta Copper Mining Co., which see.

Company and its property, near Silverton, Colo., are fully described Vol. X, Copper Handbook.

HIDDEN TREASURE MINING & LEASING CO. **COLORADO**

Address: Dr. Thos. E. Sample, sec., Omaha, Neb. C. W. Crawford, pres. **Mine address:** Salida, Chaffee county, Colo.

Property: had a lease on the Sedalia mine of the Sedalia Copper Co., 7 miles from Salida. See Sedalia C. Co.

No recent returns.

HIGHLAND MARY MINES CO. **COLORADO**

See Silver Canyon Mining Co.

Address: Ophir, Colo. Wm. Parsons, mgr.; J. D. McAlpine, engr.

Mine said to show several bodies of silver ore of milling grade. Flotation plant installed in 1917. Mine reported leased to J. H. Slattery at last accounts.

HINSDALE TUNNEL & REDUCTION CO. **COLORADO**

Is a reorganization made in 1907 of the Henson Creek Lead Mines Co.

Property: at Lake City, Hinsdale county, known as the Bonanza group, said to carry complex lead and copper ores. Has water and electric power and a 50-ton concentrator. Letters neither answered nor returned. Presumably moribund.

HONEST DOLLAR MINING & MILLING CO. **COLORADO**

Mine office: Gibson Hill, Breckenridge, Colo.

Officers: G. L. Meffley, pres.; R. L. Gore, v. p.; J. F. Meffley, sec.-treas.; A. L. Swanson, cons. engr.; George Williams, supt.

Inc. 1918, in Colorado. **Cap.,** $1,000,000.

Properties: the New York group of mines on Gibson Hill, one mile north of Breckenridge, Summit county, operated under lease and bond. Mine is reported to have a blanket vein of lead-zinc ore and two vertical veins of high-grade ore. **Development:** by long crosscut tunnel.

HOOSAC TUNNEL & MINING CO. **COLORADO**

Reorganized, 1916, as New Life Tunnel & Mining Co., which see. Company was in hands of receivers for years.

HOPE MINING, MILLING & LEASING CO. **COLORADO**

Address: Aspen, Colo.

Officers: Chas. O'Kane, pres.; J. W. Hetherly, v. p.; H. W. Clark, sec.; J. B. Stitzer, treas.

Capital stock increased from 100,000 to 150,000 shares in 1917.

Property: a group of claims, about 400 acres, includes the Little Annie mine in the Roaring Fork mining district. Ore is a sulphide of lead, carrying silver and zinc, with a considerable quantity of barite.

Development: by Hope tunnel, being driven to reach the Little Annie vein at 9,500′. Seven years have been devoted to the advancement of this adit. Work in 1917 amounted to 1,047′ at a cost of $14.58 per foot; in 1918, 915′, at a cost of $17.16 per foot. The tunnel is to be 9,500′ long, 4x7′ wide and 2,000′ below surface.

Several of the company's claims have been leased to others on a royalty basis. Examined by Geo. W. Tower, Jr., and Fred. W. Foote.

HORSE MOUNTAIN M. & M. CO. **COLORADO**

Address: J. O. Kempf, pres., Eagle, Eagle county, Colo.

Inc. in May, 1919.

Property: the Lady Bell group of 22 claims in the Fulford district, 7 miles from Eagle, on which silver ore was discovered in 1913, and from which about 175 cars of ore were shipped up to 1916. A mill is to be erected.

HORSFAL MINE **COLORADO**

Mine office: Gold Hill district, Boulder, Colo. Walter McCaslin, Longmont, Colo., operator and reported owner. Chas. P. Oliver, supt.

Mine was opened in 1917, after an idleness of 30 years. Said to have been a big producer from 1859-'87. Late in 1918 shaft was sunk from 300′ to 550′. Ore reported to carry gold, with a little silver and some lead. 10 men employed at last report.

Equipment: includes electric hoist, and a flotation mill planned.

HUMBOLDT MINES CO. **COLORADO**

Controlled by Smuggler Union Mining Co.

Address: Telluride, Colo.

Officers: Bulkeley Wells, pres.-gen. mgr.; F. N. Watriss, v. p.; Thos. J. Regan, sec.-treas., 120 Broadway, New York, with C. N. Bell and E. B. Adams, directors. C. N. Bell, supt., at last accounts.

Inc. 1915, in Colorado. **Cap.,** $500,000; $100 par; outstanding, $382,000.

Property: 25 patented claims, 180 acres, in Mt. Sneffels mining district, Ouray county.

Ore: gold, silver, lead and iron, in a 2′ quartz fissure vein in andesite with N. W.-S. E. strike and dip of 76°.

Development: 680′ vertical Humboldt shaft with 7 levels and the mile-long Sheridan tunnel connecting with lowest level of the Humboldt shaft. Greatest depth of workings, 840′.

Equipment: includes a 50-h.p. electric hoist, compressor and a tramway.

Production: started January 1, 1916. In 1916, 47,900 tons; 1917, 47,060 tons; 1918, 36,300 tons. No information as to grade obtainable. Ore is milled by Smuggler Union Mining Co.

HYATT SYNDICATE **COLORADO**

Late in 1918, T. T. Hyatt of Shawnee, Okla., and his associates, were reported to have taken over the Prussian mine at Rowena, Boulder county, Colo. L. A. Tarbett, Boulder, supt.

Equipment: includes 50-ton quartz mill and 25-ton flotation unit.

IDAHO BRIDE MINING & MILLING CO. **COLORADO**

Officers: E. D. Payne, sec.-gen. mgr., 227 Temple Court Bldg., Denver, Colo. H. A. Miller, pres.; R. A. Kramer, v. p.; A. A. Ancoin and H. Angerman, directors.

Cap., $100,000; $1 par.

Property: about 150 acres near Idaho Springs. Company organized to take a lease on the Bride vein, worked through the Idaho tunnel, and supposedly has lease and bond on the Seaton mine, opened at depth by 300′ drift in the Newhouse, or Argo, tunnel, 800′ lower than the Idaho. Company took over Foxhall property, 1914. Work was resumed on Bride vein in March, 1917.

Ore: mostly galena with silver-gold content, from 1,300′ level, said to have run $9 to $20 per ton.

Equipment: includes a concentrator. Recovery on $4.65 ore is given as $4.08, or 88%.

Management stated that upward of $500,000 has been expended in development work.

Mill has been leased for custom business to E. J. Jones. Company said to contemplate taking over some lead-silver-gold mines in the upper Union district of Clear Creek county. No recent returns.

IDAHO MINING, REDUCTION & TRANS. CO. **COLORADO**

Address: Wm. E. Renshaw, mgr., Idaho Springs, Clear Creek county, Colo.

Property: the Silver Age, Gem and Freightons Friend mines (formerly the Gem Cons. Mines Co.), showing veins with gold-copper ores.

Development: by several shafts and extensive tunnel workings. Is now operated by lessees.

Equipment: includes electric-driven compressor and hoist, and a 200-ton concentrator with 20 stamps.

In 1918 company added another 50-ton mill with two flotation units, thereby doubling the capacity of the Newton mill.

IMPERIAL CONSOLIDATED MINING CO. **COLORADO**

Office: 725 Colorado Bldg., Denver, Colo. **Mine office:** Georgetown, Clear Creek county, Colo. Edw. J. Wilcox, pres.-mgr.; Henry Butler, supt.

Inc. as a reconstruction of the Waldorf Cons. Moning Co. Is a Lawsonized corporation.

Property: 600 acres, patented, including the Tobin mine, in the East Argentine district, shows a strong fissure vein with 3′ paystreak of gold-bearing copper ore.

Development: includes the Tobin and Wilcox tunnels, with 7 miles of workings. A 3′ vein of high-grade copper was intersected, April, 1915, at depth of 500′.

Equipment: includes a 125-ton mill at the portal of the Wilcox tunnel. After an idleness of several years, operations were resumed in 1915. Reported in 1918, that the mill capacity was to be doubled.

A 42-ton trial shipment said to have averaged 10% copper, 8% lead, 1.53 oz. gold and 66 oz. silver per ton. No reports obtainable direct from company.

In Sept., 1919, Thomas W. Lawson, of Boston, Mass., was boosting this property, which is reputed to have yielded millions of dollars when silver was 50 cents an ounce. A one-mile drainage tunnel was driven, opening some of the deposits at a depth of 1,000′. The main deposits are said to have been hardly scratched, which seems strange, if true, because mine is said to have had an output of several millions before it shut down. In the profuse literature put out, about this company, capitalization, officers, detail of mine development and sampling, are omitted—preventing an estimate of the "Moral risk" in buying shares.

INDIANA MINE **COLORADO**

Mine office: Gray Copper Gulch, Ironton, Ouray county, Colo.

Property said to show a 5-inch vein assaying 30 to 60 oz. silver and 12 to 20% copper, averaging $40 per ton.

Reported that A. B. Eiseman, of New Orleans, had taken a lease on the mine.

INGALLS LEASING CO. **COLORADO**

Operated the Ingalls mine on Quartz hill, Gilpin county, showing gold-silver-copper ore in veins. Developed to depth of 430′ by shaft and cross-cuts.

Last shipments made to Chamberlain Ore Co., Blackhawk, Colo., in 1917, yielded 0.5 to 0.8 oz. gold, 10 to 20 oz. silver, and 9 to 11.83% copper Operated by a pool and has no officers.

Idle at last accounts.

IOWA TIGER MINING CO. **COLORADO**

Name changed in Nov., 1919, to Southwestern Mining Co., which see.

JAPAN-FLORA MINES & TUNNEL CO. **COLORADO**

Idle. **Office:** 702 Colorado Bldg., Denver, Colo. Mine near Telluride, San Miguel county, Colo.

Officers: J. J. Fisher, pres.; Wm. E. Humphreys, sec. and asst. treas.; J. P. H. Cunningham, treas.

Inc. Aug. 22, 1903, in Colorado. **Cap.,** $2,000,000; $1 par; fully issued.

Bonds: $300,000 authorized, at 6%; issued, $251,200. Annual meeting in October.

Property: 43 patented claims, 311 acres, and a 5-acre mill-site at Pandora, in the Upper San Miguel district, 4 miles from railway. Property shows 5 fissure veins, in brecciated andesite and porphyry, 3 being exclusively developed and said to show a width of 1′ to 8′, carrying complex sulphide ores with gold and silver, associated with pyrite, in a quartz gangue. Ore assays 7.5 oz. silver, ¾% copper, 7% lead, and 5% zinc, which, with the gold content, brings value of the ore to about $14 per ton.

Development: by tunnels from 500′ to 2,752′ long with total workings of 30,000′. Lowest point is 900′ below the surface.

Ore reserves: are estimated at 86,000 tons of $14 ore.

Equipment: includes 50-ton concentrating plant.

Property has produced considerable ore in the past, the last shipment, in 1910, averaging $47.85 per ton. Inactive since 1911.

JESSIE MINE **COLORADO**

Mine office: Gold Run, Breckenridge, Summit county, Colo. George F. Roth, Rochester, N. Y., mgr.

Mine was said to be a big producer of gold in former years. Is operated under bond and lease. Equipment includes a 40-stamp amalgamation mill.

JEWELL MINES & REDUCTION CO. **COLORADO**

Idle. Last address: R. A. Schwab, sec., Century Bldg., Denver, Colo. W. E. Hager, v. p.-gen. mgr.

Property: the Pandora mine and mill-site, 231 acres, partly patented, 7 miles E. of Pitkin, Gunnison Co., said to carry 8 fissure veins.

Development: by 1,800′ tunnel.

Equipment: included air-compressor, machine-drills, water power. No recent returns securable.

JOHN DOYLE MINING & MILLING CO. **COLORADO**

Address: Emmet Nuttes, Rico, Colo.

Inc. 1919 in Colorado.

Property: the Iron copper-silver mine near Rico. Development is by tunnels, and in August, 1919, some rich ore was being mined.

JUNE BUG MINE **COLORADO**

Mine office: Gibson Gulch, Breckenridge, Summit county, Colo. Boyce brothers took lease and option on the property in 1918, and are reported to be mining iron-silver ore assaying 300 oz. silver per ton.

KAPEGI LEASING CO. **COLORADO**

Operated the Congress mine of the Congress G. & C. Co., under lease. Company operations tied up by litigation during 1918.

KAPI MINING & MILLING CO. **COLORADO**

Mine office: Bonanza, Saguache county, Colo. H. J. Wolf, cons. engr.

Company driving a 900′ tunnel of which 800′ was completed at last accounts. Work said to cut a 12″ vein of copper and iron pyrite ore.

Equipment: includes electric compressor plant.

KENNEDY GOLD M. & M. CO. **COLORADO**

Address: Georgetown, Clear Creek county, Colo. David Kennedy, mgr., at last accounts.

Property: the Centennial mine, 640 acres, shows cupriferous gold and silver ores in a 30″ paystreak, assaying up to 24% copper, 5 to 50 oz. silver and 3 to 5 oz. gold per ton. Probably idle.

KEYSTONE CONSOLIDATED M. & M. CO. **COLORADO**

Officers at last account: Clifford A. Staley, mgr., Magnolia, Boulder county, Colo.; Willis K. Howell, pres., New York; Richard Howell, v. p.

Property: the Keystone mine an old-time producer, at Magnolia.

Development: by 400′ two-compartment shaft, to be sunk to 700′ and drained by the Sylvanite tunnel driven by Wheelman tungsten people from Boulder creek.

Equipment: includes hoist, compressor and electric power. A 50-ton concentration mill with flotation equipment was reported under construction.

Company was drifting on the 260′ level and a shipment of 4 tons of $62 ore made in 1916. No recent data.

KING SOLOMON TUNNEL & DEVELOPMENT CO. **COLORADO**

Office: 810 Majestic Bldg., Denver, Colo. **Mine office:** Frisco, Summit county, Colo.

Officers: F. C. Dinsmore, pres. and gen. mgr.; S. H. Alexander, v. p.; C. W. Rowe, sec.-treas., with W. W. Theobald, H. J. Theobald, J. R. Anders, W. J. Erxleben, C. Greenback, E. S. Blair, directors.

Inc. Jan., 1903, in South Dakota. **Cap.**, $2,500,000; $1 par.

Property: 64 quartz claims and about 250 acres placer claims, in the Ten-Mile district, Frisco, Summit county, shows fissure veins in granite, carrying auriferous and argentiferous copper and lead ores.

Development: by a 5,200′ tunnel with 5,000′ drifting. Company is working the Eleven vein, 3,700′ from portal of the tunnel, said to carry gold, silver, and lead. Steady shipments were made from this vein. Company suspended operations in Fall of 1918 owing to labor conditions, but planned extending tunnel to vein Twelve in 1919.

Equipment: includes a 160-h. p. steam and 115-h. p. electric plant, with an 8-drill compressor. Management plans to erect a mill when it has learned the nature and amount of ore in vein. Colorado & Southern R. R. runs by the property.

KISHMAN LEASING CO. **COLORADO**

Out of business in May, 1916. Fully described, Vol. XII.

KITTIMAC MINES CO. **COLORADO**

Address: Silverton, Colo.

Officers: Daniel B. Carey, pres.; Wm. Youngson, v. p.; Jos. L. Clark, sec.-treas.; Joseph Jacob, mine supt.; Frank Card, mill supt.

Inc. 1914, in Wyoming, as successor to company of same name inc. in Arizona and now dead, which is described in Vol. XI, Copper Handbook. **Cap.**, $2,500,000; $1 par; $2,000,000 shares issued and a $40,000 bond issue outstanding.

Property: transferred to a Colorado company in 1916, which continued development and milling, comprises 800 acres in Eureka mining district, near Silverton, San Juan county, includes 70 claims and a 76-acre mill site. Mine has 2 sulphide and 7 quartz veins, outcropping on surface for 3,000′ and developed by 2 tunnels, 920′ and 1,050′ long, with 2,000′ drifts. Ores carry gold, silver, copper, lead, zinc, and iron. On the Isabella vein an orebody 19′ wide was developed for 600′, said to average $10 per ton in gold and silver.

Ore reserves: management estimated 500,000 tons of ore in sight.

Equipment: includes compressor, drills, electric motors, 10,040′ aerial tramway, 150-ton mill with flotation unit, Huff electrostatic separators and several buildings. No recent returns.

K. & K. MINING CO. **COLORADO**

Guy Harper, mgr., at last report.

Reported in 1918 to have taken over the Gold Anchor mine at Alice, Clear Creek county, Colo.

Equipment: a hoist, and flotation mill. Mail sent to the mine has been returned unclaimed.

KOBOLD MINE **COLORADO**

Mine office: Idaho Springs, Clear Creek county, Colo.

Early in 1919, C. L. Jaynes, supt., and I. Heilig, who are operating the

property, reported cutting 4″ of ore assaying 10 oz. gold and 44 oz. silver. Mine developed by 70′ shaft.

LACKAWANNA MINING & REDUCTION CO. **COLORADO**

Address: Silverton, San Juan county, Colo. Believed to be idle.

Inc. 1917, to operate the Lackawanna properties now being operated by D. L. & W. Mng. & Red. Co., which see.

LAKE GEORGE DEVELOPMENT CO. **COLORADO**

Office: 22 E. Columbia St., Colorado Springs, Colo. A. J. Kiser, sec.-treas. Property sold in 1917 and company in receiver's hands. Fully described, Vol. XII.

LAKE MINE **COLORADO**

Owned by Hal and Robt. H. Sayre. Robt. H. Sayre, Central City, Colo., mgr.

Property: 5 patented claims, in Virginia mining district, Clear Creek county, shows pyrite, chalcopyrite, gray copper, zinc and lead. Ore occurs in fissure vein running N. 80° E. with dip 65°, in granite-gneiss formation.

Development: by 2 tunnels, 600′ and 2,000′ long to vertical depth of 2,400′, with a total of 15,500′ of workings.

Dividend distributed among the owners for the fiscal year ending August 1, 1916, was $10,000. Produced 10,848 tons averaging $8 per ton.

Mine operated in 1917-18 by W. T. Hireen of Idaho Springs. Reported that concentrates produced ran between $40 and $60 per ton.

LAKE SUPERIOR OPHIR MINING CO. **COLORADO**

Address: Ophir, Colo. Believed to be out of business. Mail returned unclaimed.

Inc. Sept., 1911, in Arizona. **Cap.,** $1,000,000; $2 par. Is reorganization of the Calumet-Telluride Mng. Co.

Property: in Chapman gulch above Ophir, San Miguel county, said to carry free gold ore.

Equipment: includes aerial tram, electric power and 20-stamp mill, which handled about 100 tons of $15 ore daily at last accounts.

LA PLAISANCE MINING & MILLING CO. **COLORADO**

Mine office: Crisman, Boulder county, Colo.

Inc. 1918, by E. V. Grant, A. Dawson, and F. A. Fair, to operate the New Enterprise and La Plaisance mines. **Cap.,** $50,000. Both properties were producers of high-grade gold and silver ores, but had been abandoned.

Equipment: includes hoisting and compressor plants.

LA SAL COPPER-SILVER MINING CO. **COLORADO**

Now owned by Michigan-Colorado Mining Co., which see.

LAURA LEE MINING & LEASING CO. **COLORADO**

Out of business in 1918. See Volume XIII for a sample of advertising literature.

LEADVILLE & MOSQUITO RANGE MINING & MILLING CO. **COLORADO**

Office: Geo. J. Ermlich, pres., 92 Eighteenth St., Denver, Colo.

Operating the Walter Scott property, located 1½ miles from Worman, on west side of Mosquito range, Lake county.

LEWIS MINE CO. **COLORADO**

Telluride, San Miguel county, Colo. Taken over by Lewis Mng. & Leasing Co., which see.

LEWIS MINING & LEASING CO. **COLORADO**

Address: Telluride, San Miguel county, Colo. H. G. McClain, gen. supt.

Property: a long-term lease on the Lewis mine, Bridal Veil basin, Telluride, idle since 1912. Mine has fissure veins with shoots of complex-lead-zinc-copper ores.

Development: by 500′ shaft, and equipped with flotation mill. Pumps installed and mine unwatered in 1918. Employs 30 men.

LEWIS MOUNTAIN MINING & MILLING CO. COLORADO

Address: La Plata, Colo.

Officers: H. Perini, pres.; J. Orocchi, v. p.; T. R. Lilyard, sec.; C. M. Berkey, treas.; J. E. Warnecke, mgr.

Inc. 1916, in Colo. **Cap.,** $1,000,000; $1 par. 600,000 shares outstanding

Property: 18 claims, 7 patented, in Lewis mountain, 3 miles north of La Plata, La Plata county, includes the Parole, Ten Broeck, Highland and Sylvan mines, carrying gold and silver telluride in quartz vein in diorite and limestone, averaging $27 per ton.

Development: by 400′ and 700′ tunnels. Has 4,700′ of workings, greatest depth being 1,700′. Company drove a 3,000′ crosscut tunnel in 1919.

Equipment: includes compressor and drills. An aerial tram and 50-ton mill are the latest additions proposed.

Produced to early 1919, 800 tons averaging about $60 per ton.

LIBERTY BELL GOLD MINING CO. COLORADO

Office: 131 State St., Boston, Mass. **Mine office:** Telluride, San Miguel county, Colo.

Officers: Arthur Winslow, pres.; J. J. Cairnes, v. p.; Henry L. Rand, sec.-treas., with Herbert Kean, Geo. R. Fearing, Jr., directors. Charles A. Chase, mgr.; H. G. McClain, supt.

Inc. in Missouri. **Cap.,** $700,000; $5 par; $667,800 outstanding.

Dividends: in 1915 amounted to 16%; in 1916, 28%.; 1917, 34%; 1918, 58% or $387,310, totaling $2,594,181.

Property: the Liberty Bell mine at Telluride, shows gold and silver-bearing quartz in a fissure vein averaging 3′ to 4′ in width. The main orebody runs N. W.-S. E. and dips 57° W. For geology of the district, see U. S. G. S. Geologic Folio No. 57. Reported, 1918, to have leased part of Humboldt Claim in Ouray county, from the Smuggler-Union Co. Shipments in 1918, averaged 2.565 oz. silver and 0.529 oz. gold. Mine and mill expected to shut down, 1920.

Development: by 2,600′ tunnel and 1,000′ raise from tunnel level to abandoned upper workings. Ore is mined by open stopes on stulls or by shrinkage stoping. All openings amount to about 16 miles of workings.

Equipment: includes hoist of 50 tons hourly capacity, electric power, duplex compressor, Norwalk compressor, 1.5 miles tram, a 500-ton concentrator and cyanide mill. Extraction averaged 96%, and total cost per ton amounted to $8.97 in 1918.

Production:

	Tons Ore Treated	Oz. Silver Produced	Oz. Gold Produced
1918	90,700	198,591	46,861
1917	143,100	261,294	31,170
1916	165,300	256,711	30,580
1915	173,700	314,432	24,054
1914	173,840	315,919	33,150
1913	179,216	288,602	36,693
1912	175,340	313,845	48,993

Ore extracted from mine amounts to about 2,144,612 tons. Reserves are estimated at 100,000 tons. Total production since 1899 said to be $14,043,893.

LIBERTY LEASING & MILLING CO. COLORADO

Address: Breckenridge, Summit county, Colo. Frank Peabody, mgr.

Reported in 1918 to be operating the Monte Cristo mine, in the upper Blue River region. Orebody is a blanket deposit, 4 to 7′ thick, carrying gold, silver, iron, and zinc. Milling plant has been remodeled and electrified to bring it up to date.

LIBERTY MINING & RED. CO. COLORADO

Controlled by The Dorr Co., Denver, Colo. Owen Johnson, mgr.

Reported developing the Pennsylvania Mine group at Montezuma, Summit county.

LINCOLN GROUP MINES CO. **COLORADO**

Office: 1816 California St., Denver, Colo.

Officers: H. A. Wimbush, pres.; Peyton Hugh, v. p.; H. G. Wimbush, treas.; R. R. Moodie, sec., with Harry J. Newton, directors.

Inc. 1914, in Arizona.

Property: 10 claims at Idaho Springs, Clear Creek county, said to carry streaks of ore assaying 7.8 oz. gold and 8.1 oz. silver. Developed by tunnels, crosscuts and drifts. Lessees at work in 1916; idle since then. Rumored recently that the mine will be sold to a New York syndicate.

LITTLE FOUR LEASING CO. **COLORADO**

Leasing on the 1,600′ level of the Gem mine at Idaho Springs, Colo., owned by the Gem Cons. Mines Co., and reported to have struck a vein showing 8′ of ore running $40 per ton. The lessees are Dr. A. Fraser, W. E. Renshaw, Mrs. F. Renshaw and S. Smith.

LITTLE GIANT GOLD M. & M. CO. **COLORADO**

Lawson, Colo.

Officers: F. L. Collom, pres.; F. F. Chady, v. p.; H. E. Minier, sec.-treas.-mgr.; F. P. Koontz, supt., with R. L. Dear and Ira Spencer, directors.

Inc. in Colorado. **Cap.,** $500,000; $2 par.

Property: 58 patented claims, 350 acres, in Downieville mining district, Clear Creek county, carries gold-silver-lead ores in quartz veins, running E. W. with dip 60°. Country rock is granite.

Development: to depth of 900′ by 2 tunnels, 3,500′ and 1,000′ long.

Equipment: includes steam hoist, compressor, drills and concentration mill.

The Little Giant is credited with a past production of $4,000,000.

LITTLE KINGDOM MINING CO. **COLORADO**

Address: L. H. Flanders, sec., Kittredge Bldg., Denver, Colo.

Inc. in Arizona with original capital of 10,000,000 shares 1c par, changed to 1,000,000, $1 par, and later to 500,000 shares, $1 par.

Property: a number of patented claims in the Enterprise and Lake Gulch district, Gilpin county. Ore is reported to carry lead sulphide with varying amounts of silver. Company has not operated property in five years, but three claims are worked on lease. Company's flat rate taxes were reported in arrears, at last accounts.

LITTLE MONTANA MINING CO. **COLORADO**

Office: Colorado Springs, Colo.

Officers: C. M. MacNeill, pres.; C. C. Hamlin, v. p.; C. B. Garnett, sec.-treas.

Inc. 1912, in Wyoming. **Cap.,** $150,000; $1 par.

Gross earnings, 1917, were $3,210; expenses, $4,167.

All stock, except three shares, owned by Granite Gold Mng. Co., which company operates mine. Property described under Granite Gold Mng. Co., in Cripple Creek district.

LOGAN METAL CO. **COLORADO**

Office: 5 Fonda Block Bldg., Boulder, Colo.

Officers: J. R. Woll, pres.; S. H. Blakesley, v. p.; W. T. McGinnis, sec.; F. W. Kohler, treas.

Inc. 1918, in Colorado. **Cap.,** $200,000, shares $1 par; outstanding 140,000 shares. A close corporation.

Property: 12 patented claims, about 50 acres, at Crisman, Boulder county, has gold, silver, and tungsten in fissure veins in granite. Main course is N.-S., with 25° dip N. E.

Development: by 4 tunnels totaling two miles. Greatest depth is 700′.

Equipment: includes hoist, compressor, pump, and electric power. Mine worked mainly by lessees.

LONDON MINES & MILLING CO. **COLORADO**

Controlled by the Story, Jewett and Packard estates. Mine office: Alma, Park Co., Colo. Chas. Aicher, mgr.

Property: the London mine on London mountain, 7 miles W. of Alma, and about the same distance from Leadville, opened in 1875, is an old-time producer.

The ore deposits are fissure veins in gray and white porphyry. The main London vein averages 18″ thick, runs N. 37° W., with dip of 65° W., while the McDonald, a parallel fissure is 16″ thick. Assays reported to average 4 oz. gold, 4 oz. silver, 8% lead. The main London vein has been the principal producer in the past. Company reports both veins to be making equal production in 1919. In November, $50 to $100 ore was being shipped.

Development: by 2 adits, one 300′ below the other, opening the London vein for 2,980′ and exposing backs of 150′ to 650′. Company is driving a tunnel to cut vein system, 780′ below present workings, giving new stoping ground, 780′ high and 2 miles long. Machine-drills are used. Company planning a 200-ton mill.

LOUISIANA-COLORADO MINING CO. **COLORADO**

Office: Alma, Park county, Colo.

Officers: A. J. Trone, pres.; E. A. Ritter, v. p.; A. J. Brand, sec.-treas., with Eugene Constantin, J. W. Lepine, W. H. Price, and Dr. T. Stark, directors.

Property: the Dolly Varden mine, about 18 claims, 150 acres on Mt. Bross, Alma; also reported to have purchased the Moose properties adjoining the Dolly Varden on the north, from the estate of Ludlow Patton, N. Y., consisting of 19 claims, 300 acres. The rocks are lime and porphyry; veins are 20 to 40″ wide, and contain galena and antimonial silver. The first carloads of concentrates were said to have returned 0.02 gold, 177 oz. silver, and 4½% lead.

Development: by tunnel and drifts, 2.000′ long.

Equipment: includes 200-ton mill with flotation unit, and an 8,000′ aerial tramway. In Sept., 1919, the mill was treating 150 tons daily, producing 200 oz. silver and 40% lead concentrates. There were 40 men employed.

LUCKY BOY MINING CO. **COLORADO**

Office: Jamestown, Colo.

Officers: E. H. Hunt, pres.; T. Johnson, v. p.; Joseph Lloyd, sec.-treas.; E. R. Sawyer, supt.

Inc. in Colorado. **Cap.,** 1,000,000 shares, par 10c, outstanding, 151,175 shares.

Property: 7 claims, 1 patented, comprising 39 acres, in Central mining district, Jamestown, Boulder county. Ore is in a fissure vein in gray granite, carrying gold, silver, lead, copper, and zinc. Developed by shaft 36′ deep. A prospect.

LUCKY GIRL MINES CO. OF COLORADO. **COLORADO**

Office: 1214 Elizabeth St., Denver, Colo.

Officers: J. A. Kapps, pres.; J. E. Bailey, principal owner, sec.-treas., and mgr.

Inc. 1917, in Colorado.

Property: Lucky Girl and National (patented) lode claims in Sugar Loaf Mt. district, Boulder county. Veins carry gold, silver, and fluorspar. Operating through Good Morning tunnel with major development being done on Lucky Girl vein.

Mine equipped with 3-drill compressor and machine-drills.

MALMO MINING & MILLING CO. **COLORADO**

Reported in 1918 that C. W. Brandenburg as manager, and Eastern interests had formed a company of this name with capital of $25,000, to operate property at Left Hand creek, Brainerd camp, near Nederland, Boulder county, Colo. Veins were reported to carry pyritic ore assaying 6 to 30% copper. Shipping ore carried 2 oz. gold and 90 oz. silver per ton.

MARIE MINING CO. **COLORADO**

Idle and probably dead. Breckenridge, Colo. A reorganization of the O'Reilly Gold Mining Co.

Inc. 1915, in Arizona. **Cap.,** $1,500,000. Owned by Haverhill, Mass., capitalists.

Property: 51 acres on North Star mountain, 10 miles S. of Breckenridge, Summit county, said to show Witch Hazel and other veins of gold ore.

Development: by 763′ adit.

MARION MINES & MILLS CO. **COLORADO**

Office: 850 Equitable Bldg., Denver, Colo. **Mine office:** Rye, Colo.

Officers: Henry E. McElwain, pres.; John H. McElwain, Frank Bulkley S. McElwain, Frank Bulkley and Clarence A. Brandenburg, Denver, directors. Jos. Giedlartz, sec.-treas.

Cap., $300,000, increased from $200,000, fully paid by $100,000 cash, balance in property. Outstanding debts, Feb., 1917, $118,389. No financial information received since.

Property: the Greenhorn group, 19 claims, 6 patented, together with one millsite claim, total 65 acres; also 120 acres held by location, making 185 acres mineral land in the Hardscrabble district, Custer county, Colo.

Development: by tunnel showing a vein of zinciferous copper and lead ore with small gold and silver values. Has water power, compressor and 100-ton concentrating mill. Erected a 100-ton flotation plant to treat tailings in 1915. Is a small producer, but no figures available.

MARMATITE MINING & LEASING CO. **COLORADO**

Office: Rico, Colo. E. H. Snyder, mgr.

Operating under lease the Blackhawk mine, owned by the Rico-Argentine Co., also the Pro Patria mine of the Syndicate M. & M. Co., and the Silver Swan mine. The Enterprise vein of the Silver Swan is being opened. Ore contains iron pyrite, zinc, and a little silver. Reported shipping at rate of two cars per day in 1919, to the Durango smelter. An assay office has been built and the Pro Patria tram and mill are also operated under lease.

MARSHALL & RUSSELL GOLD M. M. & T. CO. **COLORADO**

Out of business; property at Empire, Clear Creek county, sold at receiver's sale July 9, 1917. See full description in 1916 edition of this book.

MARTIN MINING AND POWER CO. **COLORADO**

Martin M. & P. Co. of Delaware, is the holding company.

Address: S. G. Martin, mgr., 40 Exchange Place, New York, N. Y.

Officers: S. G. Martin, pres.; S. L. Martin, v. p.; W. B. Jones, sec.; with E. F. Nolan and C. W. Wright, directors.

Inc. in New York. **Cap.,** $100,000. Registrar, Empire Trust Co., 120 Broadway, New York. Transfer agent, Security Transfer Reg. Co., 66 Broadway, New York.

Property: 24 claims, 378 acres. 215 lots, 13 acres; other property, held by agreement and lien, option, etc., 1,296 acres, located in Silverton quadrangle and Eureka mining district, San Juan county.

Geology: Eruptive porphyry cut by 20 fissure veins. Company describes three vein zones: first, 10 to 100′ wide, carrying gold with some chalcopyrite; second, 25 to 100′ wide, a copper-silver vein; third, several zinc-lead-silver veins, the ore being complex and refractory, but milling to 40% zinc and 65% lead product, with silver in the latter.

Development: 15,000′ of tunnels, the lowest or Martin tunnel-right with portal at side of railroad, will, according to company, cut 15 known veins with 8,000′. Management reports 3,000,000 tons of partly-developed ore with an average gross value of $12 per ton. About $500,000 has been spent in developing, exploration work, and in opening ore.

Equipment: plan includes a 1,200-ton mill, tram and compressor.

Company expects to produce 585,000 tons in four years with net value of $6,867,050, expenses in that time to be $940,000.

This will be a big mine if these figures are correct.

MARYLAND MINES & RED. CO. **COLORADO**

Officers: W. N. MacPhail, pres.; J. Miller, v. p.; H. F. Christensen, sec.-treas.

Property: Maryland group of 22 acres in South Boulder mining district, Gilpin county. Ore averages $12 per ton in gold and copper. Company planned erection of mill in 1919.

MARY MURPHY GOLD MINING CO. COLORADO

Offices: 414 Boston Bldg., Denver, and Romley, Chaffee county, Colo.

Officers: Chas. C. Parson, pres.; Geo. E. Collins, v. p. and gen. mgr.; H. W. Robinson, sec.; John W. Hudston, treas., with Louis F. Eppich, directors; Alfred Ware, mine supt.; H. L. King, mill supt., at last accounts.

Inc. May 20, 1909, in Colorado. **Cap.**, $1,850,000: $5 par; $1,790,500 outstanding January 1, 1918. Bonds authorized, $350,000; issued $231,000, of which $62,000 were redeemed Dec., 1917. Majority of stock and bonds are said to be held in England. Stock transferred at company's office. Continental Trust Co., Denver, registrar. Annual meeting second Monday in March.

Income statement for year ending Dec. 31, 1917, showed net smelter returns, $242,701; expenses were $314,004; depreciation, interest, loss from commission, etc., $22,744, leaving deficit $94,047.

Comparative general balance sheet years ending Dec. 31:

Assets	1917	1916	Liabilities	1917	1916
Prop. & equip...	$2,037,821	$2,009,074	Cap. stock.....	$1,850,000	$1,850,000
Supplies & prepaid ins.....	45,398	34,710	Bonds	169,000	179,000
Current assets..	166,876	228,420	Current liabil....	120,200	39,646
Profit & loss....	17,688	.....	Sinking fund....	965	10,507
			Reserves (a)...	127,617	126,905
			Surplus	.....	66,146
Total	$2,267,783	$2,272,204	Total	$2,267,782	$2,272,204

(a) for examination, purchase and development of new properties.

Dividends: two of 7c per share each, paid in 1915, and one of 7c in 1916. There was set aside in 1915, $110,000; and in 1916, $15,000, for acquisition of new property.

History: the Mary Murphy mine, discovered 1874, was not extensively worked until acquired by a St. Louis company in 1880. The yearly output 1880-1885 averaged about $300,000 net from ores sold to smelters. The gross value was about three times as much. One-third of the gross value of the ore was received by the mine, the remaining two-thirds being absorbed by smelting and refining charges, and by railway freight.

The first mill was erected in about 1886. Subsequently the property was leased and operated with varying success until about 1906. The lessees built mills at Romley and St. Elmo, and a smelter at Buena Vista. All of these plants were destroyed or dismantled, and the mine practically abandoned in 1906.

Property: 42 claims, mostly patented, 350 acres in Chalk Creek district, Chaffee county.

The Yankee Girl, Genesee-Vanderbilt and Robinson mines in the Red Mountain district, were acquired in 1917, and a 50-ton mill built at the Genesee. The mines contain complex silver ores in vertical chimney deposits. Development is in progress.

Ore: contains gold, zinc, lead, silver and copper, in order of value, in a complex network or system of nearly vertical fissure veins in quartz-monzonite; the Mary Murphy is the main vein. Veins vary in width from 6″ to 12′, and contain shoots and irregular lenses of ore. Average assay of milling ore: 0.2 oz. gold; 2.7 oz. silver; 4.4% lead; 7.9% zinc; 0.5% copper.

Development: by tunnels with a shaft connecting the tunnel levels: length of principal tunnels, No. 7, 750′; No. 14, 1,500′; Golf, 4,350′. Total underground workings over 9 miles; greatest depth of workings, 1,975′ vertical from surface. Late in 1919 a crosscut tunnel on 1,500′ level had been connected by a raise with the 800′. No stoping has been done between.

Equipment: includes small hoist, 3 air-compressors, 2 aerial tramways and 175-ton concentrating mill. Steam power is used.

In the mill wet concentration is used followed by flotation of slime, using pine oil; there is a 25-ton electrostatic separation plant for the zinc-iron middlings.

Flotation did not act so well on the zinc ore in 1916, even on sulphide

material. The process cost 23c. per ton of ore milled. Some interesting work has been done at this plant.

Production: in 1913, 14,428 oz. gold; 2,233,037 lb. zinc; 3,321,313 lb. lead; 146,606 oz. silver; 152,000 lb. copper.

Ore mined, 1917, was 36,231 tons, compared with 54,954 tons in 1916, and 60,561 in 1915.

In 1917 the yield was 950 tons lead concentrates, worth $113,025; 755 tons non-copper concentrates, $29,597; 1,754 tons zinc concentrate, $73,956; together with bullion and crude ore, receipts totaling $242,701.

Recent costs have been:

	Tons Milled	Mng.	Mllg.	Tram-ways	Gen'l	Total
1916	51,116	$4.11	$2.18	$0.16	$0.34	$6.79
1915	55,880	3.20	1.99	0.12	0.25	5.56
1914	48,526	3.08	1.96	0.13	0.21	5.38
1913	34,271	3.45	2.04	0.24	0.30	6.03

Note: mining costs are distributed over a slightly larger tonnage than tons milled.

The Mary Murphy mine has seen its best days. At the beginning of 1917 available ore was estimated as 8,000 tons, and 6,000 tons in the Iron Chest mine. Much of the ground being mined would not pay under normal metal prices. Unless larger orebodies are opened, the manager, G. E. Collins, predicts a suspension of milling operations.

In Oct., 1919, the mill was treating lessees' ore and old tailings.

MASTER KEY MINING CO. **COLORADO**

Office: 403 Empire Bldg., Denver, Colo. **Mine office:** Columbine, Colo.

Officers: T. E. Kleckner, pres.; J. A. Leslie, v. p.; .H S. Holcomb, sec.-treas.

Inc. January, 1919, in Colorado. **Cap.,** $250,000; $1 par.

Property: 14 claims, about 289 acres in Columbia basin, Hahn's Peak mining district, Routt county, has contact and cross fissure veins in limestone and quartzite, yielding gold, silver, and lead.

Development: by two shafts, 70′ and 110′ deep, tunnels and underground workings, 380′. Company reports smelter returns as $407 per ton when silver was 75 cents an ounce.

MATRIX MINES CO. **COLORADO**

Address: Idaho Springs, Clear Creek county, Colo.

Mail returned from Denver office. J. A. Hazen, mgr., at last accounts.

Property: 16 claims, including the Prince Albert, on Columbia mountain, opposite Lawson. An 18″ vein of rich silver ore was mined in 1919.

MATTIE B. MINING CO. **COLORADO**

Inc. in Colorado. **Cap.,** $100,000; $1 par. Stock offered at 50c in 1917.

Property: Bob Cat group, 20 acres in Cleora mining district east of Salida, Chaffee county. Reported to have cut copper ore 300′ from portal of tunnel, said to be 18 to 30′ thick.

MAYFLOWER LEASING CO. **COLORADO**

Operating the Mayflower mine, near Silverton, San Juan county, under lease. J. H. Slattery, mgr.; A. Gillis, supt.

Equipment: includes compressor. Reported shipping concentrates amounting to two cars a day. Employs 20 men.

McCARTHY-HIDDEN TREASURY MINING CORP. **COLORADO**

Officers: E. L. Thomas, Omaha, pres.; T. A. O'Brien, supt.

Reported to have taken over the Oriental mine, formerly known as the Hidden Treasure, in Gunnison county. Developed by 3,700′ crosscut tunnel and several thousand feet of workings on seven levels. Concentrates said to assay $90 in silver, lead, and gold.

Equipment: aerial tram 3,800′ long, mill and flotation unit, water and steam power with combined capacity of 1,000 h. p., and compressor.

McINTYRE MINING CO. **COLORADO**

Address: John W. Prout, mgr., Rico, Colo.

Property: the Puzzle mine at Rico, Dolores county, credited with past production of silver ore worth $300,000.

Development: by 135′ shaft with 2,637′ of workings. Present owners have not shipped any ore, but have been looking for a vein lost 30 years ago. This was found, 4½′ to 5′ wide, but after driving 400′ no commercial ore was developed.

In 1918-1919, company raised up 132′ on the vein, then drove an adit from surface 190′ to catch the top of the raise and to find the lost vein or orebody.

MELVINA MINE **COLORADO**

Office: Jamestown, Colo. A. Murphy, mgr. Operating the mine located between Wall St. and Gold Run gulch at Salina, Boulder county. The mine, idle since 1907, was unwatered late in 1917. Equipment includes a 50 h. p. electric hoist. Ore is high-grade gold talc formation with tellurium.

MEMPHIS & IDAHO SPRINGS GOLD M. & M. CO. **COLORADO**

Idle. Mine near Idaho Springs, Clear Creek Co., Colo., J. J. Williams, pres.; Wm. M. Slack, sec.-treas., at last accounts.

Inc. in Colorado. **Cap.,** $1,500,000; $1 par; non-assessable.

Property: 14 claims, patented, carry veins with lead, copper and zinc sulphides. Mine developed by shafts of 125′, 250′ and 460′ and tapped at depth of 2,350′ by the Newhouse tunnel.

Equipment: includes 22-h. p. electric hoist and air compressor. Was leased to John Kuykendall of Denver, in 1915. No recent returns.

METALS TUNNEL CO. **COLORADO**

Office: 2555 West 37th Ave., Denver, Colo.

Officers: F. E. Holmes, pres.; J. J. Brown, v. p.; H. G. Fowler, sec.-treas. and mgr., with R. A. Haynes and A. H. Daniels, directors.

Inc. April, 1915, in Arizona. **Cap.,** $150,000; 10c par; 925,764 outstanding in 1919. Annual meeting, first Tuesday after first Monday in June, at Phoenix, Ariz.

Property: 71 claims, 160 acres and a mill-site, aggregating 525 acres, situated about 7 miles S. W. of Idaho Springs, Clear Creek county, Colo. Veins are said to be 3 to 50′ wide, and to assay $5 gold; also carries copper, silver, iron and zinc.

Development: tunnel 2,800′ long and numerous prospect workings. Company was driving a crosscut tunnel to cut several known veins at last accounts. Tunnel can be used for transportation, and was being advanced on contract. The August, 1919, advance was 27′ at cost of $17.92 per foot.

Equipment: includes power-plant, compressor with 6 drills, and blacksmith shop.

The secretary states "in regard to the formation, everything continues favorable, the dip and pitch are right, there is a good amount of moisture, and I know we are justified in looking for important developments. . . ."

MICHIGAN-COLORADO COPPER CO. **COLORADO**

Office: Penobscot Bldg., Detroit, Mich. **Mine office:** Paradox, Montrose county, Colo.

Officers: A. C. Carton, pres.; E. V. Laud, sec.-treas.; with G. F. Galloway, C. Holmes, H. Behrendt, P. W. Klintworth, and G. N. McBride, directors. Jesse F. Boyd, mgr.

Cap., $3,000,000; $1 par; 1,000,000 shares are treasury stock.

Property: 12 claims and 3 mill-sites, patented, 150 acres, at Cashin, Montrose county. Company, in 1918, bought out the La Sal Copper-Silver Mining Co., which was a reorganization of the Consolidated La Sal Mining & Smelting Co., which succeeded the La Sal Copper Mining Co. Property includes the Cashin mine, which has been idle for many years. In August, 1919, company acquired an interest in the Locker-Brewer copper mine, near Monticello.

Geology: there are three fault-fissures, at the Cashin, the Red Chief, Horseshoe, and Maude veins—varying from a few inches to 12′, composed of sandstone or fault breccia showing copper carbonates, sulphides, and native copper, with silver as sulphides and native silver. Assays average 6% copper and 1.7 oz. silver.

Development: by tunnel 1,540′ long. Company expected its 100-ton flotation mill to be ready by the end of 1919.

MICHIGAN MINING & MILLING CO. **COLORADO**

Bankrupt. Assets sold at Receiver's sale, and bought in by Edward Moir, the previous president.

Office: Foster Bldg., Denver, Colo. See Vol. XIII.

MID-COLORADO MINES CO. **COLORADO**

Address: Georgetown, Colo.

Officers: Abraham Plank, pres., Wooster, Ohio; O. H. Kniffen, v. p.; L. A. Lang, sec., Denver; I. E. O'Hail, treas., Wooster, with Geo. B. McFadden, directors.

Inc. March, 1915, in Colorado. **Cap.,** $600,000; $1 par; 400,000 outstanding. Annual meeting, second Tuesday in July.

Property: 13 claims, 11 patented, on Republican mountain, ½ mile W. of Georgetown, Clear Creek county, including the Mineral Chief mine, was purchased in 1915.

Ore: gold, silver, lead, zinc in fissure vein in porphyry, said to assay .09 oz. gold, 16 oz. silver, 18% lead, 7% zinc.

Development: by 7 shafts ranging in depth from 140′ to 1,100′, with total workings of 1½ miles.

Ore reserves: said to be 50,000 tons.

Equipment: includes electric power 50-ton mill equipped with crusher, rolls, jigs, tables and flotation plant.

Production; previous to 1915 said to be 190,000 tons. No recent information received.

MIDLAND CHIEF MINES CO. **COLORADO**

Address: F. J. Woodward, gen. mgr., Colorado Bldg., Denver, Colo.

Inc. in Massachusetts. **Cap.,** $250,000; $5 par; 12,000 shares in treasury.

Property: 11 claims, 50 acres on Democrat mountain, Georgetown, Clear Creek county, Colo.; also a 50-ton mill. Two ore-shoots have been opened, one 125′ long and 4′ wide, with 400′ backs; the second on No. 6 level, is 4′ wide and 450′ long.

Production: in 1917 was about 700 tons returning about $5,000.

MID-WEST METAL MINING & HOLDING CO. **COLORADO**

Office: 515 Mining Exchange Bldg., Denver, Colo.

Officers: F. E. Wire, pres.; H. L. Barger, v. p.; W. F. Sien, sec.

Property: operating under lease and option the Iron Mask mine on Shock hill, near Breckenridge, Summit county, Colo. The Alladin Lamp claim near Montezuma, was taken in August, 1919.

Company reported taken over by the Climax Molybdenum Co., which see. and iron sulphide with gold and silver, averaging $100 per ton.

Development: by 1,500′ tunnel. Two compartment shaft equipped with electric hoist being sunk.

MILL GULCH MINING CO. **COLORADO**

Address: C. F. Flon, sec., Colorado Springs, Colo.

Inc. 1910, in Colorado. **Cap.** $1,000,000; $1 par, non-assessable.

Property: on 31-mile mountain, 5 miles S. of Guffey, Park county.

Development: work has been done intermittently since organization. A 220′ shaft was deepened to 320′ in 1919, opening ore that has returned 8½% copper, 13 oz. silver, and some gold.

Equipment: steam power, pump, hoist, smithy, and all necessaries.

MINERALS RECOVERY CO. **COLORADO**

Office: Denver, Colo.

Officers: P. W. Chambers, pres.; W. W. Anderson, v. p.; W. E. Bryan, sec.-mgr.

Company purchased property of the National Radium Institute at Denver, Colo., in 1919, and expects to buy 200 tons of carnotite and uranium-bearing ores each month to keep plant in operation. The National Radium Co. had a lease on 16 claims from the Crucible Steel Mining & Milling Co., a subsidiary

of Crucible Steel Co. of America. These claims were in Long Park, Montrose county, and Telluride, San Miguel county.

MINNEHAHA MINING & MILLING CO. **COLORADO**

Address: George Bibb, mgr., Silverton, Colo.

Officers: J. J. McFeely, pres.-treas.; A. V. Dawson, v. p.; C. L. Beard, sec.

Inc. in 1918, in New York with capital of $100,000, to operate the Minnehaha group, at Ross Basin, Gladstone, San Juan county. The claims have never been worked to any extent. A mill has been planned.

MOJAVE TUNGSTEN CO. **COLORADO**

Address: N. H. Brown, supt., Boulder Falls, Boulder county, Colo.

Company and holdings described under California mines.

MOLLY B. MINING CO. **COLORADO**

Address: J. A. Hazen, mgr., Holyoke, Colo. **Mine office:** Breckenridge, Colo.

Property in Yuba Dam Flats, ½ mile north of Breckenridge, Summit county, includes Fox Lake, Como, and Breckenridge veins. Company reported driving three headings into a blanket formation of copper ore containing gold, silver, and bismuth.

Equipment: includes compressor and blacksmith shop.

MOLLIE GROVES MINING & MILLING CO. **COLORADO**

Office: 420 Ernest & Cranmer Bldg., Denver, Colo.

Property: near Parshall, Grand county, was not regarded favorably by the late Horace J. Stevens, owing to company's alleged preposterous claims Letters neither answered nor returned. Fully described Vol. XI, Copper Handbook.

MOLYBDENUM PRODUCTS CO. **COLORADO**

Address: W. J. McCarthy, mgr., Buffehrs, Summit county, Colo.

Company reported taken over by the Climax-Molybdenum Co., which see.

Property: located on Bartlett mountain, Buffeher, a mile south of Climax, Lake county, adjoins property of Climax Molybdenum Co. Company owns a 250-ton mill, in which a secret process for treatment of molybdenite is said to be used. Equipment includes a 2-mile aerial tramway. An 80% product is expected.

MONON MINING CO. **COLORADO**

Office: Creede, Colo.

Officers: G. C. Manley, pres.; A. Drumm, v. p.; T. H. Thomas, sec.-treas.

Property: the Monon group, 3 miles north of Creede, Mineral county, Colo. Property was first worked in 1891, but has been idle many years. Now being operated by lessees who are shipping 90 tons of silver ore per week; 100 cars reported to have returned $173,440.

MONTEZUMA CONSOLIDATED SILVER MINES CO. **COLORADO**

Office: Magee Bldg., Pittsburgh, Pa.

Directors: Joseph Giediartz, F. C. Ewing, C. A. Brandenburg, J. F. Haggerty, V. C. Miller, M. Winter, and W. F. Galbraith. H. T. Porter, sec.-treas.; T. R. Hunt, supt.

Inc. July, 1919, in Colorado. **Cap.,** $2,000,000; $1 par; 700,000 outstanding. Annual meeting, second Tuesday in February.

Property: 77 claims, 10 patented, in Summit county, shows a fissure vein in granite and porphyry. Orebody is 400 to 700′ long and in places 13′ wide. Its course is N. E.-S. W., and dip 40 to 72°. Ore is a sulphide, averaging 11 oz. silver, 9% lead, and 15% zinc.

Development: about 900′ of workings. Mine is entered through tunnels of adjoining properties.

Equipment: includes 3-drill compressor and lease on a 100-ton mill, which is equipped with a flotation unit.

Company started operations late in 1919, and no production figures are as yet available

MONTEZUMA MINES & MILLS CO. **COLORADO**

Office: I. A. West, sec., 621 Equitable Bldg., Denver, Colo.

Officers: H. H. McCulloch, pres.-treas.; H. F. Baker, v. p.

Inc. in Colo. **Cap.**, $1,000,000; $1 par.

Property: 22 claims, 12 patented, and 29 patented mill-sites, covering 215 acres, in Snake River mining district, Summit county, Colo. Operations suspended in 1917, due to lack of funds. Company's indebtedness was reported as $51,409. Late in 1918 a mortgage was foreclosed, and by July, 1919, property had passed out of company's hands. The sale did not pay all debts, preventing dissolution of corporation.

MONTEZUMA SILVER-LEAD MINES, LTD. **COLORADO**

See St. Johns Mines (Colorado), Ltd.

Address: Equitable Bldg., Denver, Colo. **Office:** 38 Broad St. House, London, E. C. 2, England.

Directors: G. A. Williamson, chairman; H. Weld-Blundell; M. M. Dewar, G. O. Shepherd.

Inc. May, 1917. **Cap.**, £75,000, divided into 34,500 shares of 10% cumulative preferred at £1 par, and 170,000 shares of ordinary at 5s. par. Outstanding, 22,500 preferred shares and 142,000 ordinary shares, both fully paid.

Property: the St. Johns group of silver-lead mines, 1½ miles south of Montezuma, Summit county. This property was purchased from the St. Johns mines, Ltd. for £55,000.

The bulk of the ore is of milling grade, averaging about £5 per ton in value. The milling plant has been remodeled.

MOORE MINING & MILLING CO. **COLORADO**

Office: Sugar Loaf, Boulder county, Colo.

Developing claims on Sugar Loaf since 1914. Has driven a crosscutt tunnel 500′ to intersect veins of Livingstone dike, which company estimated to cut in 40′. Company also operating the September Morn group.

MOOSE MINES **COLORADO**

Reported owned by Louisiana-Colorado Mining Co., which see.

Property: at Alma, Park county, Colo., was sold in 1909 by the Patton estate, to H. W. Scott, who formed a company, which failed.

MORNING GLORY MINE **COLORADO**

Address: Jas. Harbaugh and A. B. Harbaugh, owners, Pitkin, Teller county, Colo.

Property: 12 claims, 120 acres, at the head of north fork of Quartz creek, said to show a number of veins from 4′ to 35′ in width, developed by tunnels. A 400′ tunnel is said to cut a 10′ vein assaying up to $107 per ton in gold and silver. An 800′ tunnel is said to cut a 35′ vein that will assay 4% copper in addition to 4′ of molybdenum ore, while a third tunnel, 190′ long, cuts a 4′ vein assaying $8 per ton in copper, lead and zinc.

Lessees working on property and shipments being made, at last reports.

MOSQUITO GULCH SILVER MINES CO. **COLORADO**

Office: 1214 Foster Bldg., Denver, Colo. **Mine office.** Alma, Colo.

Officers: M. L. Peters, pres.; W. Glaister, v. p.; W. A. Benzie, sec.-treas.; W. B. Brooks, mgr., with A. E. Mansfield, directors.

Inc. March, 1919, in Colorado. **Cap.**, 2,000,000 shares one mill. par.

Property: 4 claims, 30 acres, in Mosquito gulch, 2½ miles S. E. of Alma, Park county, known as Little Elva group consisting of Little Elva, Gold Coin, Fraction, and Little Edith claims.

Geology: limestone and quartzite on surface overlying schist and schistose granite, and cut by fissure veins containing free gold in a quartz gangue. Silver, lead, and zinc ores occur as replacements in limestone, and along contacts of sedimentaries with intrusive porphyry. Lead ore averages 23%, and carries about 12 oz. silver and 25% zinc.

Development: by 97′ shaft, there are about 30 shafts on property from 16 to 26′ deep. Equipment includes hoist and pump.

Company plans to develop two known ore strata, one at 26′ in limestone, the

other at 56′ in lime-porphyry contact; and later to sink to the Orphan Boy contact, which is said to cut the property.

MT. KELSO MINING CO. **COLORADO**

Office: 703 E. & C. Bldg., Denver, Colo. J. A. Marsh, pres.

Cap., $600,000; shares $1 par.

Property: 5 claims on Kelso mountain, Clear Creek county, and a one-fourth interest in the Tiger and Grafton claims,

Was in process of development, 1917-18, but only one shipment made.

MOUNTAIN FLOWER GOLD M., MLLG. & P. CO. **COLO.**

Office: 502 Corby-Forsee Bldg., St. Joseph, Mo.

Officers: C. J. Griswold, pres.; J. R. Jennings, v. p.; T. G. Sorter, sec.-treas.

Inc. 1907, in Arizona. **Cap.,** $2,000,000; $1 par; $1,384,000 outstanding, March, 1919.

Property: Mountain Flower group, 6 claims; Delta group, 10 claims; 2 mill-sites and Delta tunnel-site, 200 acres, at Deep creek, upper San Miguel district, San Miguel county, said to show a quartz vein in diorite and porphyry. Ore contains gold, silver, zinc, and lead.

Development: by 1,100′ of tunnels. Company reports 3 veins in Delta group and four in the Mountain Flower group.

Early in 1919, company was planning a 200-ton mill to use oil flotation. Judging by prospectus and other literature issued in 1917, company expected to develop an enormous body of ore. Some of the figures given are contradictory. Same management as Ocotillo Copper Co., which see.

MOUNTAIN TOP MINING CO. **COLORADO**

Address: Ouray, Colo.

Officers: Windsor Morris, pres.-treas.; G. H. Beebe, v. p.-gen. mgr.; G. H. Barnhart, sec., with E. C. L. Bartow, Carl Larger, W. E. Hopton and J. A. Mathews, directors.

Inc. Aug. 11, 1911, in Colorado. **Cap.,** $750,000; $1 par; $500,000 issued. Bonds authorized, $250,000; $146,000 issued.

Property: 12 claims covering 9,000′ along the N. extension of the Ouray county, 6 claims covering 9,000′ along the N. extension of the Smuggler-Union vein.

Geology: fissure-vein in andesite, showing ore with galena and gray copper, and carrying gold, silver, lead, and copper. Shoot is from 6 to 36″ wide and 500′ long. Mill ore reported to assay $30, and shipping ore over $200 net per ton.

Development: by crosscut tunnel 2,500′ long, with total of over 9,000′ of workings, to depth of 1,000′.

Ore reserves: given as 30,000 tons.

Equipment: includes compressor, 2,300′ tram and 50-ton mill employing 2 pneumatic flotation units. Plant is unique in that ore-treatment is all done underground in order to prevent snow-slides damaging mill. Extraction is 89%. All machinery is motor-driven. This plant was described by W. F. Wilcox in the "Scientific American" of December 13, 1919.

Mill turning out 3 tons of concentrates every 24 hours in 1919. A carload of ore sold in August was settled for $402 per ton. Similar ore is shipped about every six weeks.

MUDSILL GOLD-SILVER MINES CO. **COLORADO**

Mine office: Alma, Colo.

Officers: Senator J. B. Stevens, pres.; W. B. Brooks, v. p.; A. S. Frost, sec.-treas., with T. A. Thompson and Frank L. Loomis, directors.

Inc. in Colorado. **Cap.,** $400,000; 25c par; 1,000,000 in treasury.

Property: Mudsill group of 260 acres, in Sacramento district, near Alma, Park county, on London fault, which traverses the ground.

Up to 1893, property had produced in excess of $2,000,000. Adjoins the London mine with $20,000,000 production.

Company operating early in 1919.

MUTUAL CO-OPERATIVE MINING CO. COLORADO

Office: 507 First National Bank Bldg., Cheyenne, Wyoming and 515 Exchange Bldg., Denver, Colo.

Officers: J. F. C. Sievers, pres.; A. M. Startzel, v. p.; Frank E. Wire, sec.; L. E. Johnson, treas.; H. A. Wilcox, supt., with A. M. Startzell and F. E. Gibson, directors.

Inc. 1912, in Wyoming. **Cap.,** $2,500,000; $1 par; in treasury, Jan., 1919, 248,289 shares.

Property: 10 claims in Gold Hill district, Boulder county, including the Hoodoo and Columbus claims, 2¼ miles from Salina. Believed to own a ⅘ interest in the Golden Queen group, Kokomo, Summit county; also reported to have purchased 63 acres adjoining the Gold Queen, which gives tunnel site to railroad. In April, 1919, company reported that all the property was leased under bond to Denver men, except the Columbus claim, which was sold.

Development: by 600′ of tunnels, and an old shaft on the Hoodoo, which was cleaned out and retimbered in 1916. Quantities of milling ore are said to exist in old workings, and the vein is reported to be over 2′ wide, carrying 2% copper, with lead, gold and silver. The Kokomo properties in 1918 produced 54 cars of ore valued at $21,000. This mine is developed by 48′ shaft and 508′ tunnel, which cuts vein 400′ from portal. Company planned a lower transportation and drainage tunnel. The Silver Queen mine is the principal producer. Literature disseminated 1915-1918, regarded unfavorably.

NATIONAL FINANCE AND HOLDING CO. COLORADO

Office: Toledo, Ohio.

Reported to have taken over the Hinsdale county holdings of the Colorado & Connecticut Gold Mining Co., which see.

NATIONAL RADIUM INSTITUTE COLORADO

Property sold in 1919, to the Minerals Recovery Co., which see. Dr. Howard A. Kelly, pres., Baltimore.

Inc., 1913, in Delaware. Plant was operated by U. S. Bureau of Mines, but closed down when Bureau moved its Colorado branch from Denver to Golden.

NATIONAL RADIUM PRODUCTS CO. COLORADO

Address: Grand Junction, Colo.

Officers: Geo. Kunkle, pres.; A. B. Dillion, v. p.; W. R. Ennis, sec.-treas., with T. H. Jones and J. A. Osborn, directors.

Inc. Jan., 1916, in Colorado. **Cap.,** $100,000; $1 par; $71,000 outstanding.

Property: 18 claims, 360 acres, in Gateway mining district, Mesa county, Ore is a blanket deposit in sandstone yielding 1½% uranium oxide and 3% vanadium oxide. Output to 1919 was about 72,000 pounds of these metals.

Equipment: includes 10-ton concentration mill. Reported enlarging experimental plant to 200 milligrams of radium salts per month.

NEDERLAND-BEAVER TUNGSTEN MINING CO. COLORADO

Idle. Mail returned unclaimed, Sept., 1918, from Mining Exchange Bldg., Denver, Colo.

Officers: D. D. Shirley, pres.; W. M. Scott, v. p.; R. Woodworth, sec.-treas. Was to be incorporated in Colorado with capitalization $200,000 shares 10c. par; non-assessable. Pre-organization certificates offered to public early in 1916, at 3c. per share, with 5% discount for cash.

Property: company claimed to own 8 claims, 80 acres, in Nederland district, Boulder county, Colo., and that, "the surface showing is excellent and orebodies should be opened with a small amount of work. The stock is to be sold to provide a development fund to open the tungsten ore." Careful investors will certainly refrain from investing in this "Tungsten opportunity."

NEW ENGLAND EXPLORATION CO. (THE) COLORADO

Office: 14 Ashburton Place, Boston, Mass. Controls the Smuggler Union Mining Co., Colo., which see.

Officers: T. L. Livermore, pres.; Bulkeley Wells, v. p.; with R. L. Agassiz, directors. T. E. Sherwin, treas.

Inc. 1898, in Maine. **Cap.,** $2,000,000; shares $100 par; outstanding

1917, $1,875,700. Annual meeting first Wednesday in June, at Portland, Me. Stock transferred at company's office.

NEW ERA MINES **COLORADO**

Office: 31 State St., Boston, Mass. **Mine office:** Idaho Springs, Clear Creek county, Colo.

Officers: Benj. A. Howland, pres.; E. M. Sanger, sec.; Robt. H. McLaughlin, treas.; W. A. Gilman, mgr.

Inc. Nov. 8, 1915, in Maine. **Cap.,** $500,000; $1 par; 100,000 shares held in trust for treasury. Stock listed on Boston Curb. Paul Revere Trust Co., Boston, transfer agents. Annual meeting, second Monday in January.

Property: 15 claims, 3 patented, about 75 acres, and a millsite, 5½ miles from Idaho Springs, formerly owned by the Trail Mining Co., and worked during 1913-14 by the Calumet-Corbin Mining Co.

Ore: consists of a mixture of coarse galena, chalcopyrite and pyrite, containing gold and silver, with a quartz gangue and much siderite. Gray copper is abundant, while zinc blende is occasionally found. Five veins have been developed, with main workings on the Great Western and New Era veins. Selected smelting ore averages from $50 to $60 per ton, mainly in gold and lead.

Mine is said to have the extension of the Lamartine and Oneida veins, and is credited with a lead and gold-silver production of 2,361,000 lb. and $650,000 respectively. Developed by over 4,000′ of tunnels, crosscuts and shafts. Benj. F. Hall, in 1914, estimated 64,330 tons of ore in sight, valued at $415,382, based on an 85% extraction. Property reported on by Forbes Rickard.

No recent reports obtainable from company.

NEWHOUSE TUNNEL CO. **COLORADO**

See Argo Mining and Tunnel Co.

NEW LIFE TUNNEL & MINING CO. **COLORADO**

Office: H. A. Reinhart, Kentland, Ind.

Officers: William Darroch, pres.; E. D. Quigley, v. p.; H. A. Reinhart, sec.-treas.

Inc. in 1916 as a reorganization of the Hoosac Tunnel & Mng. Co., which company was in receiver's hands for many years. **Cap.,** 1,000,000 shares; 600,000 issued.

Company was issuing the proceeds from stock sales for paying off debts, notes, etc., of the old company, and was to resume mining operations when out of debt.

Property: 1 unpatented and 16 patented claims, 81 acres in Spanish Bar mining district, Clear Creek county, about 1½ miles west of Idaho Springs.

Ore: is quartz impregnated with iron and copper pyrite, also some lead and zinc. It requires milling and concentration, as the gold-silver values are closely associated with the pyrite. Veins vary from 6″ to 4′ in width, about ¼ being of high-grade material, the balance milling ore.

Development: by 200′ incline shaft said to show a vein carrying $10-$14 ore. Shaft is flooded below 50′ in depth. Main working is the Hoosac tunnel which has been driven 1,015′ on the Rising Sun vein. There are a few stopes, crosscuts and a 60′ winze, all said to show ore.

Equipment: includes compressor, drills, 10-stamp mill, classifier, and 3 Wilfley tables.

Management seems to be earnestly trying to rehabilitate company, but appears to need more capital to put mine on a paying basis.

No work has been done since May, 1918, on account of lack of funds. A 5% assessment, payable Oct., 1919, should have raised $300,000, paid off the $12,000 debt and enable work to be resumed.

NEWMAN LEASING CO. **COLORADO**

Office: Aspen, Pitkin county, Colo.

Officers: H. G. Koch, pres.; W. K. Hanson, sec.-treas.; H. C. Watson, son, gen. mgr.

Reported early in 1919 to have paid a dividend of $12,500, or 25% on the $50,000 capital originally invested.

Development: by 5,500′ main tunnel from which 3 inclined raises, 150, 200, and 900′, have been driven to cut the ore.

Production: 1,100 to 1,500 tons of $35 to $40 silver-lead ore monthly in August, 1919.

NIL DESPERANDUM MINES CO. COLORADO

Office: 15 Citizens National Bank Bldg., Boulder, Colo.

Officers: M. S. Brandt, pres.-mgr.; B. S. Sim, sec.-treas.; T. F. Sotham, directors.

Inc. 1916, in Colorado. **Cap.,** $300,000; 10c par, increased Nov., 1919, to $500,000, $1 par.

Property: a ten-year lease on the Nil Desperandum and Interocean properties, in all 65 acres, at Sunshine, Boulder county. Company reports vein to be 5′ to 15′ wide, about 4 miles long, averaging $42 gold, 1 to 5 oz. silver, also some vanadium.

Development: 350′ Nil Desperandum shaft, and 600′ Interocean shaft; workings total 3,000′.

Company has been reopening these old mines which will be operated through the American shaft, 525′ deep. The Interocean group is credited with production of $2,000,000; the Nil Desperandum with over $100,000.

OHIO AND COLORADO SMELTING & REFINING CO. COLORADO

Office: 822 A. C. Foster Bldg., Denver, Colo., and 61 Broadway, New York. Works: Salida, Chaffee county, Colo.

Officers: J. C. Kortz, pres.; H. V. Putzel, v. p.; Max Schott, sec.-gen. mgr.; J. B. Beaty, treas.; A. T. Thompson, supt.

Cap., $3,000,000. Is controlled by American Metal Co., Ltd., through ownership of 65% of the capital stock. The company is indebted to the A. M. Co. for over $1,000,000, but is not generally considered so valuable an asset.

Property: the Salida smelters 12,000 tons monthly capacity, doing a general custom business. It includes a 300-ton sintering plant, sampling mill, 4 lead blast-furnaces, 48x180″, and handles mainly silver-lead ores. The only copper treated is that bought with lead ores, which is concentrated to 40% tenor.

Company reports show 95,305 tons Colorado ores treated in 1918, yielded 12,460 oz. gold, 1,454,597 oz. silver, 9,603,089 lb. lead, and 1,241,353 lb. copper.

Smelter was closed indefinitely in February, 1920.

OHIO MINE COLORADO

Located on Shroek hill, Breckenridge, Summit county. The lessees, Biggins and Anderson, reported to have opened a streak of high-grade silver ore in 1918.

OLD HUNDRED MINING CO. COLORADO

Property inactive for several years prior to 1918; enquiries through various channels have been fruitless. Company probably defunct.

OLD TOWN M., M & TRANSPORTATION CO. COLORADO

Address: Idaho Springs, Colo.

Officers: Wm. L. Bush, pres.; Geo. K. Kimball, sec.-treas-mgr., with R. J. Davies, J. Ramsey Speer and J. B. Phillips, directors.

Inc. 1910 in Colorado **Cap.,** $1,000,000; $1 par; 738,302 outstanding. Annual meeting, first Monday in February. Company succeeded the Old Town Consolidated Mining Co., which itself was the successor of the Old Town Mining & Milling Co., both defunct. Property bought in at sheriff's sale for $60,000, in 1910 and reorganized under present name. Dividends since 1910 amount to $59,826.

Property: twenty-two patented claims in Russel mining district, Gilpin county, has the Old Town vein, carrying a paystreak of 4′ average width, with gold and silver-bearing copper ore.

Development: 2,205′ incline shaft with 4,326′ tunnel; over 5 miles of workings.

Equipment: includes hoist, pump, steam and electric power and air compressor.

Production: total production to 1916, $218,467. Company idle in 1917,

but in 1918 property was reported to have produced about $12,000 per month through the Becky Sharp shaft, operated by lessees.

In December, the mine was taken over by E. R. Clark and others of Colorado Springs under bond and lease; G. K. Kimball, in charge.

ONEIDA-STAGG MINING & MILLING CO. **COLORADO**

Address: H. T. Rogers, mgr., Idaho Springs, Colo.

Inc. 1914, as a consolidation of the Oneida and Stagg Mining companies. Mine at Freeland, 5 miles from Idaho Springs, Clear Creek county.

Development: by 1,000′ tunnel and a 150′ raise from the tunnel level, which cut a 5′ vein of gray copper ore, said to assay as high as 4% copper, 10 oz. silver, and 0.52 oz. gold. A 50-ton cyanide mill was erected in 1914 to treat the ore by the continuous decantation system, but was remodeled in 1915 to use oil flotation. Milling costs were placed at 85 cts. per ton of ore treated. Production from development work is said to have paid all operating expenses. No recent returns.

ONONDAGA MINES CO. **COLORADO**

Office: 717 Onondaga Bank Bldg., Syracuse, N. Y. **Mine office:** Georgetown, Clear Creek Co., Colo. Arthur H. Osborne, mgr.; T. Kyner, supt.

Property: the Onondaga and Colorado Central-Aliunde group on Leavenworth mountain, Georgetown. In the Onondaga, the Ruler vein 18″ wide, showing gold-silver-lead ore, is developed through the Capital tunnel and drifts run eastward on the vein at 3 different points. The Aliunde group has about 30 miles of underground workings, including the Hall and Doric tunnels; the latter will be advanced to intersect the Ruler vein of the Onondaga. The Aliunde is reported to have produced milling ore which yielded 275 oz. silver per ton in former years.

In 1918, new work on the 300′ level opened up 2′ of pyrite and steel galena, ore said to assay more than $75 per ton. Production is small as company is blocking out ore for future shipments.

Equipment: includes compressor, hoist and power plant.

OPHIR CONSOLIDATED CO. **COLORADO**

John M. Whitehead, Janesville, Wis., chairman bondholders' committee; other committeemen are: John R. Evans, Oshkosh, Wis.; Wm. Smith, La Crosse, and Wm. Voss, Watertown, Wis.

Property: fifty odd claims, including the Ophir gold mine, near Telluride, adjoining the Carribean mine on the east, and the Butterfly mine on the west. The Ophir was first opened about 20 years ago, but was idle 10 years, until present holders started operations.

Development: includes a 2,500′ tunnel and considerable work on several levels. Near the tunnel end an 800′ raise connects with the 6th level of the old workings. Recent work has opened up considerable milling ore.

Management plans organizing an operating company, capital about $500,000, to provide funds to develop the mine and remodel the old mill.

OPHIR GOLD MINES, MILLING & POWER CO. **COLORADO**

Succeeded Oct., 1915, by Ophir Range Gold Mining Co., which see.

OPHIR GOLD MINES & RED'N. CO. **COLORADO**

Address: J. M. Belisle, mgr., Telluride, Colo.

Inc. Aug., 1916, in Colorado. **Cap.,** $250,000; 10c par. One million shares paid for property.

Property: the New Dominion and April Fool mine at Ophir, San Miguel county, said to show ore in upper workings carrying gold and silver, with lead and zinc at depth.

Development: by 985′ tunnel and 1,100′ crosscut tunnel. By Sept., 1919, after doing 2,500′ of driving, a shoot of milling ore had been developed. Over $30,000 has been spent in development work. Management plans to install a flotation plant.

OPHIR RANGE GOLD MINING CO. **COLORADO**

Letter returned in 1917, from Ophir, San Miguel county, Colo., and mine probably closed down.

Company acquired the holdings of the Ophir Gold Mines, Milling & Power

Co., Oct., 1915. W. P. Day pres., Peoria, Ill.; A. W. Wilson, sec.; W. H. Staver, mgr.

Inc. July, 1915, in Colorado.

Operated a lease on the Suffolk mine, 300 claims, partly patented, at Ophir.

Ore: gold-silver, in fissure veins, traversing andesite and noted for its pockets of free gold ore.

Development: by several tunnels 500′ to 2,000′ long, with a total of 20,000′ of workings.

Equipment: includes 300 cu. ft. air compressor, 5,270′ tramway and 100-ton concentrating mill with 2 Wilfley tables.

Production: in 1915 amounted to 2,000 tons of ore. Concentrates averaged $15 per ton in gold and silver. No recent returns.

OPPORTUNITY CONS. GOLD MINING CO. COLORADO

Letter returned from 318 Century Bldg., Denver, Colo. Arthur Park, Jas. R. Hayes, L. W. Partridge, Francis B. Choate and D. L. Cubberly, directors, at last accounts.

Inc. 1915. **Cap.,** $500,000; $1 par.

Had a 3-year lease and bond on the London mine, comprising 12 claims, in Pine or Wisconsin district, Gilpin county, said to show well defined veins of gold-silver ore. Developed by 204′ shaft with 3 crosscuts, 140′, 250′ and 132′ in length.

Equipment: included a 10-stamp, 50-ton amalgamating and concentration mill and boarding house. Closed down since 1917.

O'REILLY GOLD MINING CO. COLORADO

Reported in 1915 that company was reorganized as the Marie Mining Co., and development continued. Owned the Bay State mine, near Breckenridge, Summit county, developed by a 300′ tunnel, showing auriferous and argentiferous copper ore.

OURAY CONS. MINING & REDUCTION CO. COLORADO

Office: Ouray, Colo. Presumably the operating company for the Ouray S. & R. Co., which see.

Officers: Thos. B. Crawford, pres.-treas.; C. J. Sigfrid, John Hayden, Richard Davis and J. R. Patterson.

Inc. 1916, in Colorado. **Cap.,** $5,000; one mill par; 2,000,000 outstanding.

Property: the Treasury tunnel group, near Red mountain, Ouray county, also a bond and lease on the Beaver, Belfast, and Ida L. properties. In 1919, company purchased 8 claims and 65 acres of placer ground near Ironton Park, including the Guadalupe, mine, formerly owned by the Brown Mtn. Smelting Co., and developed by 2,000′ tunnel and 500′ crosscut.

Equipment: 2 mills of 400-tons capacity with flotation unit and gravity concentrators. An aerial tram will connect the Guadalupe mine with one of the mills.

Company reports expenses of $30,000 for construction work and equipment. First shipment in April, 1918, reported to have yielded 64 oz. of silver and 27% copper per ton, with gross value of $8,000.

OURAY SMELTING & REFINING CO. COLORADO

Office: Hayden Bldg., Ouray, Colo. Thos. B. Crawford, pres.-treas., T. J. York, sec.

Inc. in Colorado. **Cap.,** $750,000; $1 par; divided into 185,000 7% preferred shares, 82,000 outstanding, and 562,500 common stock, 150,000 outstanding.

Was reported in 1916, to have taken over the Brown Mountain Smelting Co.

Property: 435 acres, patented, on the Uncompahgre river, 4 miles from Ouray county, which is presumably operated by the Ouray Cons. M. & S. Co., which see.

Development: by 250′ shaft and over 3,500′ of tunnel and drift work. The company being without funds in 1914, the mine was closed down, but was reopened in 1917. The 350-ton smelter at Ouray is idle. Company also owns a 75-ton custom mill.

PARAGON MINING CO. **COLORADO**

Address: Henry C. Demming, gen. mgr., 15 N 3rd St., Harrisburg, Pa. Is successor of Tirbircio Gold Mining Co.

Property: 400 acres of lode and placer claims near La Plata, La Plata county, is developed by 1,500′ of adits.

Equipment: includes rock crusher, electrical plant, a 50-stamp and a 10-stamp mill. Company was idle in 1917-18, but expected to resume operations in 1919.

PARK TUNNEL MINING & MILLING CO. **COLORADO**

Address: Aspen, Colo.

Officers: Robert Shaw, pres.; W. R. Foutz, v. p.; F. M. Yates, sec.-treas., with W. H. Cornwall, Ed. Turner, John Castellini, and H. O. Halleck, directors.

Inc. 1917, in Colorado. **Cap.,** $150,000; $1 par.

Property: 21 claims patented, about 180 acres, in Tourtelotte Park, 2 miles south of Aspen, Pitkin county, partly owned and partly held under lease.

Workings are on fault contact, said to contain a remarkable amount of low-grade bluestone ore.

Company plans to drive a 3,000′ tunnel at a depth of 700′ to develop all the mines, and install a tramway. Although the properties were worked for many years but little mining has been done in this particular section for nearly 25 years. The Camp Bird, Iowa Chief, Edison, and Best Friend claims, on which the company has leases, are reported to have produced $645,000.

PARKER GROUP OF MINES **COLORADO**

Address: John H. Meager, owner, Silverton, San Juan county, Colo.

Property: 5 claims, about 2 miles N. E. of Silverton, said to show a fissure vein in andesite-lime-porphyry formation, traceable at surface for several thousand feet. The ore is a sulphide, containing copper, silver, gold, iron, and molybdenum.

Development: by several tunnels and crosscuts. A prospect.

PASSIFLORA MINING & MILLING CO. **COLORADO**

Address: Westcliffe, Custer county, Colo.

Property: in White Hills district, produces iron-copper-lead sulphide, and is developed by 330′ shaft.

Six sets of lessees are at work, and company reports shipments of about 100 tons per week.

PAY ROCK SILVER MINES CO. **COLORADO**

Address: Silver Plume, Clear Creek county, Colo. E. L. N. Foster, mgr.

Mine idle since 1892; was discovered 1872 and is reported to have produced $2,000,000 worth of silver-lead and zinc ore.

Development: by a series of tunnels, connected by a 700′ winze.

Present company working since Sept., 1917, principally cleaning and retimbering the old workings.

PEERLESS CONSOLIDATED COPPER CO. **COLORADO**

Offices: 430 Symes Bldg., Denver, Colo.

Officers: J. A. Pate, pres.; W. B. Bishop, v. p.; F. B. Tiffany, sec-treas.

Inc. 1917, in Colorado. **Cap.,** $50,000; 1c par.

Property: 60 acres and tunnel-site, totaling 205 acres in Spruce Creek district, near Hillside, Custer county, Colo.

Development: by 2,200′ tunnel; deepest workings are 950′.

Equipment: includes compressor, blacksmith shop, etc. Company has expended $40,000 on development work.

PEERLESS MINING & MILLING CO. **COLORADO**

Address: Salida, Chaffee county, Colo. H. F. Schnelker, pres.-gen.-mgr.; I. W. Haight, sec.-treas., at last accounts.

Inc. Nov., 1904, in Colorado. **Cap.,** $500,000; $1 par.

Property: the North Pole group, 6 claims, 70 acres, with 10 acres timbered, on Cyclone mountain, in the Monarch district, 16 miles west of Salida,

showing several fissure veins in granite. Veins have auriferous and argentiferous lead and copper sulphides, with lead predominating.

Development: by 1,600′ crosscut tunnel and a 65′ shaft sunk on the vein.

PELICAN MINING & MILLING CORPORATION COLORADO

Office: 141 Milk St., Boston, Mass. **Mine office:** Lake City, Hinsdale county, Colo. Mine was developed by tunnel and equipped with electric power and air-compressor. No 1918-19 report obtainable; probably dormant.

PENNSYLVANIA MNG., POWER & REDUCTION CO. COLORADO

G. L. Levi, Philadelphia, Pa., v. p.-sec.; Leopold Sternberger, mgr. P. O. Box 972, Denver, Colo.

Inc. 1910 in Colorado. **Cap.,** $2,500,000; 600,000 shares in the treasury. Is a close corporation, owned by Leopold Sternberger and Estate of Samuel Sternberger. Owns entire stock issue of the Fall River Hydro Electric Power Co.; also the Lotus group of mines and property formerly held by Lucania Tunnels & Mines Co., which includes the Ludwig tunnel.

Property: lies between Fall river and Central City, Clear Creek and Gilpin counties, and includes the Pennsylvania group, 374 patented claims, including several millsites and placers, covering about 2,500 acres. Shows fissure veins with complex lead-zinc-copper ore, containing silver and gold, also uranium, molybdenum and tungsten. None of the mines were producers excepting the Lotus group which is reported to have shipped some ore until closed down by water.

Development: by shafts and adits, about 8 miles in all; including the 6,400′ Lucania tunnel.

Equipment: includes steam and water-power plants, air compressors. No production figures available.

PENNSYLVANIA MOLYBDENUM MINES CO. COLORADO

Address: 705 Johnstown Trust Bldg., Johnstown, Pa.

Officers: M. Dembinski, pres.; G. A. Farmer, v. p.; J. A. Sloan, sec.; S. G. Fetherman, mgr.

Inc. 1916, in Colorado. **Cap.,** $100,000; 10c par; all outstanding.

Property: 14 claims, unpatented, 150 acres, in Quartz Creek district, near Pitkin, Gunnison county, shows fissure vein 5 to 6′ wide, producing gold, silver, copper, and molybdenum, assaying $25 molybdenum and $5 gold, silver, and copper per ton. The Bon Ton claim was acquired early in 1920 for $15,000.

Development: 1,500′ tunnel, and total of 2,800′ of workings.

Equipment: compressor, 50-ton concentrator, and steam power. Company started operations in March, 1919, and has since opened some high-grade gold-silver ore.

PERIGO MINES COLORADO

Address: Perigo, via Rollinsville, Colo.

D. W. R. Kinney, mgr., and S. J. Gish were reported to have taken a lease and bond on the group.

Property: 44 claims in three groups and placer ground extending 2½ miles along South Boulder creek, owned by J. E. Lighthouse, the E. W. Williams estate, and Mrs. L. H. Potter. The mines are credited with a $2,000,000 production in the past, but have not been worked systematically for 40 years. Ore carries gold.

Lessees plan to operate both the 50-ton Gold Dirt mill and the 100-ton Perigo mill.

PHILADELPHIA MINES CO. COLORADO

Mine office: Montezuma, Colo.

Officers: E. F. Pooley, pres.; F. P. Rosengarten, v. p.; W. F. Wagner, sec.-treas., 16th and Indiana Sts., Philadelphia, Pa.

Inc. May, 1913, in Colorado. **Cap.,** $1,250,000; $1 par; 755,760 outstanding.

Property: 75 claims, 16 patented, about 365 acres, in Montezuma mining district, Summit county, carries a sulphide ore in fissure veins traversing Montezuma granite and porphyry, said to give average assays of 0.07 oz. gold; 8.7

oz. silver; 15.05% lead; 26.6% zinc. The main orebody is reported to be from 8″ to 8′ wide and 900′ long, running N. W., with dip of of 45°.

Development: by 6 tunnels, the 405′ Jumbo, 150′ Monitor, 450′ Tip Top, 1,490′ Philadelphia, 3,400′ Colorado-Toledo and 112′ Cross Lode, with total workings of 9,000′.

Equipment: includes compressors, electric power, and 100-ton concentrating mill, using a ball-mill and flotation plant.

Mine was leased in 1919 to Philadelphia Mines Leasing Co., after having been inactive for some time.

PHILADELPHIA MINES LEASING CO. **COLORADO**

Operates the property of the Philadelphia Mines Co., which see.

PILGRIM GOLD, SILVER & COPPER M. & M. CO. **COLORADO**

Address: O. L. Gage, mgr.

Cap., $350,000, par $1. Listed on Boston Curb.

Reported to have bought the Two Forty group, in the Russell district, near Central City, Gilpin county.

Development: by 1,000′ tunnel and 320′ shaft.

Equipment: includes a 10-stamp mill with flotation unit. A compressor was to be added.

PINE MARTIN MINING CO. **COLORADO**

Office: 934 Gas and Electric Bldg., Denver, Colo.

Officers: E. P. Young, pres.-supt.; B. F. Bachman, v. p.; Chas. B. Bovier, sec.; Wm. G. Krape, mgr.-treas., with G. B. Kemp, directors.

Inc. March 27, 1915, in South Dakota. **Cap.**, $250,000; 10c par; 1,139,400 shares issued. Annual meeting, first Wednesday in March. From Dec. 1, 1917, to Nov. 1, 1918, receipts were $1,953;; expenses, $1,823.

Property: 10 patented claims, about 50 acres, held under bond and lease, at Red Cliff, Eagle county, said to show a blanket quartz vein in porphyry-granite formation, carrying gold and silver values. The orebody strikes N. and is almost flat.

Development: by 8,000′ of old workings, mainly tunnels. Management estimated 300,000 tons of ore developed and on dumps. Company built 100-ton amalgamation-concentration and flotation mill in 1916; also a dam with 2,000′ pipe-line supplying mill with its own power. Started operations August, 1917.

During 1918 company acquired the Ground Hog dump, reputed the largest and richest in the district, and this is now going to the mill.

PINGREY MINES **COLORADO**

Address: O. A. King, mgr., Buffehrs, Colo.

Property: three separate groups of claims on Bartlett mountain, near Climax, Lake county, Colo. Three prospect tunnels develop molybdenite ore averaging 1% MoO_3, which experiments show will make 1 ton of 95% concentrate from 100 tons of ore.

Company was to put up a 500-ton mill near Climax, but its erection is said to have been held up by litigation.

PIONEER MNG., MILLING, POWER & TUNNEL CO. **COLORADO**

Address: Fred. H. Thompson, supt., Central City, Gilpin county, Colo.

Property: 7 claims, 5 patented, said to have 4 small veins showing gold-silver, copper and tungsten values, with porphyry hanging-wall and granite footwall.

Development: by 665′ tunnel and 400′ drifts, reported to have cut the Martin vein, in May, 1916.

Equipment: includes stamp-mill, compressor, etc. Company also owned 3¼ miles of patented placer ground and water-rights on Pine and Clear creeks to generate electricity. No recent reports.

PITTSBURGH MINE **COLORADO**

Address: Central City, Gilpin county, Colo.

Owned and operated by Cashier Gold Mining Co., which see.

POOR MAN MINING CO. **COLORADO**

Address: Caribou, Colo.

Property: operating in 1918, the Poor Man mine, north of Caribou,

Boulder county, Colo. The paystreak, reported as 1 to 2′ wide, consists of ore running 100 to 300 oz. silver per ton. Mill returns show a total production of $750,000.

POWERS MINING, MILLING & LEASING CO. COLORADO

Address: Robert Wilkinson, mgr., Black Hawk, Colo.

Company has taken a lease on the Powers mine in Russell district, Gilpin county, said to be a large copper producer.

Planned to purchase an air-compressor and electric pump.

POZO GILPIN MINING CO. COLORADO

Mine near Idaho Springs, Clear Creek county, Colo., has lead-copper ore mined for its gold and silver contents, by shaft and tunnel work. The Engineering Mining Co., operating a lease on the property, sank a 100′ shaft below the tunnel level. Work was suspended in Oct., 1915, pending addition of electric power to handle the water encountered in this work.

Equipment: includes steam power plant and compressor. No recent information.

PRECIOUS METALS CORPORATION COLORADO

Office: 109 W. 26th St., New York. Mines in Mill gulch, San Juan county, Colo.

Officers: Chas. E. Force, pres.-treas.; F. W. Force, v. p.-sec.; and A. Fricke, directors.

Inc. Nov. 7, 1905, in Colorado. **Cap.,** $5,000,000; shares $5 par, reduced in 1918 to $1,000,000. Columbia Trust Co., New York, registrar. Annual meeting, third Monday in November. Company owned the entire stock issue of the East Canada Smelting Co., Ltd., which owned the McDonald copper-sulphur mine at Weedon, Quebec. The Canadian holdings were sold in 1915 to Weedon Mining Co., Ltd.

Property: the Silver Crown group, 12 claims, 9 patented, and 4 mill sites, about 7 miles from Silverton; also the Forest and John mines, 9 miles distant, patented and freehold. Ore occurs in quartz veins in andesite, carrying lead and silver values. Developed by 2,500′ of tunneling.

Idle since November, 1914.

PRIDE OF THE WEST MINE COLORADO

Address: A. W. Harrison, mgr., Silverton, San Juan county, Colo.

Property: the Pride of the West and Green Mountain mines, in Cunningham gulch, 6 miles from Silverton. The latter mine is opened by a 1,500′ tunnel. At 600′ a raise was driven to the surface and is said to have cut rich ore at 1,250′.

Equipment: the old mill was remodeled to include flotation. Producing in 1918, but closed down Jan., 1919, owing to scarcity of labor and high costs.

PRIMOS CHEMICAL CO. COLORADO

Office; Primos, Delaware county, Pa.

Officers: Gideon Boericke, pres.; John J. Boericke, treas.; Harold Boericke, sec.

Inc. 1901, in Pennsylvania. **Cap.,** $500,000. Is the largest buyer and producer of vanadium, molybdenum, and tungsten ores in the United States.

Vanadium Department: company owns at Vanadium, Colo., about 5,000 acres of roscoelite bearing land, locally known as the Bear Creek property. At this place company operates a 400′ shaft and tunnels, mining both on its own account and through a large number of lessees. About 65 men are employed in the mine and 40 at the mill. The reduction plant at Vanadium was burned in March, 1919, but rebuilt by October.

The output of this property, together with that from the Placerville and San Pete properties, in San Miguel county, Colo., are treated in a local mill and the concentrate shipped to the parent company, at Primos, Pa. The properties are the biggest vanadium producers in America.

At Placerville, a two-bucket tram and a compressor plant were installed in 1918.

Molybdenum Department: operates the Urad mine, the first in America to be worked for molybdenite exclusively. It is in the Daily district, 11 miles

above Empire, Clear Creek county, Colo. Ore occurs in veins, is mined through tunnels and an open cut, the product being sacked and shipped.

Equipment: includes compressor, flotation mill and 2,400′ aerial tramway. Employs 125 men.

Primos Exploration Co.: subsidiary of the Primos Chemical Co. H. Boericke, gen. mgr.-pres.; G. Boericke, treas.; J. J. Boericke, sec.

Inc. Nov. 24, 1915, in Delaware, to explore for ores and minerals. **Cap.,** $200,000.

Primos Mining & Milling Co.: is a close corporation, controlled by the Primos Chemical Co., the largest dealers in rare minerals in the world. Same officers as P. C. Co., with C. F. Lake, v. p., and Harold Boericke, sec. and gen. mgr.

Company owns many properties at widely scattered localities, which are operated by different departments.

Company has large and extremely valuable holdings in Boulder Co., Colo., tungsten field, adjacent to Nederland.

Property: 1,680 acres, distributed over 5 sq. miles in the northern part of the Nederland district.

Geology: rocks are gneissoid granite and a granite schist, which grade into quartz and mica-schist. These rocks are cut by dikes of pegmatite in which the ores occur as veins and streaks, carrying ferberite, black tungstate of iron, in a matrix of quartz and feldspar and crushed rock. Veins run N. and S. and usually dip steeply, rarely as little as 45°.

The Conger is the principal mine, but two others are operated. At the Conger three veins are open, the Conger, Middle and East. The first two unite on their strike on the 450′ level, making a large orebody. Ore shoots are lens-shaped, and show rapid pinching and enlargement. On the 200′ level the vein has been stoped for a total distance of 800′, and a big ore shoot has been stoped for 250′ long, 90′ high, and 8′ wide.

Development: the shaft is said to be 1,100′ deep, making it the second deepest tungsten mine in the world, the Atolia in California coming first. Levels are about 100′ apart, and shrinkage stoping is employed. A working tunnel connects with the shaft at the 150′ level.

Equipment: includes hoist and 300 cu. ft. compressor. A two-mile tramway from mine to mill hauls ore in trains of five cars of 1½-ton capacity by 3½-ton storage battery motor.

The Quaker and Oregon mines, about 4 miles from Lakewood, have a relatively small output, which is delivered to the mill by wagon. The Lone Tree mine, half a mile from Lakewood, has a high-grade orebody, 100′ long, stoped for 70′ high and as much as 20′ wide. The Quaker shaft is 325′ deep.

The Primos mill, at Lakewood, treats 60 tons daily of 3 to 5% ore. It has a 100-ton bin for company ore, and six 15-ton bins for custom ore. After sampling, ore goes over 1⅛″ grizzlies, oversize to Blake crusher, then to 10 stamps of 1,000 lbs. each; delivering 3½ to 4 tons of 20-mesh pulp per 24 hours. Battery pulp goes to No. 6 Wilfley tables, making concentrates which are sent to settling tanks above Frue vanners, whose tailings go through settling tanks, with discharge to Dorr classifiers and sand to Prosser tube mill, whose product with part of settlers goes to Frue vanners. Tailings of vanners go to canvas tables. Milling practice produces concentrates carrying from 40 to 65% tungstic acid, with recoveries ranging from 65 to 85%.

In February, 1920, the Vanadium Corporation of America, which see, acquired all the holdings of the Primos company.

PRIZE MINING CO. **COLORADO**

Address: O. Barlow Willmarth, Montrose, Colo.

Officers: W. H. Gibson, pres.; M. J. Katz, sec.: A. S. Schafer, treas.: with De Witt C. Cohen, H. F. Dawes, Fred Rothchild, Edward Schafer and Henry Sidenberg, directors.

Inc. in New Jersey. **Cap.,** $250,000; $1 par; all issued. Annual meeting, April 25th, at Jersey City.

Property: 9 claims, 6 patented, 15 acres, in Gilpin county. Examined by E. E. Chase. Claims show a 4′ N. E.-S. W. fissure vein in granite. Ore is a sulphide containing gold and silver.

Development: by 1,500′ shaft with 6,000′ of workings.

Equipment: 37-h. p. electric hoist. No operating figures available.

PROGRESS MINING & MILLING CO. **COLORADO**

Address: R. D. McCausland, mgr., Frawley, Colo., and Equitable Bldg., Denver, Colo.

Officers: P. S. Smith, pres.; M. E. Peters, sec., with Wm. B. Brook and Martin Barber, directors.

Inc. in Colorado. **Cap.,** $2,500,000; $1 par. No balance sheet issued.

Property: 26 claims, patented, including the Wilson mine, Robinson group and Felicia Grace, Champion and New York leases, all at Robinson, Colo., 16 miles from Leadville, Lake county. Ore carries lead and zinc. Reserves estimated by T. H. Teal at 678,644 tons.

Development: by Robinson tunnel 3,000′ long, which attains depth of 1,200′ and exposes 4 ore shoots in 6′ to 10′ contact vein with incline shaft to open ground below tunnel. There are also 3 shafts, East, 650′, El Dorado, 650′ and the 1,200′ Wilson shaft opening ore at 1,040′ depth.

Equipment: 300-ton Wilson mill, which is idle.

The company is not, strictly speaking, a mining company, but rather an ore treatment enterprise, specializing in the separation of the complex zinc-lead-iron-silver-gold ores of Colorado in its 300-ton custom concentrator at Robinson. It controls, by contracts, the outputs of a large number of mines in the Kokomo district. However, the company also has mines of its own upon which it can rely in case of necessity. The company's first twelve carloads of lead-iron concentrates shipped gave average smelter returns of $33.73 per ton. When promotion was brought out in 1916, P. S. Smith, pres. of the company, estimated profits on lead-iron concentrates at $52,350 per month, promoters claiming 6,000,000 tons of ore blocked out that varied from $20 to $40 per ton.

Property: believed to have merit, but ore treatment is not as easy or as cheap as estimated. Has been much touted in newspapers and brokers' circulars. Presumably idle.

PUEBLO SMELTER **COLORADO**

Is owned by the American Smelting & Refining Co., which see.

PURITAN MINE **COLORADO**

Address: Geo. R. Stuart, owner, Alice, Colo., at last accounts.

Property: 78 claims, 46 patented, 330 acres, in Lincoln mining district, Clear Creek county, said to show contact and quartz veins, up to 26′ in width, in granite and schist.

Ore: is a sulphide, high in silica, from 20-30% sulphur, with gold, silver, copper and iron, gold predominating. Pay-shoot said to be 400′ long.

Development: by 4 tunnels, 1,320′, 500′, 190′ and 135′ long; also shafts 85′, 40′, and 35′ deep. Total workings about 3,825′. No recent returns.

PUZZLE LEASING CO. **COLORADO**

Address: William Keogh, supt., Breckenridge, Colo.

Property: the Puzzle mine in the Breckenridge district, Summit county, Colorado.

Development: by 500′ shaft and several thousand feet of drifting. In June, 1917, high-grade lead ore was shipped to smelter. Mill was overhauled in 1917. Extensive development reported in progress during 1918, but no exact figures obtainable from company. Examined by Forbes Rickard.

QUINTET MINING CO. **COLORADO**

Address: Sunnyside via Creede, Mineral county, Colo.

Cap., $50,000. Company is a holding corporation for the original company, Creede Quintet Co., whose 20-year charter has expired. New company was considering raising the capital stock to original $500,000 basis. Reported to have paid a dividend of 5c a month for December, 1917, and January, February and March, 1918.

Property: the Monon mine at Sunnyside, operated under lease by A. M.

Collins. Said to have shipped 600 tons per month of 100 oz. silver ore during 1918. The ore-body developed to a depth of 100′, is 80′ long and 20′ wide.

RADIANT MINING & REDUCTION CO. **COLORADO**

Address: H. M. Kingsley, Silverton, Colo.

Officers: H. M. Kinsley, pres.; A. B. McClave, treas.; O. L. Keen, sec.

Property: operating under lease the 27-claim group of the Ruby Mining Co., located in northern part of San Juan county, comprising 450 acres. Mine reported to have considerable high-grade silver ore. Some ore was being developed and shipped in September, 1919, but no definite information procurable concerning production.

Equipment: includes a 50-ton mill.

RADIUM COMPANY OF AMERICA **COLORADO**

Property: at Tidwell, 15 miles from Green river in Paradox Valley district, Montrose county, Colo., comprises a number of claims covering carnotite-bearing sandstone cut by quartz stringers. Carload shipments carried 2.24% uranium oxide and 3.87% vanadic acid. Described in U. S. Geol. Survey Bull. 530-K, p. 163.

RADIUM COMPANY OF COLORADO, INC. **COLORADO**

Early in 1919, name was changed from Schlesinger Radium Co. to present title.

Office: 2001 E. Colfax Ave., Denver, Colo., also 50 Union Square, New York City, N. Y. **Mine office:** Naturita, Colo.

Officers: Dr. V. C. Thorne, pres.; K. L. Kithil, v. p.-gen. mgr.; W. A. Schlesinger, v. p.-tech. mgr.; J. W. Thorne, sec.-treas., with S. B. Thorne, W. V. Hodges, and L. J. Hunt, directors.

Inc. 1915, in New York. **Cap.,** $600,000; $150,000 issued.

Property: 5 claims in Gateway district, Mesa county, and Paradox district, Montrose county. Contains blanket formations in horizontal beds, the ore being disseminated in sandstone. Ore occurs in pockets and vein layers, varying in each claim, except at the Rock Creek claim, where ore occurs in a fissure. Ore carries 2 to 5% uranium oxide, 1 to 9% vanadium oxide, and 2 to 10 milligrams of radium per ton.

Development: surface work, underground stopes, and tunnels. Total working ore about 2,000′.

Equipment: concentrator and chemical plant at Denver. Three buildings are used to house this chemical plant.

Production: 1,000 to 1,200 tons of carnotite ore per year, averaging $150 to $500 per ton in 1918. Recovery was over 85% of metals contained, at cost of $80 per milligram of radium extracted.

Uranium is recovered as a by-product in shape of sodium uranite and uranium oxide, and vanadium, also a by-product, as iron vanadate containing 40% oxide of vanadium.

The Cold Light Mfg. Co., which makes luminous articles, is a subsidiary of company.

RADIUM ORE SAMPLING CO. **COLORADO**

Address: O. Barlow Willmarth, mgr., Montrose, San Miguel county, Colorado.

Company owns custom sampler completed in 1918 and costing $12,000, to sample all kinds of rare ores, such as vanadium, tungsten, etc., and concentrates. A storage warehouse is connected with the sampler. It is reported that company does not assay, purchase, nor deal in ores. Up to September, 1919, the plant had handled 20 cars of radium-bearing ore.

RANDOLPH GOLD MINING, MILLING & TUNNEL CO. **COLO.**

Office: 741 Equitable Bldg., Denver, Colo.

Officers: W. A. Snyder, pres.; T. P. Fohry, v. p.; W. A. Skinner, sec.; W. C. Danks, treas.

Inc. 1918, in Colorado. **Cap.,** $1,000,000; shares $1 par; 525,000 outstanding. Bonds authorized, $100,000; $58,000 issued.

Property: the Gold Dirt mines on Carode mountain, Empire Clear Creek county, consisting of 45 patented lode claims and 3 placers, 430 acres in

all. Mine formerly owned by the Empire Tunnel Co., had been shut down for years because of litigation. Property bought in at trustee's sale. Ore contains gold, silver and copper.

Development: by two tunnels 2,700′ and 4,000′ long, greatest depth 600′. Past production of mine is said to be $1,000,000. Present owners claim 1,730,000 tons blocked out that will average $6.35 per ton. The Empire company received royalties from lessees amounting to $7,690, $22,270, and $30,000, respectively, in the last three years of operation.

Recent work in tunnel has been preparatory to operation on a large scale. A mill with concentration, flotation and amalgamation units is planned.

Equipment: includes compressor, transformer, blacksmith shop, and concentrating mill.

RARE METALS ORE CO. **COLORADO**

Office: 603 Symes Bldg., Denver Colo.

Officers: G. S. Wood, pres.; Nelson Franklin, v. p.-mgr.; Geo. A. Stahl, sec.; A. F. Zang, treas; S. B. Tyler, supt.

Inc. March, 1916, in Colorado. **Cap.,** $100,000; $1 par.

Is a subsidiary of the Vindicator Consolidated Gold Mining Co. of Cripple Creek. Owns a 75-ton custom tungsten mill at Rollinsville, Gilpin county, on the D. & S. L. R. R., 4 miles from Nederland. Equipped with crusher, rolls, ball-mill, jigs, Wilfley and Deister tables, classifiers, and Callow tanks. The concentrates produced averaged 60% in tungstic acid content. Probably shut down, 1919.

RAWLEY MINING CO. **COLORADO**

Office: 61 Broadway, New York. Chas. E. Beckwith, mine supt., Bonanza, Saguache county, Colo.

Officers: E. M. Davis, pres.; H. A. Millard, v. p.-gen. mgr.; N. H. Broughton, sec.-treas.; R. E. Cranston, cons. eng.

Inc. 1901 in Colorado **Cap.,** $2,500,000; $1 par; 1,903,679 shares outstanding. Annual meeting, third Monday in January.

Property: 64 claims, 400 acres, shows fissure veins in andesite, running N.-S., nearly vertical and about 6½′ in width. Veins carry argentiferous galena, bornite, and chalcopyrite, in a heavy sulphide smelting ore.

Development: mine is 1,200′ deep, with 10 levels and a total of 15,000′ of workings. Reserves estimated at 90,000 tons, that will assay 8.89 oz. silver per ton; 2.36% copper, 8.92% lead, 80c gold, and 190,000 tons additional on same ore-shoot. Ore from all levels is handled downward through a 3-compartment shaft to a crosscut tunnel 6,235′ long, and connecting with 1,200′ level.

Equipment: includes 20-mile power line, 2,100 cu. ft. compressor, 3-ton locomotives. Company plans to crush coarse ore at mine and transport it by 7-mile aerial tram, being constructed in 1919, to Shirley mill handling 125 tons daily.

A small force was working in 1919, company waiting for completion of tram before resuming full operations.

RAYMOND CONSOLIDATED MINES CO. **COLORADO**

Address: Dexter T. Sapp, pres., Gunnison, Colo.

Property: about 600 acres, includes the Raymond mine in Gold Creek district, about 5 miles N. of Ohio City, Gunnison county, said to have 2 ore-bearing veins.

Development: by 2,700′ tunnel and drifts.

Equipment: includes compressor, steam plant, and concentrating mill. Has been idle for years.

READY CASH MINING & MILLING CO. **COLORADO**

Company operated a mill at Robinson, Lake county, Colo., in 1918-19. In addition to handling its own ores, company purchased zinc-lead-iron ore suited to its system of concentration.

RED MOUNTAIN MINES CO. **COLORADO**

Subsidiary of Mary Murphy Mines Co. George E. Collins, mgr., Ironton, Colorado.

Property: operated several mines including the Yankee Girl, Genessee-

Vanderbilt, Robinson, and Joker tunnel properties at Red mountain, near Ironton, Ouray county, Colo. The main tunnel is in 2,250′.

Properties had been idle many years, but are said to have produced copper, lead, silver, and other metals, of a total value of $12,000,000.

Company has sub-leased the Yankee Girl dump and some of its properties. Small shipments were made in 1918, and a small mill has just been built.

RED STONE GOLD MINING CO. **COLORADO**

Address: 1135 10th St., Denver, Colo.; also 226 Walnut St., Ft. Collins, Colorado.

Officers: Paul Burkhart, pres.-treas.; H. Y. Maier, v. p.; A. W. Hausheer, sec.

Inc. March, 1909, in Colorado. **Cap.**, $300,000; $1 par; 217,653 outstanding.

Property: 4 claims and a lease on another claim, 100 acres altogether, 10 miles S. W. of Ft. Collins and ½ mile from Masonville, Larimer county. Claims carry a quartz vein in granitic schist, the vein running N. E. and dipping 85° and containing gold, silver, and copper ore. Mill concentrates assay about $11 per ton, but shipping ore runs about $30 per ton.

Development: by 240′ of underground workings including 40′ shaft and 200′ tunnel.

Company planned erection of mill in 1919.

RESOLUTE MINING CO. **COLORADO**

Address: J. A. Houghton, pres., 54 De Menil Bldg., St. Louis, Mo. **Mine address:** Rico, Dolores county, Colo.

Property: Telegraph, Newman and Expectation groups, near Rico, under development, 1918-'19. Mill, with flotation unit, planned.

REVENUE MINES CO. **COLORADO**

Address: Ouray, Ouray county, Colo.

Property: owned by A. E. Reynolds, of Denver. Includes the Cumberland, Revenue-Virginius, and Wheel of Fortune mines. Extensive development work was done in 1918, and the Cumberland mine shipped silver-lead ore. The Revenue-Virginius is credited with a total production of $26,000,000. The Wheel of Fortune mine, located in 1875, has been worked for varying periods and is to be operated with the Revenue.

The Revenue mine was optioned to the A. S. & R. Co., in May, 1919, but dropped in November.

REVILS MINING & INVESTMENT CO. **COLORADO**

Address: Silver Cliff, Custer county, Colo.

Property: the Hornsilver Consolidated mine just E. of Silver Cliff in the Hardscrabble district, operated under bond and lease. Ore carries silver and manganese.

REX GOLD MINING & MILLING CO. **COLORADO**

Properties are leased to Lincoln Mines and Reduction Co., which see.

Address: Cripple Creek, Teller county, Colo.

Property: about 35 acres, includes the Ironclad, Pard, Magna Charta, Quartzite, and Annex claims. While investigating potash deposits, manganese ore was uncovered in what is believed to be a blanket deposit, extending for perhaps 1,000′, with a width of 50′.

REY SILVER MINES CO. **COLORADO**

Address: Alma, Park county, Colo.

Mine is in Sacramento district, near Alma. Company reported in 1919 to be opening a 12 to 15′ silver vein, assaying $50 per ton. The strike is believed to be on the London fissure, which underlies several properties in that section. There are 31 sets of lessees working on the London on a tunnel and equipment planned for 1920. Late in 1919 200 to 300 oz. silver ore was opened.

RICHMOND HILL MINING, MILLING & LEASING CO. **COLO.**

Address: Aspen, Pitkin county, Colo.

Officers: W. H. Cornwall, pres.; C. E. Doolittle, v. p.; F. M. Yates, sec.-treas., with E. W. Layton and A. Johnson, directors.

Reported in 1919 to have secured a 5-year lease and option on the Little

Annie mine and mill. Dump was said to contain 5,000 tons of payable ore, besides 4,000 tons of ore broken in the mine.

RICO ARGENTINE MINING CO. **COLORADO**

Office: Mackintosh Block, Salt Lake City. **Mine address:** Wm. McCullough, supt., Rico, Dolores county, Colo.

Officers: F. W. Price, pres.; A. E. Rykert, v. p.; J. H. Woodmanses, sec.-treas.; S. A. King, J. E. McKnight and J. E. Frick, directors.

Inc. 1911. **Cap.,** $100,000; 10c par; 963,136 issued; assessable; assessment No. 6 of 1c per share levied January 4, 1917. Company is its own transfer agent and registrar. Listed on Salt Lake Exchange. During 1918, company paid off indebtedness amounting to $70,000.

Property: the Black Hawk and Argentine groups, 21 claims, 145 acres, mostly patented, adjoining the Rico-Wellington Mining Co. property.

Geology: alternating strata of limestone and sandstone, dipping at angle of about 30° and cut by almost vertical fissures of great extent and persistence. Where these fissures cross the soluble limestone they contain flat replacement deposits of sulphide ores, carrying copper, zinc, and lead, with gold and silver values. The ore shoots or bedded deposits are from 3-30′ thick. These fissures and the limestone are identical both in character and occurrence with those which are producing in the Rico-Wellington property.

Development: a new tunnel, 200′ lower than former workings, cut in 1917, a strong shoot of marketable ore carrying copper, lead and zinc, with good gold and silver content. This opening drained the main shoot through to a connection with upper workings. In 1918, it was reported that bismuth was appearing in some of the ore.

Production: for 1917, $100,000; the net smelter returns of which were $88,837. Of this, $47,576 was for ore shipped by company and $41,261, shipped by lessees. On January 1, 1919, company operations were suspended until September, but lessees continued shipping at rate of 1,000 tons per month.

It was reported late in 1918 that the Rico Consolidated Co. had brought suit against the Rico Argentine Mining Co. over apex-rights for wrongful extraction of ore, worth $900,000.

RICO CONSOLIDATED MINES CO. **COLORADO**

Owned by Jesse Knight interests of Provo, Utah. G. Garren, supt., Rico, Dolores county, Colo. Listed on Salt Lake City Exchange.

Property: adjoining the Rico Argentine on the N. E., is said to show a vein of copper-silver-lead ore 35′ wide in the upper workings. A tunnel was driven over 300′ to gain 140′ depth. Company has been making shipments, but they are not reported.

Company brought suit in 1918 against the Marmatite Leasing and the Rico Argentine companies, alleging that they had trespassed on the Allegheny lode. Company claims that 15,000 tons of ore valued at $60 per ton, amounting to $900,000, had been shipped.

RICO MINING CO. **COLORADO**

Reorganized as Syndicate Mining & Milling Co., which see.

RICO-WELLINGTON MINING CO. **COLORADO**

Address: Provo, Utah.

Officers: Jesse Knight, pres.; Chas. Read, v. p.; W. L. Mangum, sec.-treas.; R. L. Anderberg, asst. sec.-treas.; H. R. Trenholm, gen. mgr. Directors: Jesse Knight, J. W. Knight, Chas. Read, K. S. Jordan, W. L. Mangum, R. E. Allen, H. R. Trenholm. Albert Lofquist, supt.

Inc. August, 1911, in Utah. **Cap.,** $1,000,000; $1 par; 51% of stock owned by Knight Investment Co. Listed on Salt Lake Exchange.

Since the property was taken over by its present owners it has earned over $500,000, has invested $50,000 in a mill and expended $100,000 in development work. The debt of $150,000 advanced for this equipment and work was paid off in 1916. Present debt of company, 1919, for development, is $50,000.

On April 25, 1917, No. 1 dividend of 1½c per share was paid, followed by similar amounts in May and June. On July 25, 4c was paid. The total is $39,000.

Property: the Wellington mine, at Rico, which contains ore-shoots formed by replacement and contact metamorphism in the limestone beds of the middle member of the Hermosa formation. In 1914 a flat deposit of zinc-lead ore was cut. It lies parallel to the Black Hawk fault. To the north the orebody is cut off by a cross fault parallel to the Nellie Bly fault, the orebody north of the fault being 170′ below. Across the Black Hawk fault a copper deposit, replacing limestone and broken by several faults, has been opened, the ore carrying good copper and silver values.

Development: consists of about 22,000′ of underground work, reported to expose large amounts of lead-zinc and copper ore. Exploration is devoted to the Black Hawk and Iron veins, two great ore-bearing fissures, traversing the property N. W. and S. E. In these the ore makes in lime beds that look almost like coal deposits, and as many as 5 and 6 beds, one above the other, have been opened. At 2,500′ from portal of Mountain Spring tunnel and about 270′ below Wellington level, copper ore was opened in 1919. The better grade of ore is 3½′ wide, averaging, it is said, about 9% copper and 14 oz. silver, or $35 per ton.

Equipment: includes a 2,500′ tram to the Rio Grande railroad, handling 50 tons per hour at a cost of 23c per ton. The 100-ton mill, formerly belonging to the Pro Patria Co. and leased for 5 years, was remodeled at a cost of nearly $30,000. A tube-mill, 5 Deister tables, 6 Callow tanks, 2 Callow screens and electrical equipment were installed in 1918. A compressor costing $4,000 was erected.

Production: for 1917, 424 tons of copper ore, 1,826 tons of lead-zinc, 709 tons iron sulphide, and 1,687 tons lead-silver, all dry weights, net value, $105,589. Cash on hand, December, 1917, was $2,395. No work is reported for 1918, but company was again operating in 1919, and had shipped 300 tons of pyrite to the East, by April 1st, 1919.

Property is a good one and, being managed by Jesse Knight, the company is assured of skilful, economical and up-to-date operation.

RILLA MINING CO. **COLORADO**

Address: Arthur J. White, 68 Devonshire St., Boston, Mass., and Breckenridge, Colo.

Officers: Wm. A. Irving, pres.; Edson W. Noyes, v. p.; Frank S. Sinnick, sec.-treas., with Samuel Klous and Geo. S. Sinnick, directors.

Inc. Feb. 18, 1915, in Colorado. **Cap.,** 1,000,000; $1 par; 500,000 in trust, 177,000 shares listed on Boston Curb, January, 1916. Annual meeting, third Wednesday in January. Company is practically a reorganization of the O'Reilly Gold Mining Co., capital being reduced from $2,500,000.

Property: the Bay State group, 13 claims, 65 acres, on the north slope of North Star Mt., 8 miles from Breckenridge, Summit county, said to show copper, silver and gold ore in fissure veins in diorite and porphyry. The Witch Hazel vein is 8′ wide.

Development: tunnels, 1,300′, 200′, and 60′ in length. In the 1,300′ tunnel a 200′ crosscut was said to have cut a 6′ vein of copper ore. Management claimed that $125,000 had been spent on development work. No ore reserves given.

Equipment: 330 cu. ft. air-compressor, electric power. Future plans provide for 100-ton mill and 2 additional compressors.

It is a tunnel proposition. No recent returns.

RITO SECO GOLD MINE **COLORADO**

Fifty-one per cent. of stock owned by Assets Realizing Mines Corp. of California, which see.

Property: about 800 acres, patented, near San Luis, in Costilla county, Colo. From about 11½ acres, over 2,000 tons have been shipped averaging $3.36 gold and 25c silver per ton. Company expects same value from 200 acres.

Development: company reports "a body of ore about 600′ wide and 4,500′ long, proven to a depth of 125′," and that 37 shafts, tunnels, crosscuts and drifts have proved 5,900,000 tons of ore, which will be mined by steam shovel and will be treated in a flotation plant, to have a capacity of 1,250 tons daily. The

by-product is pyrite, said to run 35% sulphur and devoid of zinc, lead, antimony or arsenic, making it valuable for sulphuric acid.

Water power 3 miles from mine is capable of generating 1,500 h. p.

The Assets Realizing Mines Corp. reports that the owners of the other 49% of the stock will furnish $500,000 to build the mill, etc.; that $200,000 has been paid, and $100,000, is due in June, 1920.

ROANOKE MINING & MILLING CO. **COLORADO**

Office: 221 Foster Bldg., Denver, Colo.

Officers: E. LeN. Foster, pres.-treas.; F. G. Warden, v. p.; W. C. Johnston, sec.

Inc. in Colorado. **Cap.,** $100,000; 10c par; all outstanding.

Property: 11 patented claims, in Clear Creek county, Colo., containing gold, silver, bismuth, and lead ore in a fissure vein in granite. Ore is a sulphide almost 2′ wide, and runs N. 60° E. Said to assay 10 to 2,000 oz. silver, 30% lead, and 0.2 oz. gold per ton.

Development: by tunnel 900′ long, and total of 3,000′ of workings.

Property has not been operated for 20 years, but company plans driving a crosscut tunnel to intersect vein at 400′ depth.

ROCKY MOUNTAIN GOLDFIELD MINING CO. **COLORADO**

Offices: Denver, Colo., and St. Elmo, Chaffee county, Colo.

Property: the Hayden, San Diego, Little Johnny and Nellie claims, at Barren mountain, Chalk Creek district, Chaffee county, said to carry several veins whose outcrop is owned for 4,500′. The mine is near several producers, including the Mary Murphy, credited with a $25,000,000 production.

Development: 600′ tunnel and 80′ shaft on Hayden vein, and shallow shafts on others. The Nellie has made shipments of $40 ore. A 150-ton concentrating mill at St. Elmo treated the ore. No recent returns available.

ROSS MINING & MILLING CO. **COLORADO**

Idle many years.

Office: Ross Bldg., Waynesburg, Pa. Mines at Silverton, San Juan county, Colo. Company sub-leased the Champion mine, which it controls, in 1918, to Cassagranda & Co. The company has had much financial trouble, like its predecessors and collateral relatives in a chain of promotions, all fully described, Vol. XI, Copper Handbook.

ROYAL GEM MINING CO. **COLORADO**

Address: Guy Adams, Boulder, Colo., and E. C. Wenzel, mgr., Caribou, Colo.

Property: 7 claims, 40 acres, purchased in 1916 from W. B. Baker, by present company, a New Orleans concern. Claims are Sago, Mammoth, Royal Gem, St. Riter, St. Paul, Index, and Camp Bird, located near Caribou, Boulder county. Sixteen shafts have been sunk and payable silver ore reported opened.

ROYAL TIGER MINING CO. **COLORADO**

J. A. Traylor, mgr.; T. A. Braun, supt.

Property: company owns and operates the Royal Tiger mine, formerly known as the I. X. L. mine in Swan valley, 9 miles north of Breckenridge, Summit county. Vein is said to be 50′ between walls carrying lead, silver and bismuth.

Reported in May, 1919, that company had purchased the Cashier group of the Cashier Mining & Milling Co., comprising four claims, about 25 acres, in Brown's gulch, near Breckenridge, and has produced $125,000 gold and concentrates to value of $25,000.

Company has been using small mill, but plans a new 300-ton mill.

RUBY KING GROUP **COLORADO**

Option on this group was secured in 1918 by the Mogollon Mines Co., New Mexico, which see.

SACO DE ORO MINING CO. **COLORADO**

Address: Barrick-Dollison Co., fiscal agents, 512 Mack Bldg., Denver, Colo. Chas. E. Barrick, pres.-gen. mgr., Apex, Colo.

Cap., $20,000; in 1918 an offering of 50,000 shares was made at 10c each.

Property: 5 claims, about 15 acres, near Apex, Gilpin county, Colo.

Shaft has been sunk 215′. Property said to show fissure veins carrying gold, silver and lead ore.

Equipment: compressor, hoist and electric plant were added in 1919. It is hoped that the mine will warrant its name.

ST. JOHN MINES (COLORADO), LTD. **COLORADO**

Address: Edwin H. Platt, mgr., Equitable Bldg., Denver, Colo. M. F. Bremer, sec., 38 Broad St. House, London, E. C. 2, Eng. Directors: Geo. A. Williamson, chairman; J. O. Shepherd, Chas. P. Winterton, M. M. Dewar.

Inc. Feb. 13, 1913. **Cap.,** £75,000; 5s. par; all issued and fully paid.

Property: company was organized to acquire from E. L. A. Munby and E. J. Munby, the St. John silver-lead-zinc mines, 19 claims, 100 acres, together with concentrator, located on the west side of Glacier Mt., 1½ miles south of Montezuma, Summit county. Purchase price was £58,250, payable £3,000 cash and £30,000 in fully-paid shares for the property and £20,000 cash and £5,250 in full-paid shares to the promoters, the Tres Forcas Synd., Ltd.

During 1917 the company's property was sold to the Montezuma Silver-Lead Mines, Ltd., for £55,000, out of which the mortgage debt was discharged. The corporation is now a holding company, whose chief asset is 40,000 ordinary shares of the Montezuma S.-L. Mines, Ltd.

The company also owns 50 acres timber land within a mile of the mining property.

Company formerly held an option on the Revenue Tunnel group of mines, 600 acres, in the Ouray district, including the Virginius mine, reported to have 400,000 tons of stope fills and 50,000 tons probable ore below the tunnel level. The purchase price of this property was to be $187,000, with final payment of $42,223 due July 1, 1917. To provide for further payments a loan of £25,000 was authorized, £21,000 of which was subscribed. The loan carried 7% interest. The undeveloped portion of this property was sold in November, 1915, for $75,000. Early in 1919, the Revenue mines were said to be in operation under management of their owner, A. E. Reynolds. No information could be secured from the St. John Mines Co.

In September, 1915, a 1/3 interest was acquired in the Hilltop mine at Leadville, said to be producing high-grade zinc carbonate ore, £8 to £9 per ton, until forced to close temporarily owing to the weather; the mine is at an altitude of 13,000′.

The company also held a 2/5 interest in the Ruby mine at Leadville. Production started in December, 1916, and in February was returning a profit of £40 per day. A lease was also held on the Shamrock, Mt. Sneffels and Lake claims.

No recent returns obtainable.

ST. LOUIS-COLORADO MINING CO. **COLORADO**

Believed to be idle; mail returned unclaimed, 1918, from Leadville, Colo.

Officers: D. W. Almond, pres.; S. Davies, v. p.; F. D. Allen, sec.-treas.; with E. Saunders, directors.

Inc. March 3, 1915, in Colorado. **Cap.,** $500,000; $1 par; 300,000 issued.

Property: 16 patented claims, 320 acres, in Lake, Pitkin and Chaffee counties, 15 miles S. W. of Leadville.

Development: by 3 tunnels, 50′, 125′ and 300′ long, which opened a vein carrying gold, silver, copper, and lead.

ST. PAUL MINING & REDUCTION CO. **COLORADO**

Address: Silverton, San Juan county, Colo. Norwood Johnson, pres. and treas.; J. B. Ross, v. p. and gen. mgr.; Frank L. Ross, sec.

Inc. March, 1908, in Colorado. **Cap.,** $100,000; shares $1 par.

Property: the St. Paul group, in the Red Mountain district, an old mine that formerly shipped some ore netting $1,000 per carload. The mine has a 300′ shaft, with levels at 200′ and 300′, developing small but rich ore shoots, said by former management to carry 8% copper; 10% lead, 10% zinc, 5 to 10 oz. silver and 1 oz. gold per ton. Since 1914 the mine has been worked by lessees. At last accounts, shaft was said to be in ore averaging $6 a ton. During 1918 an electric hoist was installed.

SAN ANTONIO MINING CO. **COLORADO**

Company has been idle for several years, but property has been operated by the Summit Copper Mining & Milling Co., which see.

SAN JUAN QUEEN GROUP **COLORADO**

Address: Rasmus Hanson, Silverton, Colo.

Property: in Picayune gulch, Treasure mountain, Eureka district, San Juan county, about 1½ miles from Picayune and 12 north of Silverton. There are six veins in andesite. The Sandiago vein has 3½′ of ore in a 50′ vein, assaying 0.3 oz. gold and 3.7 oz. silver. The Atlantis-Watsika veins average $2 gold and 62.9 oz. silver. The San Juan veins shows 6″ to 2′ of ore, a mixture of pyrite, galena and tetrahedrite in dark quartz. The Sunnyside and Gold Grained veins are cut by a diabase dike, favorable in size and value.

Development: by about 5,100′ of workings.

C. W. Purington, in a report dated August 25, 1906, estimated possible reserves as 1,742,857 tons, averaging $7 per ton, or a total value of $12,000,000.

SANTIAGO CONS. MINING, MILLING & TUNNEL CO. **COLO.**

Office: Georgetown, Clear Creek county, Colo.

Officers: Mrs. S. F. Glass, pres.-treas.; Mrs. E. J. Smith, v. p.; S. F. Glass, sec.

Inc Feb., 1906, in Colorado. **Cap.,** $600,000; $1 par; 594,101 shares outstanding.

Property: 20 claims, of which 13 are patented, 100 acres in all, near Georgetown, Clear Creek county. Has a fissure vein, averaging 1½′ wide, carrying sulphide ore said to run 2 oz. gold, 300 oz. silver, 10% copper and 30% lead in sulphide.

Development: by 600′ shaft and tunnels 200′ to 1,200′ in length, workings totalling 25,000′. In 1918, a lessee on No. 4 level mined 200 tons of ore carrying 2 oz. gold, 65 oz. silver, 9% copper, and 23% lead. On No. 7 level, an orebody about 10″ wide was opened for about 150′. Company claims to have 100,000 tons of ore in reserve, with 300 tons blocked out.

Equipment: includes electric hoist, tramway, and sampler. Mine is worked both by lessee and on company account.

Production: from January, 1911, to December, 1918, was $247,653, the average grade being about $50 per ton.

SARATOGA MINING CO. **COLORADO**

Office: Union Trust Bldg., Detroit, Mich. **Mine office:** Idaho Springs, Clear Creek county, Colo.

Officers: F. L. Colby, pres.; Chas. R. Dunn, sec.; E. W. Pendleton, treas., with Edwin Lodge, directors. John Owen, gen. mgr.

Inc. Nov. 18, 1911, in Colorado, as the successor of the Clear Creek Mining & Reduction Co. **Cap.,** $300,000; $10 par; issued, 20,024 shares.

Property: the Saratoga-Gaston group and the Cyclops claim, at Russell gulch, opened through the Newhouse tunnel.

Equipment: includes steam power.

In August, 1917, lessees were treating dump ore, but could only operate a few months on account of scanty water supply. No later returns received.

SCEPTRE MINES & MILLS CO. **COLORADO**

Address: Georgetown, Colo.

Cap., $75,000; shares $1 par.

Property: reported operating under least the Sceptre mine, of the Sunburst Consolidated Mines Corp., which see. Property located on Democrat mountain, near Georgetown, Clear Creek county. Equipment includes an aerial tram 6,935′ long.

SCHLESINGER RADIUM CO. **COLORADO**

Name changed, early in 1919, to Radium Co. of Colorado, Inc., which see.

SEATON MINING & MILLING CO. **COLORADO**

Address: Cincinnati, Ohio. H. E. Machol, supt., Idaho Springs, Colo.

Property: the old Seaton mine on Seaton Mountain, near Idaho Springs, Clear Creek county. Mine re-opened, 1916, through Argo tunnel and 650′ raise was to be put through from west drift on Seaton vein to connect with Foxhall

tunnel. The Seaton vein is cut at 6,007′ from entrance to the Argo tunnel. No recent figures obtainable.

SEDALIA COPPER CO. **COLORADO**

Address: C. H. Swanton, sec., Canon City.; D. A. Freeman, pres., Boston, Mass.

Inc. 1899. **Cap.,** $1,000,000; shares $10 par.

Dividends reported paid in 1900, when shares were sold at $10, declining to $1.

Property: 40 acres, patented, 7 miles from Salida, Chaffee county; shows 35′ ledge of pyritic copper-zinc ore carrying 2.75% to 12% copper, 750′ below outcrop. Upper levels show large amount of oxidized ore.

Whittemore Bros., shoe polish manufacturers, originally interested. Property formerly leased to Salida Gold & Copper Mining Co., succeeded by Shawmut Consolidated Mining Co., succeeded by Salida Copper Co., all now dead. The Shawmut Co. purchased the leaching plant and remodeled it for a 50-ton ore concentration mill.

Development: by shaft and tunnels, aggregates 4,000′. Is an old property, operated by the Hidden Treasure Mining & Leasing Co., at last accounts.

SEVEN METALS MINING CO. **COLORADO**

Mine office: Georgetown, Colo.

Officers: E. T. Wilcox, pres.-treas.; James McGee, v. p.; J. J. Weber, sec.; John Hanson, supt., and W. T. Brooks, mgr.

Cap., $1,000,000; $1 par. Listed on Boston Curb.

Property: in the Argentine district, Clear Creek county, embraces the Stevens group, Centennial mine, and mineral rights to the Tobin vein between the Stevens and Centennial. The latter is said to have a vein 5 to 20′ wide, showing for 1,500′, having value in silver, gold, and copper.

Development: by 900′ tunnel in the Stevens; 2 tunnels in the Tobin, one 1,500′ long and 1,600′ below top of mountain, and the other 200′ long 700′ below apex; the Centennial is developed to a depth of 1,000′.

Equipment: at Stevens includes concentrating mill, compressor, and hydro-electric power-plant.

Production: the Stevens group is credited with a production of nearly $2,000,000 worth of silver, when it was 65c an ounce.

This company has been much advertised by T. W. Lawson of Boston, who operated a pool that boosted the stock for awhile, and presumably sold out their holdings.

SHAFTER MINING CO. **COLORADO**

Office: 1 Broadway, New York. **Mine office:** Idaho Springs, Clear Creek county, Colo. M. S. Payton, pres.; Chas. D. Ross, sec.-treas.

Inc. 1880, in New York. **Cap.,** $100,000; shares $100 par.

Lands carry copper ores with value mainly in gold.

Development: by an 800′ shaft and a 5,500′ tunnel. Has been idle for several years.

SILVER CANYON MINING CO. **COLORADO**

Office: 722 Foster Bldg., Denver, Colo.

Officers: G. D. McAlpine, pres.; Dr. Henry Halm, v. p.; W. N. Geis, sec.-treas., with H. V. Immo, Emil Peltonie, A. W. Jurma, N. N. Puonavara and H. W. Mikko, directors. W. J. Hockin, supt.

Inc. July, 1916, in Colorado. **Cap.,** $1,000,000; $1 par; in treasury 79,457 shares; 808,116 shares held in escrow. U. S. Corp. Co., registrar and transfer agent. Listed on New York Curb.

Property: 45 claims in three groups—Bear Creek, Swamp Canon, and Chapman gulch, including the Highland Mary mine at Swamp Canon, San Miguel county. The Swamp Canon is said to contain ore running 6 to 8 oz. silver and 2 to 2½% lead ore. The Chapman Gulch mine shows a vein 1 to 5′ wide, carrying 50c gold, 6 oz. silver, and 5% zinc. Properties are about 2 miles N. E. of Ophir and 5 miles south of Telluride.

Development: by 2 tunnels, the upper 1,400′ and lower 1,600′ long, and several thousand feet of workings. Mine has been in operation since 1899.

Equipment: includes a 24-stamp mill. A total of $450,000 is reported to have been spent on development, etc.

SILVER CITY MINING CO. **COLORADO**

Address: J. H. White, supt., Ouray, Ouray county., Colo.

Property: near Ouray. In Dec., 1919, there were 25 men employed erecting boarding and bunk houses for 80 men, saw mill, power plant, and compressor. A lower tunnel was also projected. Production is to commence in the spring of 1920.

SILVER GEM MINING CO. **COLORADO**

Company incorporated in 1918 by J. L. Grant, F. E. Wilson and E. M. Carlson, with capital of $500,000. Said to have purchased the Silver Horn property on Ute creek, near Idaho Springs, Clear Creek county. Company expected to start operations in May, 1919.

SILVER GLANCE MINING CO. **COLORADO**

Address: Louis Sigmund, pres., Coaldale, Fremont county, Colo.

Property: This is a new company incorporated in 1919; 4 gold-silver claims at Coaldale, from which shipments have been made from time to time.

SILVER GULCH MINING & MILLING CO. **COLORADO**

Office: 1023 St. Paul Ave., Milwaukee, Wis. **Mine office:** Dunton, Colo.

Officers: C. H. Koenig, pres.; Robert Rom, sec.-treas.; with Henry Indra and Matt. Jacobsen, directors. E. C. Koenig, supt.

Cap., $250,000; shares 10c par.

Property: 7 claims, unpatented, known as the Rosebud mine, in the Lone Cone district, Dolores county. Mine shows a fissure vein, about 4′ wide, in sandstone, containing gold, silver, copper and lead sulphides. Course runs N. E.-S. W. with dip of 95°.

Development: by about 900′ of tunnels, blocking out 1,000 tons of ore.

Equipment: includes 2 concentrating tables. In Oct., 1919, a 50-ton flotation mill was in course of construction.

SILVER LAKE MINES **COLORADO**

Owned by American Sm. & Ref. Co. R. P. Reynolds, supt., c/o A. S. & R. Co., Durango, Colo.

Property: 143 patented claims in the Animas mining district, Silverton, San Juan county.

Ore: carries gold, silver, lead, copper, and zinc in fissure veins in andesite. Vein dip 70°, and have an E.-W. strike. Ore reported to occur in shoots from 1x20′ to 8x1,200′, and said to assay 0.20 oz. gold; 6 oz. silver; 2.5% lead; 1% copper; 3.5% zinc.

Development: by tunnels, the two longest 12,000 and 7,500′; greatest depth of workings 1,700′ below surface; total workings, 165,000′.

Equipment: includes 2 air-compressors, aerial tram, and a 450-ton mill equipped with flotation plant.

Mine has been worked by lessees since 1911, but production figures are not obtainable.

SILVERMANE MINES CO. **COLORADO**

Office: Chicago, Ill. **Mine office:** Lake City, Colo. R. A. Ralph, supt.

Inc. in 1919; a close corporation.

Property: 14 claims, patented, 7 miles west of Lake City, Hinsdale county. Shows gold, silver, copper, and lead ore in a fissure in rhyolitic and andesitic breccia. There are 3 pay-shoots, one 250′ long, and two each 100′ long. Orebody is from 9″ to 4′ wide. Ore assays 25 to 100 oz. silver, 20% lead, 3% copper and 0.1 oz. gold per ton.

Development: by tunnels, 1,140′ and 200′ long; also 4,030′ of workings. The inclined shaft is 620′ deep and connects with the tunnel.

Company said to have been recovering old workings and blocking out new ore. Property promising, but?

SILVER MOUNTAIN MINING CO. **COLORADO**

Address: 604 Denham Bldg., Denver, Colo.

Officers: A. J. Hoskin, pres.; Eugene Perley, v. p.-mine mgr.; D. C. Stratton, sec.-treas., with C. W. Savery, directors.

Inc. in Colorado. **Cap.**, 2,500,000 shares; one mill par; non-assessable, transferred at main office.

Property: 3 claims, Chief, Ruby Silver, and Funston, a bond and lease on the Black Jack, and an option or agreements on Little Silver and other adjoining properties, all situated on Silver mountain, near Blackhawk, Gilpin county, Colo.

Development: 185′ Black Jack shaft and considerable drifting. Ores contain gold, silver, and lead. A 9-ton trial shipment realized $110 per ton net, from smelter. Another lot of 20 tons gave $192.11 per ton net. Regular shipments were expected by June, 1919. Mine has produced $20,000 from upper levels. A car of ore shipped late 1919 yielded $4,569.

The C. W. Savery Securities Co. of Denver, in November, 1919, advertised "Silver Mountain," saying that it had "tremendous possibilities." One of its representatives took 6 samples, the lowest of which assayed 9.16% lead and $17.12 in gold and silver, all the others being considerably higher.

SILVER PAINT MINES CO. **COLORADO**

Office: 1037 First National Bank Bldg., Denver, Colo. **Mine address:** Harry E. Larson, supt., Box 548, Ouray, Colo.

Officers: A. E. Bundsen, pres.-treas.; H. E. Larson, v. p.; P. R. Anderson, sec.

Inc. February, 1918, in Colorado. **Cap.**, $50,000; $1 par.

Property: operating under bond and lease, three claims, two of which are patented, 40 acres in Uncompahgre mining district, Ouray, said to carry gold, silver, copper, iron, zinc and lead in pink quartzite, that dips at 30°. Ore body is 2′-4 wide and is said to assay $1.60 gold, 10-400 oz. silver, 14% copper, 5% zinc, 6% lead, 14% iron.

Development: three tunnels, 160′ 135′ and 140′ long. Equipped with 550′ tramway. Mine idle for 30 years before work was started by the present company.

SILVER PLUME CONSOLIDATED MNG. CO. **COLORADO**

Office: 1221 Foster Bldg., Denver, Colo.

Officers: Roderick Stewart, pres.; C. D. Gibbs, v. p.; W. A. Bibbs, treas.; Harry Wilcox, supt.

Cap., $3,000,000; $1 par; in treasury 1,470,000 shares. Transf. office at Registrar & Transfer Co., Equitable Bldg., New York.

Property: 12 claims, 249 acres, grouped as (1) the Buxton, ten claims on Brown mountain, two miles west of Silver Plume, Clear Creek county, consolidated by tunnel claim and covering area of 3,000 by 5.000′; (2) the Lone Wolf mine, two claims, on Republican mountain, at Silver Plume; (3) the Snowdrift dump, adjoining Lone Wolf mine.

Geology: claims show pre-Cambrian granite and granite-gneiss intersected by porphyry dikes. Blende and galena, with some pyrite, are the principal minerals in silver-lead deposits. Both the galena and blende are argentiferous, but silver exists mainly as polybasite, tetrahedrite, cyrargyrite, and ruby silver, in a gangue of crystalline quartz with calcite and brown carbonates of iron and lime.

Development: on the Buster lode of the Buxton group, a tunnel was driven 160′ on vein; a 40′ winze also was sunk on a 2″ cross vein, sampling 367 oz. silver, with lead and gold. The main development tunnel is being driven to intersect all the veins of the group. Advance is 100′ per month. On the Lone Wolf the main work is on the Florence vein, which averages 99.5 oz. silver, 3% lead and $2 gold per ton. The Snowdrift dump is said to contain 150,000 tons of ore discarded from the Snowdrift mine, when ore less than $90 value could not be shipped for treatment.

Company planned a 100-ton mill and erected a compressor in 1919. Shipping to Argo Milling Co. at Idaho Springs.

SILVER PLUME REDUCTION CO. **COLORADO**

At last accounts operated the Burleigh mill, near Silver Plume, Colo., and had a lease on Seven-Thirty mine. Installed an Edison plant and oil flotation.

Letters returned unclaimed and company probably dead.

SLICK BROS. MINING & MILLING CO. **COLORADO**

Address: B. B. Slick, Ridgeway, Colo. W. B. Slick, pres., Boise, Idaho.

Inc. 1909, in Nevada. **Cap.,** $1,500,000; $1 par.

Property: 10 claims, 100 acres, patented, on Mt. Hayden, Uncompahgre district, Colo., shows fissure vein in andesite. The vein runs N. E.-S. W., dips at 45°, which for 2,400′ long shows 3′ of sulphide copper ore carrying gold-silver values, and reported to average $35 per ton in all three metals. The shoot is said to carry ore for 600′x600′x3′.

Development: by 3 tunnels, aggregating 1,200′ and having back of 350′, Property reported on by F. M. Kilmer, of Boston Inst. of Technology.

Company spent about $15,000 for development work during 1916-18. Plans were laid and funds pledged to drive a tunnel 2,300′ long. Work started June, 1918; company reported this should be in ore the full distance and will cut Sutton vein at a depth of 1,155′ below the outcrop.

SLIDE GOLD MINING CO. **COLORADO**

Address: Gold Hill, Boulder, Colo.

Officers: G. W. Teal, pres.; Wm. Mitchell, v. p.; C. A. Barr, sec.-treas.; Chas. Gustafson, supt., with R. R. Kermack, directors.

Inc. Jan., 1918, in Colorado. **Cap.,** $100,000; $1 par, 44,744 shares outstanding. A close corporation. During 1918 ore dump was treated netting $13,759; expenses were $29,358, mainly for development. Milling operations were expected to start in 1919.

Property: three patented claims, 15 acres, at Gold Hill, Boulder county, contains gold and silver in quartz vein in granite. Course N. E. with dip at 5° N. Ore is 8′ wide, and carries telluride of gold, the output averaging 1 oz. gold and 3 oz. silver.

Development: by 1,000′ shaft and 5,000′ of drifts, blocking out 25,000 tons.

Equipment: steam hoist, electric compressor, 50-ton concentration mill with two flotation units. Mine idle for 20 years prior to 1918.

Production: credited with $3,000,000 gold output.

SMUGGLER LEASING CO., THE **COLORADO**

Address: C. E. Anderson, Aspen, Colo.

Officers: D. M. Hyman, pres.; E. M. Rogers, v. p.; J. L. Tilton, sec.; A. B. Simon, treas., with Mark Hyman, Edw. Kuhn and W. P. Arms, directors.

Inc. May, 1911, in Maine. **Cap.,** $500,000; $1 par; all issued, non-assessable.

Property: the Smuggler mine at Aspen, Colo., shows contact deposit in lime and shale, containing silver, lead and zinc ores.

Development: by 5,000′ and 15,000′ tunnels, and 1,000′ shaft, ground opened to 1,800′ depth.

Equipment: includes 2,250-h. p. electric plant, hoist, compressor, and 500-ton concentrating mill.

Water is troublesome, 3,500 to 4,000 gallons per minute being pumped. No 1918 report received from company.

SMUGGLER MINE **COLORADO**

Address: J. Simpson, Silver Plume, Clear Creek county, Colo.

Said to be producing 350 tons of lead-zinc-silver ore per month. The high-grade smelting ore shipped to Georgetown sampler is said to return $500-$600 a ton. The mill ore is shipped to the Hudson Mill at Idaho Springs, where it is concentrated 5 tons to one, giving, it is said, a product carrying 50% zinc, 60% lead and 150 oz. silver per ton.

SMUGGLER MINE & MILLING CO. **COLORADO**

Mine office: Balarat, via Jamestown, Boulder county, Colo.

Officers: C. F. Leetes, Freedonia, Kan., pres.; G. M. Maupin, v. p.; G. R. Prunty, sec.-treas.; T. W. Clements, gen. mgr., with G. P. Farmer, A. R. Elder and W. B. Scruggs, directors.

Cap., $500,000.

Property: the Smuggler mine at Balarat, 8 miles S. W. of Lyons and three miles N. of Jamestown in Boulder county. Mine contains gold and silver

tellurides. One ore-shoot reported producing commercial ore averaging $200 per ton. Past production is said to be $1,500,000.

Equipment: new compressor and drills have been installed lately and a 100-ton mill is planned.

SMUGGLER UNION MINING CO. (THE) **COLORADO**

Controlled by the New England Exploration Co. (which see), 14 Ashburton Place, Boston, Mass.

Officers: Bulkeley Wells, president and general mgr.; with R. L. Agassiz, T. L. Livermore, N. H. Stone and J. M. Crafts, directors. T. E. Sherwin, sec.-treas. Chas. N. Bell, gen. supt.; Carl Aikele, mine supt.; F. F. Thomas, power supt.; O. M. Sackett, tram. supt.; W. L. Reid, mills supt., at last accounts.

Inc. 1891, in Colorado. **Cap.,** $5,000,000; all outstanding; $100 par. Bonds authorized, $250,000; outstanding, $67,500. Annual meeting in June. 14 Ashburton Place, Boston, transfer office. Financial reports not made public.

Property: 77 patented claims, 996 acres, in San Miguel and Ouray counties, includes Smuggler and Humboldt mines. Ore carries gold, silver, lead and iron, occurring in a true fissure quartz vein cutting andesite, tuff and rhyolite for a vertical distance of 2,000′. Vein strikes N. W.-S. E., dips 70°; average width, 2½′. For geology of the Telluride district, see U. S. G. S. Geological Folio No. 57; also see Tomboy Gold Mines Co., Ltd., in this volume. In 1918, the Black Bear group of claims, in Ingram Basin, Telluride, were taken over by company.

Development: by tunnels with a 280′ winze from lowest tunnel, 3,700′ long; main haulage level, 3,600′ long; greatest depth of workings, 2,300′. Total workings aggregate 30 miles. Great Bear developed by 4 levels, shaft and winzes, shoots, etc.

Equipment: includes a 50-h. p. electric hoist, 2 compressors, pumps, hydro-electric power, 60-stamp mill, 600-ton cyanide plant, and flotation unit. The 80-stamp mill was burned in November, 1919.

Production: 118,668 tons ore in 1912; 137,567 in 1913; 126,505 in 1914; 107,119 in 1915; 53,009 in 1916. No 1917-1919 figures received from company. Grade of ore and recovery not made public.

In September, 1919, company was examining the Red Mountain Mines Co.'s property, for possible purchase.

SOUTHWESTERN MINING CO. **COLORADO**

Formerly the Iowa Tiger Mining Co.; named changed November, 1919.

Address: Silverton, Colo.

Property: the Iowa and Mayflower mines in the Silverton district of San Juan county. Ore carries gold, silver, and lead. Only the Iowa gold mine is now being worked. The mill includes a flotation unit. Company has been one of the largest shippers of concentrate in the district. No figures are available.

SPECIE PAYMENT GOLD MINING CO. **COLORADO**

Mine purchased in June, 1917, by C. A. O'Leary & Co., of St. Paul, Minn., who organized the Consolidated Specie Payment Mng. Co.

Address: Idaho Springs, Colo.

Property: shows gold-silver-copper ore, developed by 2,800′ tunnel. The vein was intersected 2,800′ from the portal of the tunnel and 1,000′ of drifting has been done to the west. Average grade of ore said to be around $100 per ton. Regular shipments were being made in October, 1919.

Equipment: includes electrically-driven air-compressor and a 20-stamp mill. Worked by lessees.

SPRING GULCH MINING & MILLING CO. **COLORADO**

Letters returned from W. R. Benzie, sec., Majestic Bldg., Denver, Colo.

Officers: George M. Quigley, pres.; S. H. Dunlop, v. p.; George Lopez, treas.

Property: the Star mine and mill at Ward, Boulder county, with a record of $2,000,000 production. Had a 10-stamp mill.

SQUARE DEAL GOLD MINING CO. **COLORADO**

Address: Central City, Gilpin county, Colo.

Officers: R. J. Foster, pres., 424 Wyoming St., Scranton, Pa. Max Frank, v. p.; E. H. Lawall, treas., with H. K. Griffith and L. F. Hueblein, directors. Harry J. Wolf, mgr., Golden, Colo. Thos. Martin, supt.

No capitalization nor financial statement received.

Property: 3 patented claims, near Central City, said to show gold, silver, copper and lead ore in quartz vein. Vein strikes E. W., dips 65° N.

Development: 850′ incline shaft, with 4 miles of workings. Ore reserves and production not given.

In December, 1915, property was tied up in litigation, but was being operated by a lessee, who placed his royalties in trust pending the outcome of the suit. The apex suit, between the Square Deal and Coloma Mining Co. (discussed by R. T. Walker in "Eng. & Min. Journal," of August 23, 1919), was an unusual one, the Coloma company won it, and took possession of the South Notaway vein, extracting considerable ore therefrom. A mortgage on the Square Deal was then foreclosed, and the mortgagee filed a new suit against the Coloma, obtaining permission to do exploratory work. This proved that the South Notaway vein was distinct from the Cecil vein. The court upheld this view and returned the Notaway claim to the Square Deal. Extremely interesting geologic deductions resulted from the work done.

STANDARD CHEMICAL CO. **COLORADO-UTAH**

Office: Naturita, Colo.

Operating carnotite mines in Colorado and Utah.

Property: 350 claims in Paradox Valley, 60 miles from Placerville, Colo., contains vanadium-bearing and radium-producing ores.

Company gives out no information, but is reported during 1918 to have shipped 7,000 tons of radium-bearing ore. Temporarily closed late in 1918, reopened and employing 200 men in 1919; advertising for 75 additional men, August, 1919.

See U. S. Bureau of Mines Bull. No. 1: 25, p. 944.

STANDARD GOLD-BEARING MINING & MILLING CO. **COLORADO**

Officers: F. E. Groves, v. p. and mgr., Salida, Colo.; Hon. W. P. O'Brien, pres.; George L. Ramey, sec.; J. S. Ramey, treas.; Jas. Zoeter, John Millner, Dr. S. B. McFarland, directors.

Property: 8 claims, 144 acres, in Monarch district, Pass Creek, Chaffee county, shows fissure veins in granite porphyry that carry copper-lead ores. Values run $4-$16 per ton.

Development: by 900′ of tunnel work with 285′ back. Company had a mill with flotation equipment. Examinations have been made by Clyde H. Jay and J. H. Freeman. No recent report received.

STANLEY MINES CO. **COLORADO**

Office: 1027 First National Bank Bldg., Denver, Colo. **Mine office:** Idaho Springs, Clear Creek county, Colo.

Officers: J. P. H. Cunningham, pres.; Geo. W. Johnson, v. p.; H. J. Wolf, sec.-mgr.

The property formerly owned by this company was acquired by Cunningham, Johnson & Fisher, a co-partnership, in August, 1916, by purchase, the old Stanley Mines Co., being dissolved. The S. M. company was incorporated 1904 with $75,000 capital as successor to Consolidated Stanley Mining & Milling Co.

Property: 76 lode claims, 10 placer claims, 3 millsites, all patented. Shows gold and silver-bearing lead and copper ores.

Development: 641′ main shaft, and 5 others from 60′ to 680′ deep; 24 crosscuts, total 1,050′; Hukill tunnel, 380′; adits and drifts, 22,790′; raises, 3,460′; winzes, 570′; a total of 30,181′ Vein area stoped is 635,000 sq. ft. Past production is $3,500,000. New company cleaned and retimbered main adit level 3,500′ long and resumed active development, November, 1918.

STAR TUNNEL & MINING CO. **COLORADO**

Office: 213 Coronado Bldg., Denver, Colo.

Officers: M. O'Hea, pres.; W. P. Day, v. p.; E. T. Butler, treas.; S. L. Morris, sec.

Inc. 1918, in Colorado. **Cap.,** $40,000; 1c par; 1,000,000 shares in treasury, January, 1919.

Property: in Enterprise mining district, Blackhawk, Gilpin county, and the Iron City concentrating mill, 75-ton capacity, at Blackhawk. Mill has treated over $1,000,000 worth of ore.

Development: by 450′ crosscut tunnel. Plan to drive tunnel an additional 250′ to cut three veins. Company reports ore samples returning $231 a ton, of which $200 was in gold values.

Mine had not been operated since 1883.

SULPHURET MINING & REDUCTION CO. COLORADO

Address: Lake City, Colo.

Officers: Col. Burgess, pres.; W. C. Humphrey, sec.; H. G. Heath, treas.

Company incorporated, 1919. Cap., $100,000. Has taken bond and lease on the Cora and Sulphuret properties, 1½ miles from Lake City, believed to be owned by H. G. Heath.

Development: by 216′ shaft and tunnels. Company plans concentration plant with flotation unit.

SUMMIT COPPER MINING & MILLING CO. COLORADO

Office: Federal Reserve Bldg., St. Louis, Mo.

Officers: Frederick Kohn, pres.; R. A. Morris, sec.; G. P. Heckel, mgr.; J. F. Roper, supt.

Inc. 1915, in Colorado. **Cap.,** $500,000; $1 par.

Property: 34 claims, patented, 200 acres, including Carbon Lake, Camp Roberts and Koehler groups and a 20-acre mill-site, all located in Red mountain district of Ouray and San Juan counties. Mines said to show veins in porphyry ore carrying 12% copper, 10% lead, 10 oz. silver and about $3 gold per ton. Property was formerly owned by San Antonio Mining Co., which see. Examined in August, 1919, by Kirby Thomas.

Development: by 37′ and 200′ shafts the Camp Roberts tunnel 625′, and Koehler tunnel 2,800′; driving a raise 310′ from the Koehler tunnel to the Carbon Lake workings.

Equipment: a 100-ton concentrating plant is to be erected.

SUNBURST CONSOLIDATED MINES CORP'N. COLORADO

Address: care of E. T. Larkin & Co., 10 Postoffice Square, Boston, Mass. Mine Office: Georgetown, Colo.

Officers: G. L. Nye, pres.; Arthur Longley, v. p.; H. N. Stevens, sec.-treas., with E. H. Talbot, N. W. Jordan, J. C. Hershey and J. M. McClave, directors.

Inc. in Colorado. **Cap.,** $1,000,000; $1 par. In treasury 400,000 shares. Registrars and transfer agents, U. S. Corporation Co., N. Y., and Metropolitan Trust Co., Boston, Mass.

Property: 16 patented, 3 unpatented claims and 3 patented millsites, includes Sunburst, Astor, Stewart, Sceptre and Wolverine mines on Republican and Democrat mountains, near Georgetown.

Geology: ore carries about 10 oz. silver, 10% lead, 12% zinc, and $2.40 gold in the low-grade area, an ore which company expects to net almost $25 ton. In other sections, silver is reported as running from 150 to 500 oz. per ton. Principal veins are in gneiss and pegmatite.

Development: started reopening tunnels in May, 1916. Sceptre tunnel, 3,200′ long; Grant, 1,000′ long, and Sunburst, 900′. A raise 380′ long from Sceptre to Grant and Sunburst tunnels was completed in 1918. The main tunnel was re-timbered in 1919, and lessees opened some rich silver ore.

Equipment: includes compressor, transformer, blacksmith shop. Aerial tram, 6,935′ long connecting loading station with Col. & Southern R. R. at Georgetown, costing $25,000, was completed early in 1919.

Company reports $125,000 spent on development during 1916, 1917 and 1918. Production said to be $500,000.

Reported that Canadian interests, headed by Isbell, Plant & Co., Toronto, have taken over the property.

SUN-MOON LEASING CO. **COLORADO**

Office: 517 Equitable Bldg., Denver, Colo.

Officers: J. C. Hershey, pres.-treas.; G. L. Felt, v. p.; G. L. Nye, sec., with G. C. Manley and S. P. Doran, directors.

Inc. Feb, 1917, in Colorado **Cap.,** $100,000; $1 par; 90,000 shares issued.

Property: the Hill Top mine, 35 patented claims, 320 acres, Horse Shoe district, Park and Lake counties, Colo. Replacement deposits in limestone carry ore that assays 25 oz. silver and 20% lead. Company formerly operated 60 acres on Seaton mountain, Clear Creek and Gilpin counties.

Development: by 450′ shaft and 3,500′ underground workings. Company developing known ore-bodies and expected to ship early in 1919.

SUNNYSIDE GOLD MINES CO. **COLORADO**

Defunct. Property taken over by Sunnyside Mining & Milling Co., and operated by the U. S. S. R. & M. Exploration Co.

SUNNYSIDE MINING & MILLING CO. **COLORADO**

Subsidiary of U. S. S. R. & M. Exploration Co.

Office: Eureka, San Juan county, Colo.

Officers: M.H. Kuryla, mgr.; E. L. Young, mine supt.; B. Marquand, mill supt.

Property: shows a deposit of complex gold developed by two 300′ shafts, two 5,000′ tunnel, and 5 levels.

Equipment: four 1,500 cu. ft. compressors, electric underground haulage, 33,000′ tramway with capacity of 50 tons per hour, and 500-ton mill. This has 2 crushers, three 1,400-ton steel bins, tube-mills, ball-mills, flotation machines, Dorr thickeners, and Portland filters. The process employs selective flotation of lead-gold-silver-copper, followed by flotation of zinc.

Company plans a 9-mile railroad to Ouray.

On April 21, 1919, a fire destroyed the bunk houses, commissary buildings, and compressor house; the machinery was ruined and mining operations ceased. Company re-built the structures of steel and corrugated iron, and in September was in full operation. By December, there were 300 men employed.

SUN TUNGSTEN CO. **COLORADO**

Mail returned September, 1918, from 329 Foster Bldg., Denver, Colo.

Officers: A. E. Blakesley, pres.; Denver, Cons. Stock Ex.; Valdo F. Wilson, v. p.; J. M. Caldwell, sec.;Paul Hardy, directors; Mr. Von Kueren, supt., Boulder, Colo.

Cap., $3,000,000; $1 par; 2,800.000 in treasury at last report.

Property: 2 claims, the Lucille group of tungsten mines, Sunshine district, near Boulder, Colo., held under bond and lease, and similar lease on the C. O. D. mine at Cripple Creek.

Stock offered at 5c a share, March, 1916. Is a G. R. Q. proposition and not favorably regarded.

Probably idle.

SWARTHMORE CONSOLIDATED MINING CO. **COLORADO**

Officers: Chas. B. Galbreath, pres.; Harvey Hanes, v. p.; J. E. Carpenter, sec.; Paul Barriclow, treas., at last accounts.

Inc. July, 1907, in Colorado, as a merger of the Swarthmore Copper Co., and Enterprise Mining Co. **Cap.,** $3,500,000; $1 par.

Property: 17 claims, 11 patented, 60 acres, near Eldora, Boulder county, includes the Golden Fleece mine, having fissure veins in pre-Cambrian gneiss cut by dikes. Vein said to average 8′ wide and to carry a paystreak of 3 to 5% copper ore with occasional telluride of gold.

Development: by 5 shafts, deepest 403′, and by tunnels of 800′, 1,000′ and 2,000′.

Equipment: includes 2 small steam plants, a 60-h. p. hoist and a 12-drill air-compressor. A small concentrator with a 50-ton chlorination plant, and 4 mine buildings.

Property leased to Consolidated Leasing Co. since 1917.

SYNDICATE MINING & MILLING CO. COLORADO

Mine office: Rico, Dolores county, Colo. Phillip Flynn, supt.

Is a reorganization of the Rico Mining Co., whose property was sold October 29, 1917, to a reorganization committee and transferred to the Synd. M. & M. Co., a corporation capitalized at $500,000.

Property: 156 claims, 1,110 acres, with 20-acre millsite and 320 acres coal land, in the Pioneer district of Colorado, includes the Group and Syndicate mines. Ore occurs in fissure veins as lime replacements. Veins are reported to vary from a few inches to 15′ in width, traceable a mile long and to be proven to a depth of 700′. In one mine the ores carry 4% copper, 10% lead, 10% zinc and 10 oz. silver, the copper ore occurring as chalcopyrite associated with pyrite, sphalerite and galena in fluoritic gangue.

Development: by tunnels, 1,000 to 3,000′ long. A crosscut tunnel was planned, 1919, to run through the group and to cut 3 veins. Equipped with 125 hydro-electric power at mine and 100-h. p. at mill. There are two 75-h. p. hoists, 2 compound air compressors, 10 air drills and 1 air electric drill; two 9 by 15″ Blake crushers, 18 Wilfley tables, etc.

Production: up to 1918 estimated at 1,200,000 lb. copper.

TAYLOR MOUNTAIN MINING CO. COLORADO

Address: D. E. Cook, asst. sec., Chippewa Falls, Wis. **Mine office:** Garfield, Chaffee county, Colo. W. F. Norway, pres.

Inc. Oct., 1905, in Colorado. **Cap.,** $1,200,000; shares $1 par. Annual meeting, in November.

Property: the Lily mine, 7 claims, 65 acres, in the Monarch district, 1½ miles from Garfield and 19 miles from Salida. The property has a nearly vertical N.-S. contact vein, between granite and limestone, carrying lead and copper ores and showing copper ore which the management estimates to average 6% copper and 2 oz. silver per ton.

Development: by a 280′ main shaft, with 4,000′ of workings.

Equipment: includes electric power with 16-h. p. hoist and 35-h. p. air compressor. Engine house, smithy, carpenter shop. Shipped about 120 tons per month in 1914. No later shipments reported, as company has not worked mines in years.

TEDDY BEAR GROUP COLORADO

Address: W. Wallace Gibb, lessee, Lawson, Colo., or 638 G. & E. Bldg., Denver, Colo.

Property: 6 patented claims on Eastern end of Red Elephant Mountain, Lawson, showing silver, lead, copper and zinc in fissure veins in granite. Ore is a sulphide, occurring in faults and assaying, according to manager's report, from 128 to 2,067 oz. silver per ton.

Development: by surface shafts 10′-50′ deep, 500′ tunnel and some drifts. Mine in prospect class.

TEK MINING, MILLING & LEASING CO. COLORADO

Address: Idaho Springs, Colo.

Property: an old mine with dumps estimated to contain 150,000 tons of complex gold-silver-lead ore averaging $4 per ton.

Late in 1916 the main tunnel was said to have cut 3½′ of 3 oz. gold and 7 oz. silver ore, also from 3 to 12% copper. Manager Weber appeared, however, unduly reticent about development.

No recent returns.

TELESCOPE MOUNTAIN MINING CO. COLORADO

B. F. Majors, supt., Chattanooga, via Silverton, Colo.

Reported to be developing the Telescope mine at Chattanooga, San Juan county. Operations started in fall of 1917, but owing to internal difficulties among the stockholders and officials, mine was closed until April, 1918. The Maude vein on property said to show ore that assays 50% lead, 8-10 oz. silver, with small gold values. Shipping to Durango smelter.

Equipment: includes compressor and power.

TENNESSEE MINING & MILLING CO. **COLORADO**

Office: care J. W. Thayer, sec., 715 Belmont Ave., Chicago, Ill. **Mine office:** Empire, Clear Creek county, Colo.

Officers: J. W. Loofbourow, pres.; S. B. Anderson, v. p.; J. F. Kidnell, treas., and H. J. Fersdick, directors; E. D. Payne, supt.

Inc. Feb. 11, 1911, in Colorado. **Cap.,** $400,000; $1 par; issued 294,050. Annual meeting, August 13. Company is a reorganization of the Gold Bug Mining Co.

Property: 6 claims, 2 deeded, in the Colorado district 1¼ miles from Colorado Southern Railroad. Claims have veins which show gold and silver ore with traces of copper. Property leased to Golden Empire Mining Co., which see.

Development: by 1,300′ of tunnels, a shaft and several drifts. Extensive developments have been made and large shipments are predicted in 1920.

TEPEE MINING & DEVELOPMENT CO. **COLORADO**

Letters returned in May, 1917, from Alamosa, Colo.

Officers: J. F. Revnolds, pres.-mgr.; C. L. Cunningham, v. p.; W. W. Platt, sec.; B. P. Middleton, treas., with J. F. Reynolds, W. W. Platt, T. L. Connoly, directors.

Inc. 1914, in Colorado. **Cap.,** $1,000,000; $1 par.

Property: 21 claims, about 400 acres, at Alamosa Forest Station, Forest Reserve, Conejos county. Pay ore occurs in shoots in veins in diorite. Veins vary from vertical to 45° dip, and from 8″ to 2′ in width, with strike N. E.-S. W. Ores are both oxidized and sulphide and contain gold-silver values.

Developed by 90′ shaft worked by windlass. It was proposed to cut vein by tunnel 1,500′ long. No recent reports obtainable.

TERRIBLE DUNDERBERG MINING & POWER CO. **COLORADO**

Company liquidated; entire assets sold to the Denbigh Silver Lead Mines Co., which see.

THIRD VENTURE MINING CO. **COLORADO**

W. A. Palmer, pres.-mgr., Leadville, Lake county, Colo. Company had a lease on the St. Louis mine, which has a vein with complex sulphide ores carrying copper-lead-zinc with gold and silver.

Development: by 1,450′ tunnel.

Equipment: electric, with air compressor. Shipments reported to have been 25 tons a day during 1915. No recent reports received. Probably dead.

TOMBOY GOLD MINES CO., LTD. **COLORADO**

Under management of Exploration Co., Ltd., of London.

Office: T. D. Pillans, sec., 24 Lombard St., London, E. C. 3, England; 61 Broadway, New York; D. A. Herron, gen. mgr., Telluride, Colorado.

Officers: Lord A. Butler, chairman; Marquis d'Hautpoul and I. H. M. Shaw, directors. P. L. Foster and R. M. Raymond, cons. engrs.; W. K. Betty, metallurgical adviser, and J. S. Peterson, asst. mgr.

Inc. June 7, 1899, in England. **Cap.,** £350,000; shares £1 par; 310,000 issued.

Financial statement, years ending June 20:

Year	Revenue	Profit	Dividends	Previous Balance	Balance Forward
1919.....	$861,700	$67,000	.....	$168.000	.....
1918.....	1.131.267	287.843	111.000	149,000	168.000
1917.....	1,180,000	346.000	149,000	94,560	149,000
1916.....	1,120,320	369,200	149,000	99,760	94,560

Dividends: since 1899, to June, 1918, total is 55/6 ($13.26) per share, equal to 277%.

Property: included, July, 1915, 76 claims; others have sinve been added. Original holdings were the claims acquired from the old Tomboy Gold Mines Co. of W. Va., also claims carrying a parallel vein, known as the Argentine. Later the company bought the claims containing the Montana vein and its northern extension from the Nevada Tunnel Co. The Sidney-White Cloud property was acquired in 1916, for $75,000. In 1918, the company was reported

to have purchased an interest in the Carbonero mine at Ophir, San Miguel county.

Geology: the veins in the Telluride district are filled fissures, 2½′ to 4′ in width, larger lodes sometimes appearing as a number of parallel plates of filled veins separated by sheets of altered rock. Country rock is andesite, rhyolite and San Juan tuff, with underlying sedimentaries in which the existence of the veins has not been proven. Principal metallic minerals are gold, pyrite, galena, zinc blende, and chalcopyrite. Ores contain 2 to 3% sulphides, and yield about $6 in gold and a few ounces of silver per ton. For geology of the district, see U. S. G. S. Geologic Folio No. 57; also Lindgren's "Mineral Deposits."

Development: the Tomboy and Montana properties to 2,400′ depth, and on the Argentine to 2,200′. In the Argentine lower levels is a large quantity of complex sulphide ore containing zinc, lead and copper, which will be profitable by flotation. The Montana mine is opened longitudinally by the Ophir or 1,750′ level, also 300′ beyond the boundary. In the year 1918, 568′ of new work was done in the Argentine mine, opening a 5′ vein for 359′ on the 1,900′ level, assaying $3.62 in gold and silver, 4.5% lead, 6.89% zinc, and 0.8% copper; and for 111′ on the 2,100′ level, 4.2′ of ore running $2.83 gold and silver, 2.13% lead, 4.42% zinc, and 0.95% copper ore. Reserves are estimated at 200,000 tons. In the Montana mine, the reserves aggregate 300,000 tons, and new work on the Virginius vein disclosed 3′ of ore for a length of 900′, that averaged $9 in gold and silver. A parallel vein, opened for 200′, shows 4′ of $12 silver and 5.9% lead ore.

Equipment: electric power, 80-stamp mill, concentrators, cyanide plant, and flotation plant erected in 1919, capable of treating up to 450 tons daily. The new plant renders the complex ore in the mine available for treatment. Its cost, $150,000, is being paid for out of current profits.

Production, years ending June 30:

Year	Tons	Yield	Cost Per Ton
1919	155,334	$864,699	$5.03
1918	151,028	$1,135,389	$5.58
1917	148,939	1,150,611	5.40
1916	150,488	1,074,088	4.92

Amalgamation recovers 27%; concentration, 58%; and cyanidation, 15% of the total output.

Tomboy has still a good future, especially now that flotation will permit the complex ore to be treated.

TONOPAH PLACERS CO. COLORADO

Controlled by the Tonopah Mining Co., Tonopah, Nev.

Office: Bullitt Bldg., Philadelphia, Pa. **Operating office:** Breckenridge, Colorado.

Cap., $1,000,000; $1 par. Notes outstanding, $112,000. Balance sheet December 31, 1918, showed assets totaling $1,228,110, of which $883,280 was for property, and $191,881 for dredges. Current assets were $152,948, and liabilities, $92,326. In 1917 total assets were $1,355,627, of which property was $953,159, dredges, $230,257, current assets, $172,410, current liabilities, $80,001.

Revenue in 1918 was $282,974, and expenditures, $332,902. Other income, $10,005, loss, $39,923, less depreciation on property and plant, $99,818 making a loss of $139,741. Surplus, 1917, was $219,525, making surplus December 31, 1918, $79,784.

Property: placer deposit near Breckenridge, on which 3 dredges operate about 9 months each year.

Production: in 1918 was 13,565 oz. gold, and 3,345 oz. silver from 3,267,307 cu. yds. of gravel. The average value per yard was 8.6c. During 1917 company dug 3,351,821 cu. yds., producing $451,743 at cost of 7.6c per yard.

TOPEKA CONSOLIDATED MINING CO. COLORADO

Idle. Probably dead.

Central City, Gilpin county, Colo.

Officers: at last accounts, Henry P. Lowe, pres., treas. and gen. mgr.; C. A. West, sec., with Sir Chas. Allen, Arthur Firth and M. A. Lowe, directors.

Inc. July 30, 1909, in Colorado, as successor of Topeka Mining Co. **Cap.**, $1,000,000; $5 par; fully issued. Annual meeting, June 30.

Property: 7 claims, patented, 16.46 acres, in the Russell district, shows schists and metamorphic gneiss, cut by 3 veins with N.-E. strike and dip of 45°. One vein of 4′ average width, traceable 1,300′, carries chalcopyrite and sphalerite estimated to average 0.5% copper, 2% zinc, 2 oz. silver and $10 gold per ton.

Development: by 1,500′ shaft, with a second 510′ shaft and a total of 11,640′ of workings, estimated to show 50,000 tons of ore. The mine was discovered 1862, and worked at intervals.

Finally closed down again in 1914, leaving workingmen unpaid.

TORONTO MINING CO. **COLORADO**

Office: 420 Century Bldg., Denver, Colo.

Officers: G. W. Summers, pres.-treas.; Stephen Haskins, v. p.; E. H. Summers, sec.; J. J. Elliot, supt., with F. G. Elliot, directors.

Inc. 1918, in Colorado. **Cap.**, $100,000; $1 par.

Property: lease and option on Congress mine, a patented lode claim, in Enterprise mining district, Gilpin county, two miles from Blackhawk. The lease expires March, 1921, and company can purchase the mine at any time before then for $18,375. Vein is 3′ to 60′ wide, carrying iron and lead carbonates with native silver and said to average about $3 per ton in gold.

Developed by 2 shafts, 350′ deep and a new shaft, 50′ deep in January, 1919. Company reports about 600′ of drifts and considerable stoping. Assays at new shaft were said to be about $2-$3 per ton in silver.

Equipment: includes a 60-h. p. hoist. Mine had been idle over 20 years.

TUCKER MOUNTAIN M. & M. CO. **COLORADO**

Mail unclaimed in October, 1919, at 901 Foster Bldg., Denver, Colo. Mine office: Kokomo, Colo.

Officers: G. P. Lingenfelter, pres.; S. H. Dunlop, v. p.-mgr.; W. R. Benzie, sec.-treas., with G. N. Quigley and F. A. Clarkson, directors.

Inc. Nov. 9, 1916, in Colorado. **Cap.**, $150,000; 10c par; 500,000 issued.

Property: the Washington and Hancock mines at Kokomo, Summit county, said to show a contact deposit in limestone, dipping 22° and striking N. W.-S. E. Ore is a sulphide of lead and zinc, with gold and silver, assaying $15 to $20 per ton.

Development: by 300′ tunnel and 1,000′ of workings. Shipments reported June, 1917. No later reports received.

TUNGSTEN EXPLORATION CO. **COLORADO**

Probably dead. Letters are returned unanswered from Lakewood, Colo.

Inc. April, 1916.

Officers: at last accounts, L. A. Ewing, pres.; Chas. Theobald (of Theobald & Knuth, Cripple Creek, Colo.), v. p.; Dr. R. W. Bailey, treas.; L. A. Tilborg, sec., with C. M. Webb, Norfolk, Va., G. C. Stumm and Clark G. Mitchell, directors.

Property: the Bradley tract, 200 acres, 1 mile E. of Lakewood, adjacent to Primos Chemical Co.'s mines, the Cold Spring, Cross and Bonanza mines.

TUNGSTEN GIRL CO. **COLORADO**

Probably dead as letters are returned from former address: 325 Majestic Bldg., Denver, Colo., and Ward, Boulder Co., Colo.

Officers: Joe Connors, pres.; S. T. Weller, v. p.; Dr. Osee Wallace, treas.; Hon. L. I. Harrington, sec.; above, with Kenneth Kennedy, A. V. Lafferty, Dorothy Weller and E. S. Conners, directors.

Inc. 1916, in Arizona. **Cap.**, $1,000,000; shares $1 par.

Property: the Blue Jay and Burnt Mountain groups, 3 miles from Ward, adjoining holdings of the National Tungsten Co.

TUNGSTEN METALS CORPORATION **COLORADO**

Address: T. McSherry, supt., Boulder, Colo. W. W. Charles and Geo. Teal, mgrs.

Inc. April, 1916. **Cap.**, $550,000. Company took over property of the Tungsten Metals Co. and the Ferberite Co., including the Red Sign, Red Sign No. 2 and the Ferberite mines, and constructed a $50,000 mill in Boulder Canyon, about 7 miles from Boulder.

In Nov., 1917, company acquired the Kekionga mine at Magnolia, Boulder county. Property was a gold producer but a footwall of the gold vein is the hanging-wall of a tungsten vein 6 to 8′ wide. Has 400′ shaft. Company plans tramway if warranted by development.

TUNGSTEN MOUNTAIN MINES CO., THE **COLORADO**

Offices: Boulder National Bank Bldg., Boulder, Colo. J. D. Maxwell, Tungsten, Colo.

Officers: J. G. Clark, pres.; Thomas Leeke, v. p.; F. N. Totman, sec.-treas., with S. A. Greenwood and L. W. Means, directors.

Inc. Oct. 6, 1916, in Colorado. **Cap.**, $1,250,000; $1 par; 1,049,500 issued.

Balance sheet of September 30, 1918, shows assets of $1,314,184, including mining claims and equipment, $1,268,590; mine development, $34,456; notes receivable, $10,899; cash, $434. Liabilities include surplus, $63,429; accounts payable, $755, and capital stock, $1,250,000.

Property: 42 claims, 24 patented, 360 acres, in Grand Island district, Boulder county, contains tungsten deposits in veins.

Development: to depth of 300 to 800′ by shafts, and tunnels, latter 2,400′ long. Worked started June, 1917. Lessees are reported producing steadily.

TUNGSTEN PRODUCTS CO. **COLORADO**

Office: Boulder, Colo.

Officers: W. F. Bleecker, pres.; L. C. Schultz, treas.; W. G. Bleakley, supt., with J. H. Holmes, Jr., H. C. Morgan, Morgan Belmont, directors.

Company engaged in manufacture of tungsten alloys. Closely associated with Tungsten Products Co., which see.

TUNGSTEN PRODUCTS MINING CO. **COLORADO**

Office: 3-8 William Block, Boulder, Colo.

Officers: W. F. Bleecker, pres.-mgr.; R. D. George, v. p.; L. C. Schultz, treas.; M. C. Goss, sec., with Harry Cassaday, directors.

Inc. in Colorado. **Cap..**, $2,500,000; par $1.

Property: owns and operates Luckie 2 groups of mines, 112 acres, 9½ mines from Boulder, in Boulder Canyon, between Middle and North Boulder Creek. Ore averages 2%-6% tungsten. The Luckie 2 and Lookout are the best developed mines.

The T. P. Mining company is distinct from the Tungsten Products Co., a manufacturing concern engaged in the production of various tungsten alloys; however, the Products Co. contracts to treat the Mining Company's ore at a reasonable charge, and the Mining Company has an option to purchase control of the Tungsten Products Co. at a reasonable price.

TURRET MINING & MILLING CO. **COLORADO**

Office: 308 Quincy Bldg., Denver, Colo.

Officers: R. F. Stratton, pres.; T. Richardson, v. p.-treas.; G. K. Mann, sec., with F. M. Stratton and L. S. Wade, directors.

Inc. in Colorado. **Cap.**, $100,000; $1 par.

Property: 4 claims in Turret mining district, Chaffee county, about 8 miles from Salida.

Geology: veins occur in mica-schist that alternates with black gneiss, cut by dikes of quartz porphyry. Croppings of amphibolite carry fibrous asbestos and crystallized hornblende. Average value of ore reported as, gold, $1.40, silver, $2.00 and copper, $22 per ton. Company claims 25,000 to 50,000 tons in sight.

TWIN PORTS & EMPIRE MINING CO. **COLORADO**

Formerly Duluth & Empire Mining Co.

Address: Frank Brady, supt., Empire, Colo.

Officers: C. D. Pelletier, pres., 1123 Villard Ave., Superior, Wis. J. E. Teporter, v. p.; P. J. Borgstrom, sec.; O. G. Olson, treas., with H. R. Corey, T. W. Leahy, Z. E. Darrow, directors.

Inc. in Colorado. **Cap.**, $500,000; $1 par; 200,000 issued, 100,000 for

property 100,000 for cash at par and 198,000 pooled. Bonds authorized $50,000 (for mill), convertible 1927; over $4,000 issued.

Property: 16 claims, 2 tunnelsites and 5-acre millsite, about 520 acres, in upper Union district, Clark Creek county, 8 miles W. of Idaho Springs. Company organized 9 years ago as a consolidation of 14 properties whose location, high up on a mountain side, permit working by a tunnel.

Ore: gold and complex lead zinc pyrite, also galena in the Pelletier vein.

Development: main tunnel 2,900′ with face 1,100′ below surface, exposes 15 veins. There is also 1,100′ of drifting (850′ on Columbine vein alone). The Columbine vein with average width of 5′ carries ore assaying $2 to $20 per ton. A 500′ tunnel, 600′ above main tunnel, also exposes this vein. The Pelletier vein developed by 190′ tunnel, will be cut by new tunnel 3,400′ from portal, and 1,500′ below existing workings.

Equipment: tramway, 60-h. p. hoist, air-compressor and drill.

Ore reserves: President Pelletier estimated 2,000,000 tons of ore, or 10 years' supply blocked out for 50-ton mill. Existing underground workings are, not, in our opinion, sufficient to warrant this optimistic estimates even though the figure given be confirmed by further development.

UNITED LEAD CO. COLORADO

Controlled since 1906 by the National Lead Co., which see.

U. S. GOLD CORPORATION COLORADO

Address: Boulder, Colo.

Officers: N. P. Garretson, Topeka, Kan., pres.; J. R. Wolff, v. p. and gen. mgr.; W. T. McGinnis, sec.-treas.; J. W. Middlesworth, J. H. Howry, F. E. Campbell and C. N. Watts, directors. T. J. Benjovsky, mine supt

Inc. 1903, in Colorado. **Cap.,** $3,500,000; $1 par; 3,271,062 outstanding Dec., 1917.

Property: the Klondike group, 225 acres, patented, Sphinx group, 22 mining claims in Boulder county, and Livingston group, 50 acres. Company also owns 50,000 shares, or entire capital stock of the U. S. Reduction Co., which owns the mill. Claims show fissure veins in porphyry, carrying gold ore. Widths, 3′-15′ in different workings; mill feed varies from $4 to $12 per ton.

In July, 1917, company started exploring for the old No. 1 oreshoot in its Livingston claim, which is said to have yielded $300,000 years ago.

Production: 34 tons of ore were shipped, 1915, to Denver smelters, which neted $1,414. Company reported April 10, 1916, bullion to the amount of $15,086 shipped to U. S. Mint, Denver, and that 7 tons ore shipped to Denver smelter Feb. 9, yielded $1,974. Mill was treating up to 100 tons daily at end of 1916. During 1917 the yield was about $75,000 from 15,000 tons of ore. Work was slowed down during the war, and company made arrangements to work Klondike group above Nederland. In Nov., 1919, it was stated that all work was limited to leasing, but when conditions are more favorable treatment of the large low-grade orebodies will be considered.

After 13 years of intermittent development, and lurid advertising, company started producing. The corporation is not looked upon favorably, and investors are advised to take company statements with a grain of salt.

UNITED STATES ZINC CO. COLORADO

All stock owned by the A. S. & R. Co., which see. Plant at Pueblo, Colo., has 2,320 retorts. Plant was operated at greatly reduced capacity in 1919.

UNIVERSAL ORE PRODUCTION SYNDICATE COLORADO

Office: Central City, Colo.

Property: the Homer mine in Central City hill, Central City, Gilpin county, said to show an 18″ streak of ore on the 300′ level assaying 2.07 oz. gold, 6 oz. silver and 12.7% lead per ton.

Developed by 270′ shaft. Plan to sink shaft an additional 100′ and install a large boiler and compressor.

U. P. R. MILLING & MINING CO. COLORADO

Address: Central City, Colo.

Property: the Gregory-Buell group of mines at Central City and the

Buell concentrator. Mines have vein with gold and silver-bearing copper ores, developed by 700′ shaft, equipped with steam hoist and air compressor. Mill leased 1919 to Fuller, McCulloch Co., which see.

UTICA MINING & MILLING CO. **COLORADO**

Address: C. A. Knabe, mgr., Ward, Colo.

Inc. $250,000.

Reported reopening property in 1917, which had been idle for years due to litigation. Company plans mill and aerial tramway.

VASCO MINING CO. **COLORADO**

Subsidiary of Vanadium Alloys Steel Co., Latrobe, Pa. J. A. McKenna, pres.; T. W. Conklin, v. p. and gen. mgr., Voegtle Bldg., Boulder, Colo.

Acquired property in the Nederland district in 1915, and remodeled the Boyd mill for concentration of tungsten ores which are both mined and purchased. Ore is ferberite occurring in veins in pegmatite or granite, containing from 3 to 50% WO_3, and averaging 10%.

Property: includes 15 operating mines, shipping 8-10 tons concentrates weekly.

Mill equipment: crusher, rolls to ¼", trommel, jigs, stamps for jig tails, classifiers for jig hutches and battery pulp, Card and Wilfley tables, Monell slime tables, Deister slime tables, and rag tables. Three mills have been built.

VERNON MINING CO. **COLORADO**

Office: W. L. Fleming, 50 Broad St., New York.

Mine office: A. G. deGolyer, mgr., Ironton, Colo.

Officers: W. L. Fleming, pres.; N. L. Young, sec.-treas., with W. P. Ward, A. G. de Golyer, W. S. Roberts and H. W. Hubbs, directors.

Inc. July, 1916, in Delaware. **Cap.,** $1,000,000; $1 par; all outstanding; 490,000 issued to syndicate subscribers. Security Reg. and Transfer Co., transfer agents.

Balance sheet for year ended Dec., 1917, showed receipts totaling $140,266, $105,500 being from sale of shares. There was spent at the mine $86,418, at mill $24,125, miscellaneous $2,873, leaving $26,850 cash on hand.

Property: 21 claims, 2 patented, 475 acres, located at timber line (11,000′) in the Red Mountain mining district of Western Colorado, about 7 miles from Ouray, Ouray county. There are four main veins, the South Dakota, Anaconda, Mogul, and Indian Chief. Ore developed above water in leached zone averages 10 oz. silver, 1.75% copper and small amounts of gold. The South Dakota vein has a shoot 175′ long by 5′ opening to a width of 20′ in stopes above the tunnel level where the ore averaged 12% copper, 44 oz. silver, and $2.80 per ton in gold.

Development: on the South Dakota vein is an incline shaft, 450′ to 500′ deep. Reserves are estimated as worth $200,000.

Equipment: includes machine-drills, electric hoist, compressor and 100-ton mill. A recovery of 85 to 95% has been made at this mill. Practically all of the surface plant was burned in July, 1919, causing a loss of $100,000.

Property meritorious, and management good.

VICTORIA MINING CO. **COLORADO**

Office: 86 Main St., Brockton, Mass., and Salina, Colo. **Mine office:** W. H. Hubbard, Wall Street, Boulder, Colo.

Officers: W. S. Garland, pres.-treas.; John Buchanan, v. p.; F. Allen, sec.; Dr. V. C. Alderson, mgr.

Inc. 1917, in Colorado. **Cap.,** $500,000; $1 par; 200,000 outstanding; 125,000 shares of stock held in treasury for conversion of bonds. Funded debt $125,000. Stock listed on Boston Curb.

Property: 5 patented lode claims, about 19.469 acres, at Summerville Gold Hill mining district, Boulder county, has fissure veins in granite showing silver, gold, zinc, copper and a little lead.

Development: 470′ shaft. Property examined by Victor C. Alderson, Victor Ziegler, and Arthur Hookins. By Nov., 1919, a rich shoot of silver ore had been opened for 100′ along the 400′ level, the last carload assaying 102 oz. per ton.

VINDICATOR MINES & TUNNEL CO. COLORADO

Property near Idaho Springs, Colo., formerly operated under lease by Gold Standard Leasing Co., financed by Casper, Wyo., and San Francisco capitalists. Mine said to carry the Tom Tuck vein, 6′ wide, with porphyry hanging-wall. Reported taken over in 1918 by Western Tunnel Mining Corporation, which see.

VULCAN MINES & SMELTER CO. COLORADO

Mail returned unclaimed, March, 1918, from 302 Century Bldg., Denver, Colo. C. H. Mace, supt., Iola, Colo.

Officers: at last accounts, Robt. G. Ainsworth, pres.; C. H. Mace, v. p.; Chas. P. Mety, sec.-treas., with W. W. Mace, Geo. E. Bermont, John R. Rowland, and F. J. Greenwald, directors.

Inc. Nov. 3, 1915, in Colorado. **Cap.,** $100,000; $1 par; 75,000 issued. Stock transferred at company's office. Annual meeting in November.

Property: 9 patented claims, 95 acres, in Domingo mining district, Gunnison county, said to show gold-silver-copper ore in fissure veins. Ore is a sulphide occurring in sericitic schist. The orebody strikes E.-W. and dips N. 80°. Old workings and dumps said to have a considerable tonnage of ore averaging 1 oz. gold, 4 oz. silver, and 2½% copper.

Development: by 700′ vertical shaft with 5,000′ of workings.

Equipment: includes steam power, hoist, and 50-ton hot blast copper matting furnace. Mine credited with production of $200,000 under former ownership. No recent reports.

WANAKAH MINING CO. COLORADO

Ouray, Colo.

Property sold at Sheriff's sale during 1916. Mine now owned by Bright Diamond Mining & Milling Co., which see.

WARD GOLD COIN MINING CO. COLORADO

J. F. Weber, mgr., Ward, Colo.

Reported, 1919, to have purchased the Ward Gold Coin mine group and 2 mill-sites, near Modoc Lake, Ward, Boulder county. Mine is said to show a vein 5-15′ wide carrying iron-gold-silver-lead sulphides. Developed by 218′ shaft.

WARD MINING & MILLING CO. COLORADO

Office: 215 Coronado Bldg., Denver, Colo.

Inc. in Colorado. **Cap.,** 2,000,000 shares, par 1 cent.

Property: 14 claims, Pine mining district, Gilpin county, opened by a 150′ shaft and 100′ of drifts. Ore claimed to have assayed over $100 a ton.

WASATCH COLORADO MINING CO. COLORADO

W. A. Franklin, mgr., Georgetown, Colo.

Operating the Mendota mine at Silver Plume, Clear Creek county. The lead ore is concentrated at company mill; zinc is shipped to local sampling plant. A large mill was to be erected in 1919, and the smaller plants reserved for use of lessees and custom business.

WASHINGTON MINE COLORADO

Ray Meyers, mgr., Breckenridge, Colo. And old-time property on Nigger Hill, near Breckenridge, Summit county, operated under lease. Ore treated in 20-stamp mill, and silver, lead and gold concentrates shipped. A new shaft, the Christmas, was down 50′ early in 1919, and a sample of ore from this shaft was said to have returned $67 per ton. Examined by V. C. Alderson.

WELLER GOLD MINING CO. COLORADO

Idle.

J. C. Weller, mgr., Telluride, Colo. Operated the Ballard mine near Telluride, San Miguel county, Colo. Last reports received were in 1915, when company was reported shipping bullion twice a month.

Equipment: included pipe-line, tramway, 10-stamp mill fitted with plates and concentrating tables.

WELLINGTON MINES CO. OF COLORADO COLORADO

Office: 1000 Grand Avenue Temple, Kansas City, Mo. **Mine office:** Breckenridge, Colo.

Officers: J. W. Oldham, pres.; Clifford Histed, v. p.; C. Charpiot, sec.-

treas., with Jas. H. Harless, W. B. Burget, directors. R. M. Henderson, gen. mgr.

Inc. June 12, 1906, in Arizona. **Cap.**, $10,000,000; $1 par; all outstanding. Company office in Kansas City, transfer office and registrar. Annual meeting, first Monday in June. The company organized in Arizona was only a holding company, property being operated by the Wellington Mines Co. of Colorado, which had a capital of $50,000. To reduce taxation the former was dissolved and the present company reorganized Jan. 16, 1917, with a capital of $1,000,000; shares $1 par. Company has over 5,000 shareholders.

Receipts in 1918 totaled $735,640, of which concentrates yielded $724,926. Expenditures amounted to $349,322. Cash on hand Nov. 30, 1918, $407,984.

Dividends: 1915, $300,000; 1916, $600,000; 1917, $400,000; 1918, $200,000, and Jan. 2, 1919, $100,000. The total is $1,950,000.

Property: 15 patented claims, 75 acres, at Breckenridge, is said to show lead and zinc sulphide ore in a fissure vein in diorite; dip 60° S.; strike N. 50° E. Pay ore occurs in shoots and is said to give average assays of 3% lead, 18% zinc, 23% iron, 15 oz. silver.

In September, 1917, the Dives-Pelican claims at Silver Plume were acquired.

Development: by one vertical and incline shaft and several tunnels, longest 1,800′. Greatest depth of workings, 1,000′; total linear extent several miles. Orebody is mined by stulling method. In 1918, 3,340′ of work was done. Ore extraction was confined to the Great Northern vein, a total of 40,242 tons being mined. The Wellington vein was opened on the 6th level 500′ west of shaft and drifted on for 500′. Good-grade ore was reported. The company expects to open the Siam vein, and if workers are available, other veins during 1919.

Equipment: includes double-drum electric hoist, 500 cu. ft. compressor pumps, 1,800′ tramway, all electrically driven. There are two mills, a concentrator, and a plant for roasting and magnetic separation, with a capacity of 2,000 tons monthly. During 1918, the transformer capacity was doubled and an electric hoist to equip ore shaft for the developing of the Siam vein was purchased.

Production: in 1918, 39,295 tons of ore carrying 25% zinc was crushed and there were produced 16,631 tons of 49.6% zinc concentrates and 184 tons of lead concentrates assaying 25.7 oz. silver and 36% lead; 2,681 tons of iron tailings from No. 2 mill was shipped to the smelter. There was 947 tons of 45.7% zinc ore sent direct to smelter.

Wellington Mines is now a highly profitable concern, handling a complex ore in a satisfactory manner.

WENTWORTH MINES CO. COLORADO

Address: Westcliffe, Custer county, Colo.

Inc. in Colorado. **Cap.**, $500,000; $1 par.

Property: 100 acres in the Westcliffe district, near the Black Friday, Boldomingo and other mines.

Development: by 5 shafts from 20 to 57′ deep, said to show "remarkable and unusual ore."

A prospect launched about mid-1919.

WESTERN DEVELOPMENT CO. COLORADO

Office: Boatmen's Bank Bldg., St. Louis, Mo., and 129 W. 8th St., Leadville, Colo.

Officers: C. J. Walker, pres.; E. T. Cash, v. p.; W. H. Mann, sec.; J. E. Allen, treas., with W. M. Edinger, directors.

Inc. March, 1913, in Maine. **Cap.**, $2,250,000 common and $750,000 preferred, of which all the common and $500,000 preferred is outstanding March 1919. Dividends paid amount to $100,000.

Is a holding company, its principal assets consisting of the entire capital stock of the Down Town Mines Co. of Leadville, Colo., which see.

WESTERN SLOPE COPPER MG. & SM. CO. COLORADO

Formerly operated in Unaweep district, Colo. Out of business, bondholders have taken over property. For description, see Vol. XII.

WESTERN TUNNEL MINING CORPORATION COLORADO

J. H. Marshall, mgr., Idaho Springs, Colo.

Reported, late in 1918, to have taken over the property of the Vindicator Mines and Tunnel Co. of Idaho Springs, Colo., which see.

Plan to add a new compressor and a flotation unit to the mill. Company believed financed by Cleveland capital, which is to spend $200,000, starting in spring of 1920.

WEST SIDE MINING CO. COLORADO

Georgetown, Colo.

Reported early in 1919, to be driving the Hall tunnel now 3,000′ long and at same time drifting on the lodes cut by it.

Equipment: includes 24″ track with 40 pound rails and a 4″ air line installed to the heading.

WHITE RAVEN MINES COLORADO

Address: L. A. Ewing & Co., owners, Ward, Colo.

Property: the White Raven mine and Rook mine, in Boulder county. The White, though located on the edge of the gold sulphide belt produces silver and high-grade lead. The Rook mine, located a mile S. W. of Puzzler station, is a new silver-lead property.

Development: at White Raven, the drifts and crosscuts have been so extended that 5 distinct reserve ore shoots have been blocked out, not including the main chimney which has been worked out from tunnel level to apex, and down to the 900′ level. The Rook is developed by a 200′ shaft and some drifts opening a vein 7 to 10′ wide.

Equipment. a concentration plant was reported in course of construction in 1919.

WIDE WEST MINING CO. COLORADO

Address: Joseph Terry, Silver Plume, Colo.

Operating 30 claims on Leavenworth Mountain between Georgetown and Silver Plume. Tunnel 2,700 long, is to be driven an additional 500′ to cut the veins of the Wide West group.

Equipment: includes compressor and electric power.

WIN-U-WILL M. & M. CO. COLORADO

Address: 807 Central Savings Bank Bldg., Denver, Colo.

Officers: A. M. Beam, pres.; J. A. Beam, sec.; L. J. Beam, asst. sec.; Frank Potts, treas.

Inc. July 30, 1917, in Colorado. **Cap.,** $50,000; $1 par.

Property: about 10 claims at Ward, Boulder county, including the Little Giant.

Development: by a 900′ shaft and 1,400′ of driving. No stoping has been done below 100′.

WOLF TONGUE MINING & MILLING CO. COLORADO

Office: 1541 Oliver Bldg., Pittsburgh, Pa., or 1137 Pearl St., Boulder. **Mine and mill office:** Nederland, Colo. William Loach, gen. mgr. W. T. Todd, supt.

Property: about 600 acres, including the Cold Spring and other mines in the 75-acre Beaver group, a mile south of Nederland, and the Clyde mine of the Ranch group, 3 miles N. E. The Cold Spring mine is leased to Geo. Retallack and others.

Ore: the principal ore mineral is ferberite, iron tungstate, occurring in veins in granite or pegmatite. Orebodies are commonly in the form of small lenses a few feet in length. The Cold Spring mine has a vein showing a 6′ face of ore with 12″ ore streak containing 57% tungstic acid in a shoot 150′ long on the 300′ level. Twelve men were reported working in 1919. For full description of Colorado tungsten ores see Bull. 583 of U. S. Geol. Survey by Hess & Schaller, 1914; also Bull. 652 by F. L. Hess, 1917.

The greater part of the mining is done by lessees who are paid for shaft sinking and ship their ore to the company's mill; the company receives as royalty 25% of the net proceeds, after deducting treatment charges.

In its leasing system the company supplies lessees with hoists, shaft houses,

timber, rails, piping, ore cars, etc., and loans money for development when certain work is started. Company operates its own 50-ton mill.

YELLOW PINE MINE **COLORADO**

Owned by Ralph Cotten, Boulder, Colo. J. W. Pherson, mgr., Crisman, via Boulder, Colo. Worked by lessees.

Mine on Sugar Loaf Mountain, above Crisman, Boulder county. Development by 6 tunnels and 5 miles of workings. Reported to have been a big silver producer in the past.

YOUNGSTOWN-GILPIN MINING CO. **COLORADO**

Office: 1200 Mahoning Bank Bldg., Youngstown, Ohio.

Officers: D. J. Lynn, pres.; Geo. Rudge, Jr., v. p.; H. B. Lynn, sec.; Chas. Ephraim, treas.; Geo. E. Collins, mgr.

Inc. 1908, in Colorado. **Cap.,** $1,500,000; $1 par. Transfer office, 120 Wick Ave., Youngstown, Ohio.

Property: 2 patented claims, about 5 acres, on Quartz hill, Gilpin county. Mine shows gold, silver and copper in quartz vein and patch deposits.

Development: by 700′ shaft and 600′ tunnel. **Equipment:** includes a compressor and 30 h. p. hoist.

ZUNI MINE **COLORADO**

Taken over under lease, early in 1918 by J. Anderson and E. Jackson.

Property: on Anvil Mountain near Silverton, San Juan county. The ore occurs in chimney deposits and contains gold, silver and copper. Property formerly idle many years though said to have been a large silver producer.

CRIPPLE CREEK DISTRICT

ACACIA GOLD MINING CO. **COLORADO**

Office: 205 Burns Bldg., Colorado Springs, Colo., **Mine office:** Cripple Creek, Colo. K. Mackenzie, pres.; J. Yeomans, sec.-treas.

Cap., $1,500,000; 5 cts. par; outstanding, Jan. 1, 1916, 61,011 shares. Gross production to Jan., 1919, $1,460,321. Cash and securities on hand, Jan. 1, 1918, $17,635. No liabilities. Annual meeting in January.

Dividends: to January, 1920, $136,703; last dividend, December, 1912, $14,389.

Property: the Burns and Morning Star claims, patented, 20 acres, on Bull hill, Cripple Creek. Developed by a 425′ shaft with over 2,000′ of work, on the Morning Star, and 3 shafts on the Burns claim, one a double compartment with depth of 1,450′ and a mile of underground workings. Shipping ore on 1,400′ level averages about $15 per ton. A second shaft, 350′ deep, has 3,390′ of drifting, and a third, 825′ deep, has 3,600′ of drifting. Operations have been restricted on account of high costs, but shipments resumed in Sept., 1919. Parts of the mine are leased. During 1918, about 700′ of development work was done.

AJAX GOLD MINING CO. **COLORADO**

See Colburn-Ajax Mining Co.

ALBERT BEACON GOLD MINING CO. **COLORADO**

Office: Cripple Creek, Colo.

Officers: at last accounts, Frank Vetter, pres.-treas.-gen. mgr.; F. W. Revoice, v. p.; John R. Dunn, sec., with Wm. Y. Seaman, D. W. Kilpatrick and A. M. McVicar, directors.

Inc. May, 1916, in Colorado. **Cap.,** $250,000; 10 cts. par; 1,602,825 shares in treasury, Jan. 20, 1917. Annual report for 9 months, ending Jan., 1917, showed net receipts from ore shipments and stock sales, $11,596; expenditures for the same period amounted to $10,577.

Company had a 3-year bond and lease to purchase the Prince Albert mine, with option to purchase for $50,000; all royalties paid on ore shipments during life of lease were to apply on the purchase price.

Property: the Prince Albert, Beacon and Eureka claims, 26.42 acres, patented, on Beacon hill, Cripple Creek, Teller county, credited with a past production of $1,000,000. Company's literature closely resembled that of a stock-jobbing scheme. Reported merged, May, 1917, with Gold Camp Syndicate, and the Victory Gold Mining Co., which see. No 1918 report received.

ALOHA GOLD MINING CO. **COLORADO**

Property: the Coriolanus mine on Battle mountain, Cripple Creek, Colo., adjoins Colburn-Ajax Mining Co. on the north.

Ore: gold ocurs in footwall of intrusive dike, phonolitic in character. See Colburn-Ajax Mining Co.

ANCHORIA LELAND M. & M. CO. **COLORADO**

Address: Cripple Creek, Colo.

Inc. about 23 years ago. **Cap.,** $600,000; $1 par. Irving Howbert, principal stockholder; Chas. Howbert, **mgr.**

Property: Anchoria mine on Gold hill, Cripple Creek, is one of the old-time producers and dividend payers. In 1914 the company had a debt of $30,000, due to attempts made in recent years to open up new orebodies. The mine had been worked down to the barren zone, reaching from a depth of 500′ to 1,000′, the lowest development. No recent returns secured.

BACKOFF LEASING CO. **COLORADO**

Office: St. Louis, Mo.

Company operates the Midget and Bonanza King mines of the Midget Consolidated Gold Mining Co., in Gold Hill, Cripple Creek, Teller county. Work was suspended on December 15, 1917, but resumed in February, 1919. Ten sets of sub-lessees reported at work.

BANNER GOLD MNG. CO. **COLORADO**

Address: 317 Exchange National Bank Bldg., Colorado Springs, Colo.

Officers: J. T. Hawkins, pres.; J. R. McKinnie, v. p.; E .C. Sharer, sec.-treas.; A. D. Aitken, asst. sec.-treas.

Cap., $2,000,000; $1 par. Treasurer's statement, Jan 1, 1916, showed 11,000 shares in treasury, and $185 cash on hand. At last accounts taxes paid to 1915; liabilities, $490. Last stockholders' meeting June, 1903. Listed on Denver and Colorado Springs Exchanges.

Property: 7 claims, patented, 68 acres, on Beacon hill, Cripple Creek, show 3′ fissure vein, containing gold and silver, and the C. K. & N. vein, 3′ wide where cut.

Development: 90′, 110′ and 400′ shafts, with prospecting on 3 levels. Worked through the 700′ level on the Henry Adney shaft on adjoining property. Latest reports give the gross production to 1916 as $8,149.

BEACON MINES CO. **COLORADO**

Address: J. S. Anderson, supt., Cripple Creek, Colo.

Property: company has a lease on part of the El Paso Extension ground, and in August, 1919, found a rich shoot of gold ore on the 400′ level. The deposit has been opened for 300′, and shipments have realized $200 per ton.

BERTHA B. MINE **COLORADO**

Property was reported sold, May, 1919, to the Blue Flag Gold Mining Co., which see. Mine is on Raven hill, Cripple Creek, adjoining the Blue Flag and the Cresson Consolidated Gold Mining Co.'s claims.

BIG THOMPSON MINE **COLORADO**

Formerly worked by L. G. Carlton and I. T. Russell, Elkton, Colo. H. Chapman, lessee of the Elkton Consolidated M. & M. Co., is now reported as operator.

Property: the Big Thompson mine, an old-time producer, near Elkton, Teller county. Ore occurs in vein 15 to 25′ wide, reported to average $14 per ton; mined by stoping. See Elkton Consol. Mining & Milling Co., in this volume.

BLUE FLAG GOLD MINING CO. **COLORADO**

Office: 703 Exchange Bldg., Denver, Colo.

Officers: J. F. Erisman, pres. and gen. mgr.; Jos. S. Pigall, v. p.; Jos. J. Gunnell, sec.-treas.; W. B. Warren, asst. sec.-treas; A. R. Ulrich, D. A. Schaffnit, J. M. Burkhart, R. S. Burns, J. A. Dingwall, directors. Company is a close corporation.

Inc. in Colorado. **Cap.,** $3,000,000.

Balance sheet of July 31, 1919, showed current assets of $39,695, and liabilities of $188,473. The profit and loss account, with a total loss of $403,914 brought forward, was increased to $424,111.

Properties: Blue Flag mine on Raven hill, Cripple Creek; the Laurium group at Breckenridge; also holdings in the Harshaw mining district, Ariz.; the Yellow Jacket placer in Idaho, and at Ballarat, Calif. Reported in May, 1919, that company had purchased the Bertha B and the Rattler lodes, comprising about 12 acres, on Raven hill, Cripple Creek.

The Blue Flag main shaft is 1,250′ deep; management planned general development and further sinking to connect with the Moffat tunnel at depth of 1,150′, from where a drift will be continued to the Scott shaft of the War Eagle Cons., which controls the tunnel. This will perfect ventilation and make a public transportation tunnel. The Blue Flag has a 150-ton cyanide mill.

The Laurium group is developed by tunnels, one over 1,800′ long. Ore carries gold, silver, lead and zinc. Property is equipped with 100-ton mill, operated 1917, but shut down after a short campaign. In September, 1919, the workings were being cleaned out preparatory to resuming development.

BUCKEYE MINES & MILLING CO. **COLORADO**

Office: Colorado Springs. **Mine:** Cripple Creek, Colo.

Officers: E. S. Johnson, W. J. Shinn, R. C. Argo, of Colorado Springs. **Inc.** in Colorado. **Cap.,** $50,000.

At last reports was operating property of the Blue Bird Gold Mining & Milling Co. on Bull hill, Cripple Creek, developed by the Blue Bird shaft, down 1,875′.

CAMP BIRD MINING, LEASING & POWER CO. **COLORADO**

Office: Pitkin, Gunnison county, Colo.

Officers: T. R. L. Dougherty, pres.; F. E. Gilbert, v. p.; C. Gilbert, sec.; G. R. Calhoun, treas.

Inc. in August, 1914, to operate the Camp Bird mine, located between Pitkin and Bowerman. The mine is said to have produced high-grade gold ore. Management at last accounts was sinking a shaft with intention of crosscutting 80′ to the old mine workings at a depth of 230′.

The property of the Rose Nicol Gold Mining Co., on the northwestern slope of Battle Mountain, at Cripple Creek, was reported leased to the Camp Bird Mg. Leasing & Power Co., for a six-year term starting Jan., 1917. Company refused information for publication.

CAROLINA MINING CO. **COLORADO**

A Boston corporation, E. M. Rabb, supt. Operating under bond and lease, the Colburn-Ajax property on Bull hill, Cripple Creek, Colo.

Development: by 2,000′ shaft. Orebodies are 250′ long and 4 to 8′ wide, with ore reported to average better than $20 per ton.

CATHERINE GOLD MINING CO. **COLORADO**

Mine office: Bull Hill, Victor, Teller county, Colo.

Officers: C. R. Street, pres.; H. C. Eddy, v. p.; John A. Gallagher, sec.-treas., with C. Harding and W. Bigby, directors, all of Chicago, Ill. Chas. Walden, mgr., Victor, Colo.

Company was reported to have taken a 5-year bond and lease in 1917 on the Last Dollar mine, adjoining the Modoc, in the Cripple Creek district.

Merger arrangements said to have been completed by which the Modoc Cons. Mines Co. would operate the Last Dollar mine, but no confirmation was obtainable.

Equipment: a brick and stone shaft-house was erected, and an electric compressor reported installed in 1918.

C. K. & N. MINING CO. **COLORADO**

Address: Cripple Creek, Colo. G. A. Macdermid, gen. mgr.; H. Christiansen, supt.

Property: the C. K. & N. mine, 5.3 acres, on Beacon hill, Cripple Creek, shows veins 3 to 4′ wide. Ore occurs in shoots, and is said to average $20 to $30 gold per ton.

Development: by 860′ shaft.

Production: at last reports amounted to about 550 tons of ore monthly. Mine worked by lessees was a steady producer for many years and is credited with a total output of over $1,350,000.

C. O. D. CONS. GOLD MINING & DEVELOPMENT CO. COLORADO

Address: Cripple Creek, Colo.

Officers: L. A. Van Tilborg, pres.; Claude Sachs, sec.-treas. E. J. Evans, supt.

Inc. 1915. **Cap.,** $200,000; shares 10 cts par.

Organized to operate the C. O. D. mine in Poverty Gulch, Cripple Creek, Teller county, which was one of the old-time producers, credited with an output of $1,000,000 in gold. The mine was closed down years ago as a result of drainage difficulties and was in litigation for a number of years. The El Paso and Roosevelt drainage tunnels have since lowered the water level 1,000′ or more below the lowest workings of the mine. The main 3-compartment working shaft was bottomed at 800′, with the 10th level the lowest. The first ore was shipped in September, 1915.

Equipment: includes a 65-h. p. air compressor.

In Sept., 1918, a liberal leasing policy for the development of the mine was reported decided on.

COLBURN-AJAX GOLD MINING CO. COLORADO

Address: 416 E. 10th Ave., Denver, Colo. **Mine address:** Victor, Colo.

Reported Dec., 1916, to have bought the Ajax Gold Mining Co. for $480,400.

Officers: E. A. Colburn, pres.; Wm. Lennox, v. p.; B. L. Gorich, sec.-treas., with E. A. Colburn, Jr., and C. H. Dudley, directors.

Cap., $500,000; $1 par; none outstanding.

Property: 11 claims patented, 33 acres, on southwest slope of Battle Mountain, Cripple Creek mining district, show quartz fissure veins in granite, phonolite, and basalt. Veins dip 72° S. W. with strike of N. 32° W. Pay-ore occurs as telluride. Lessees found good gold ore in the Ajax mine from the 400′ to the 2,000′ levels. The veins are from 2 to 4′ wide, and the ore is probably the extension of ore-shoots previously worked. Average grade of ore shipped in 1917 was $18.64 per ton.

Development: is by means of the 2,000′ Ajax shaft, with over 14 miles of underground workings.

Equipment: includes a steam hoist and 40-drill air-compressor. Output to date said to total $5,000,000. Property operated by lessees, the Mexican Metals Co., has a 5-year lease on the Ajax mine, from 1917, and the Carolina Mining Co. was also reported working on the mine.

CONSOLIDATED MINES & REDUCTION CO. COLORADO

Office: 433 Century Bldg., Denver, Colo., **Mine office:** 412 E. Bennett Ave., Cripple Creek, Colo.

Officers: P. A. Burns, pres.; R. A. Schwab, v. p.; John H. Gallup, sec.-treas.; J. B. Conger, gen. mgr., with W. W. Oliver, directors.

Inc. March 10, 1916, in Colorado. **Cap.,** $1,200,000 common and $300,000 preferred stock; $1 par.

Property: the Mary A and Ella W. claims on Tenderfoot Hill, in the Cripple Creek district; the Kittie Wells No. 2 mine and a millsite on Carbonate hill; the Buckhorn mine, adjoining the Kittie Wells on the east, and the Tenderfoot Hill mine. The Ella W., developed to a depth of only about 85′, opened a vein for 100′ along the strike, said to be 20′ wide and to assay $20 to $50 per ton.

The Tenderfoot Hill property is said to show ore in vein 1′ to 22′ wide, assaying $3.20 to $75 gold per ton.

Development: the 700′ Tenderfoot tunnel with drifts and crosscuts.

Equipment: a 30-h. p. hoist and an 8-drill electric air compressor.

Production: claimed to have shipped 20 cars ore in first 3 weeks of March, 1916. Planned building a 250-ton mill and cyanide plant, sinking a third shaft, extending the Tenderfoot tunnel an additional 700′, and adding a 6-drill air compressor to the tunnel equipment. Company sent out much expensive advertising and is evidently in the hands of the "promoter." No reports since July, 1916, are available.

CO-OPERATIVE MINING & LEASING CO. COLORADO

Officers: A. LaMontague, mgr., Cameron, Colo.; C. D. Taylor, sec., Colorado City, Colo.

Property: at last reports company was operating a lease on school section 16, which adjoined the Isabella mine.

Development: 1,500′ of drifting on upper levels and 875′ shaft with levels at every 135′. In the lower levels a stope 600′ long, 6′ to 8′ wide and 125′ high, was reported to average $12 to $14 a ton, but could not be mined owing to mine water. Company had 200,000 tons of tailings said to run $3 per ton.

CRESSON CONSOLIDATED GOLD M. & M. CO. COLORADO

Office: 800 Exchange Nat'l Bank Bldg., Colorado Springs, Colo. **Mine office:** Cripple Creek, Colo.

Officers: A. E. Carlton, pres.; C. K. Boettcher, v. p.; A. F. Zang, sec.; E. P. Shove, treas., with S. Penrose, T. B. Burbridge, C. M. MacNeill, L. G. Carlton, I. T. Snyder, directors. A. L. Blomfield, gen. mgr.

Inc. Sep., 1894, in Colorado, with original capitalization of 1,000,000 shares, $1 par value. In 1907, corporate life renewed and capital increased to 1,250,000 shares, $1 par; of which 1,220,000 are issued. Listed on New York Curb and Colorado Springs Mining Exchange. Columbia Trust Co., New York, transfer office. Shares sold for $2 in Dec., 1919.

For year ended August 31, 1918, ore sales, etc., amounted to $1,651,683. Operations cost $463,297; depreciation, $17,000; net profit was $1,188,386. For the same period of 1919 the net value of ore sold was $1,089,000, but dividends amounted to $1,464,000.

Dividends: total to Sept., 1919, $8,613,162. In 1916, 85%; 1917, 120%; since Sept., 1916, paid 10c. per share monthly to September, 1919. In October, it was announced that "future distributions at the rate of 10 cents a share will be made from time to time as the net proceeds of the mine will permit, in view of labor and other mining conditions. . . . "

Property: 49 acres on Raven hill, Cripple Creek, was considered of little value, until 1914, when a sensational discovery was made in a cave, 14′ by 33′ by 36′, found on the 1,200′ level, whose walls were coated and lined with rich telluride of gold. One shipment returned $468,637. The former owners divided $1,200,000 in first half of 1915, and in July, 1916, sold property to the present company for over $4,000,000.

Development: by a two-compartment shaft 1,600′ deep with intermediate levels at 100′ intervals. For the year to August 31, 1918, drifts, crosscuts, etc., totaled 8,238′, together with diamond-drilling 4,540′. In addition, 886′ were driven to connect main shaft and the 1,603 orebodies with Roosevelt drainage-tunnel.

Ore reserves: in Feb., 1919, Louis R. Noble reported net value of fully developed reserves as $2,537,889. In August, the value was about $2,100,000. This amount does not, however, include a rich strike reported on the 10th level, estimated to be 60′ by 8½′, and assaying $40 per ton. High assays on this ran to $300 per ton.

Production: for year ending Aug. 31, 1918, company shipped 89,730 tons of ore of net value of $1,628,188, after deducting freight and treatment charges. Company production for that period aggregated 9,028 lb. of pure gold. Lessees produced 1,599 tons which gave royalty of $2,539. For period of August 31, 1919, shipments of 95,000 tons returned $1,089,000 net.

Profits in July, 1919, had shrunk to $36,000, due partly to labor shortage, and partly to a lower grade of ore being mined. It would seem that unless new work discloses other rich pockets, profits will be greatly curtailed in the future. Shareholders have received very handsome returns on their investment, but the shares have declined from $4 to $2 in 1919, discounting the mine's future.

CRIPPLE CREEK DEEP LEASING CO. COLORADO

Probably idle.

Inc. in 1915. A close corporation, 50% of the stock being held by the Milltown Extension Gold Mining Co., a Nevada corporation, and the remainder by those controlling the Jerry Johnson mine. The Cripple Creek Deep Leasing Co. had a lease on the workings of the Jerry Johnson mine below the 650′ level. The property is described under title of Jerry Johnson Gold Mining Co. The

lease ran from 1915 to 1918, when company claimed it was impossible to operate lease at a profit during the war and forfeited same.

During 1918 shipments averaged $17 per ton. Information on company operations kept secret.

CRIPPLE CREEK DRAINAGE & TUNNEL CO. COLORADO

Colorado Springs, Colo.

Officers: A. E. Carlton, pres., with Irving T. Snyder, R. Roelofs, Irving Howbert, executive committee; Colo. Title & Trust Co., treas.; W. R. Waterton, sec.; T. R. Countryman, engr.; C. H. Fuller, supt.

Cap., $1,000,000; $1 par.

Company drove and controls a drainage tunnel through properties of Cripple Creek producers, from western slope of Grouse Mtn. toward the Golden Cycle and Vindicator mines at the N. E. end.

The tunnel as originally driven had a length of about 14,300′. In sections it is 9′ wide, 7′ high, with a ditch on one side, 2′ deep and 4′ wide. Grade is 0.3%. Average cost per foot of tunnel was $27.27, the cost being defrayed by the larger companies of the district. An extension financed in the same manner was completed during 1918, giving the tunnel a total length of 22,000′. This extension, a little over 7,700′ long, passes under the Golden Cycle and Vindicator mines, cutting latter at 1,950′ vertical depth.

In 1918 the water was flowing at an average rate of 3,000 gallons per minute.

CRIPPLE CREEK GENERAL MINING & EXPLORATION CO. COLORADO

Believed out of business. Mail returned, unclaimed, June, 1919, from Cripple Creek, Colo.

Officers: at last accounts were Geo. S. Ryan, pres.; S. N. Francis, v. p., with H. T. Hartman, E. A. Ritter and O. H. Nelson, directors. M. M. Belshe, sec.-treas.

Inc. in Colorado. **Cap.**, $200,000; shares 10 cts. par. Treasury, 1,250,000 shares.

Property: 5 claims, 25 acres, patented, on Bull, Raven and Ironclad hills at Cripple Creek. Developed by a 300′ shaft, 3 shallow shafts and a tunnel, all on the Katie Hollis claim. Reported merged, 1917, with the Victory Gold Mining Co., which see. No 1918 report obtainable.

CRIPPLE CREEK GOLD MINING CO. COLORADO

Address: Victor, Teller county, Colo. Company is a close corporation. Geo. Harris, mgr.; B. J. Corbett, supt.

Property: the Kohyneo mine at Victor, first worked about 14 years ago, operated unsuccessfully for a time, closed down and again reopened in 1914.

Ore: shows gold-quartz ore in veins 18″ to 24″ wide, in contact between black schist dike and granite country rock.

Development: 220′ shaft and drifts on the Strong vein, which traverses the property. Shaft was to be sunk an additional 300′. Two levels said to show large bodies of fair grade ore, and a few shipments reported to have assayed $15 per ton.

Equipment: hoist, air compressor, electric compressor, and 80-h. p. boiler. No recent information.

DANTE GOLD MINING CO. COLORADO

Office: 317 Exchange Bank Bldg., Colorado Springs.

Officers: L. L. Aitken, pres.; W. Arthur Perkins, v. p.; A. D. Aitken, sec.; Thos. A. Dines, treas.E. P. Arthur, Jr., supt.

Inc. 1895, in Colorado. **Cap.**, $1,250 000; $1 par; all issued. Company has no liabilities, and had $17,555 cash and $1,575 securities in the treasury, Jan. 1, 1919. Stock listed on the Colorado Springs Mining Exchange. Charter renewed Nov. 25, 1915, for 20 years.

Property: Dante mine, about 10 acres, patented, in Sec. 20 on Bull Hill, Cripple Creek, is under 5-year lease from April, 1916, to the Big Toad Mining and Milling Co. Said to show gold ore averaging $20 per ton. Late in 1918 a strike of ore assaying $25 per ton was reported cut on the 600′ level by a sub-lessee.

Development: 850′ shaft with 6,500′ of crosscuts and drifts, 520′ shaft with 3,800′ of crosscuts and drifts.

Equipment: 75-h. p. hoist, air compressor, complete machinery plant, 1,000′ of cable and surface buildings. During 1918 a cyanide plant with a daily capacity of 50 to 75 tons was installed to treat low-grade ores.

Production: (gross) to Jan. 1, 1919, $1,213,136; gross production for 1918 from mine, $87,758.

DAY STAR MINES CO. **COLORADO**

Main office: Marion, Ind. **Mine office:** Pitkin, Gunnison county, Colo. **Inc.** 1906, in Colorado. **Cap.,** $1,000,000; $1 par; 700,000 shares outstanding. Annual meeting in August.

Officers: Isaac R. Wagoner, pres.; Edwin Caldwell, sec.; J. H. Deakin, treas.; John E. Clark, gen. mgr., all of Marion, Ind.

Property: 19 lode mining claims, 40 acres of placer ground and a mill-site in Quartz Creek, a total of 198 acres, about 9 miles from Pitkin, Gunnison county.

Development: in 1918 management reported that three tunnels, 650′, 140′ and 180′ long respectively, had been driven on a vein showing ore said to run 92 oz. silver, 4.35% copper, $40 gold, 20% lead, and 20% zinc.

DEADWOOD LEASING CO. **COLORADO**

Mine office: Victor, Teller county, Colo. Samuel Stumpff, mgr.

Operating the Deadwood mine, on Bull hill, Cripple Creek district, under lease from the United Gold Mines Co. In 1918, while following a drift from the Williams shaft toward the Victor-Pauper vein, company is reported to have struck an 8″ vein of sylvanite, assaying 30 oz. gold per ton.

DEXTER GOLD MINING CO. **COLORADO**

A close corporation controlled by Eastern capital.

Property: the Dexter mine, on Bull hill, Cripple Creek, under lease to C. W. Benkleman, of Denver, and Anderson Bros., of Victor. Gold ore occurs in veins, 4′ wide and proved for 175′.

Development: by 1,300′ shaft, crosscuts and tunnel. Mine was a steady producer for several years. Average output amounted to 600 tons monthly, showing values from $10 to $30 per ton.

Equipment: compressor, power plant and surface buildings.

Company plans development to the 1,400′ level, but results of recent work have not been received.

DIG-GOLD MINING CO. **COLORADO**

Address: J. B. Rondes, sec., Denham Bldg., Denver, Colo.

Inc. 1915. **Cap.,** $150,000.

Property: the Alpha and Omega mines, on Gold hill, near Cripple Creek, Teller county.

Ore occurs in a vein, 5′ wide on 200′ level, and is said to assay from $9 to $60 per ton in gold. Surface work said to show a number of veins containing low-grade ore.

Development: by 270′ shaft on line between the two claims. Mine is drained to 200′ level by the Roosevelt tunnel.

Equipment: includes hoist and air compressor.

Property reported to be shut down early in 1919, but was to reopen in latter part of year.

DOCTOR JACK POT MINING CO. **COLORADO**

Offices: First Nat'l Bank Bldg., Cheyenne, Wyo., and Cripple Creek, Colo.

Officers: A. E. Carlton, pres.; V. H. Mann, sec.-treas.; L. G. Carlton, mgr., with H. L. Shepherd, Ira Harris, A. M. Stephenson, directors.

Inc. Aug. 31, 1905, in Wyoming. **Cap.,** $75,000; shares 2½c. par; $71,160 outstanding; non-assessable. Colorado Title & Trust Co., Colorado Springs, transfer agents. Annual meeting second Wednesday in June. Listed in Colorado Springs and Denver. Balance sheet Jan. 1, 1918, shows cash $63,356, accounts receivable $566. No liabilities.

Receipts for 1918 amounted to $3,579, expenses $13,500, depreciation, etc.,

$331; total loss for year $10,252. Company reported affairs inactive for 1918. Company furnished air and supplies to lessees. Unable to secure lessees for latter part of the year.

Dividends: to Jan. 1, 1919, $143,264; last dividend, $30,000, paid Dec., 1916.

Property: 15 claims, 99.3 acres, patented, on Raven hill, Cripple Creek, said to show gold ore in fissure veins. Three fractional claims were purchased at a cost of about $5,000, in 1916.

Development: tunnels and vertical shafts, amounting to several miles of underground workings with deepest at 900′. The Raven tunnel is over 3,000′ long. A total of 577′ of work was done in 1916 without developing any ore.

Equipment: includes a 52 h. p. electric hoist and air compressor. Electric power is used. A tramway was erected in 1918 to the Ingham dump.

Production: in 1918, leases produced 524 dry tons of ore with gross value of $6,025, netting company $1,129. In 1916 the output was 15,216 tons of $7.47 ore. The total output of this mine, 1903-1919, is about $2,850,000.

EAGLE ORE CO. COLORADO

Operates ore sampling plant at Victor, Colo. A. W. Oliver, gen. mgr.

ECLIPSE LEASING CO. COLORADO

Address: F. R. Marsh, pres.; Colorado Springs, Colo.

Inc. 1917, to operate a five-year lease on the Jo Dandy mine, Raven hill, Cripple Creek. No recent information received.

ELKTON CONSOLIDATED M. & M. CO. COLORADO

Address: P. O. Box 146, Colorado Springs, and Cripple Creek, Colo.

Officers: George Bernard, pres.; A. E. Carlton, v. p., with M. F. Stark, C. G. Kingsbury, C. B. Ferrin, D. C. Goddard, and E. P. Shove, directors. H. M. Ragle, sec.-treas.; R. P. Windsor, supt., at last accounts.

Inc. 1892, in Colorado; extended 1912 for 20 years. **Cap.**, $3,000,000; $1 par; 383,116 shares in treasury Annual meeting in February. Listed on Colorado Springs and Denver Exchanges. Company is one of the oldest in the Cripple Creek district.

Balance sheet as of Dec. 31, 1918, shows: assets, $3,406,326, which includes, property and plant, $2,649,158; treasury stock, $383,116; Cripple Creek Drainage & Tunnel Co., $98,300; cash, $1,352; accounts receivable, $2,224. Current liabilities were $21,333.

Earnings from ore sales amounted to $36,217; miscellaneous earnings, $10,103. Expenses were $52.006, making loss from operations 1918, $5,685. Depletion of mine, $36,217 less treasury stock sold, $2,400. Earnings in 1917 were $283,090.

Dividends: to Jan. 1, 1919, were $3,579,460; the last dividend paid May 24, 1915, was $50,000; previous to this date the rate had been 2c. a share quarterly.

Property: the Elkton group, 93½ acres, patented, on Raven hill, in Cripple Creek district. Company holds the Arequa lease on the property of the Raven & Beacon Hill Gold Mining Co.

Ore: is a sulpho-telluride in fissure veins in breccia and granite.

The Ida May group of claims was purchased in 1911.

Development: by shafts, with many miles of workings. The main shaft, 1,636′ deep, has 17 levels, and is connected with the Roosevelt tunnel by a raise from the tunnel-level. Since October, 1916, only lessees have operated on the property.

The 16th, 17th and 18th levels showed a decrease in value in 1916. The management believed they were in the so-called lean zone, but expected an enrichment when deeper developments were possible. No new developments up to 1920.

Production: (from the Elkton mine)

	Tons Ore	Value p. Ton	Cost p. Ton (a)	Freight & Treatment
1918	3,284	$11.40	$....	$7.04
1917	24,854	6.22	....	2.79
1916	36,036	8.09	.....	4.17
1915	16,510(b)	18.42	3.36	5.63
1914	29,509	18.37	2.62	5.34
1913	28,814	18.88	2.40	5.95
1912	29,163	19.01	2.22	5.85

(a) Total cost of ore shipped includes underground labor and sorting, sampling and loading, but not development. (b) Production was curtailed, awaiting extension of Roosevelt drainage tunnel.

EL PASO CONSOLIDATED GOLD MINING CO. COLORADO

Offices: 20 Broad St., New York; Cripple Creek and Colorado Springs, Colo.

Officers: Fred W. Bailey, v. p.; Daniel Thatcher, sec.-treas., with J. K. Corbiere, W. C. Sherwood, Geo. W. Gano, R. M. Rankin, A. E. Carlton, A. J. Stybr and G. N. Miller, directors. Owen Johnson, mine supt.

Inc. Feb. 27, 1893, in Colorado. **Cap.,** $2,450,000: $1 par: changed, 1913, to $2,500,000; shares $5 par; outstanding, 490,000 shares. No bonded debt. Stock transferred at office of secretary, Colorado Springs. Colorado Title & Trust Co., Colorado Springs, registrar. Annual meeting, 2nd Monday in April. Fiscal year ends March 31. Listed in Colorado Springs.

Dividends: (on stock of $1 par) 1903, 2½c.; 1904, 13½c.; 1905, 23c.; 1906, 7c.; 1907 and 1908, 2c. each; 1909, 1c.; 1910, 2c.; 1911, 2½c.; 1912, 5c.; (dividends on stock of $5 par): March 31, 1913, 12½c.; Feb. 25, 1914, 10c.; none since. Total dividends, $1,707,545.

Trial balance of Dec. 31, 1918, shows: assets, $3,404,819, which includes: mining property (stock), $2,500,000; mining property (cash), $92,762; stocks and bonds, $11,457; notes receivable, $215; ore in transit, $457; cash, $2,152. Liabilities show: working capital, $50,000; surplus, $69,211; vouchers payable, $1,635.

Accounts for 1918 show: company ore sales, $35; royalty, $8,287; other income, $1,780; total income, $10,102. Mining and general expenses, $14,650; loss from operations, $4,548; accounts charged off, $16,526; Magnet Rock suspense, gain, $31; loss for year 1918, $21,043.

Property: 70½ acres in the Cripple Creek mining district, including Elkton and Tornado mines developed by three shafts to a depth of 1,350′. Has been a prominent operator for a great many years. For geology of the Cripple Creek district, see 16th Ann. Rept. of Colo.; also U. S. G. S. Bull. 260, 1915, pp. 85-98. Orebodies occur at vein intersections in vicinity of phonolite dikes.

In 1915, after careful investigation it was found by new management that very little ore was in sight and it was mostly low-grade; that during 1914-15 the company had made no profits, had exhausted its treasury surplus, was about $70,000 in debt and doing business largely upon credit; that general expenses amounted to $1,500 per month and mining operations were being run at a loss of $3,000 to $4,000 per month.

Report on property by Louis S. Noble, sent out in 1917, was far from encouraging and unless some radical changes are made, stockholders will never receive another dividend.

Development: management stated that the prospects of finding pay ore below the 1,000′ level did not warrant further exploration work, and that therefore, since Jan., 1917, company had confined itself strictly to leasing. Work in 1918, excluding stoping, amounted to 1,011′ of drifting and crosscutting, accomplished by lessees.

Production: in 1918 amounted to 516 tons by the company and 2,537 tons by lessees, having gross value of $1,219 and $34,840, respectively.

In March, 1917, an "Independent Stockholders Committee" was formed with W. M. Downing, chairman; K. Macdermid, vice-chairman, and C. J. Starke, sec., for the purpose of changing the management of the company. The committee

asserted that the El Paso mine had been worked for the benefit of the Golden Cycle Mng. & Red. Co., and that if a flotation mill had been built, company could have mined its large reserves of low-grade ores, instead of having sent only the high-grade to the Golden Cycle mill. The committee also charged that the present management had shipped over 30,000 tons of El Paso ore to the Golden Cycle mill, averaging $8 to $11 per ton, on which treatment charges of $4 and sorting charge of $1 were paid, whereas, if a flotation mill had been built, the company might have treated its ores at $1 a ton and made a handsome profit.

During 1918, the hoist at the Nichols shaft was sold for $11,300. The management reported this advantageous, as the price was sastisfactory, a reduction in taxation was secured and operations were consolidated at the main shaft, reducing expenses. In March, 1919, it was reported that litigation between the El Paso Consolidated and the Katinka Co. over extra-lateral rights had been settled out of court, and operations were to be resumed at the Nichols shaft, an electric hoist taking the place of the steam engine.

Company has been promised a lease on part of the Henry Adney mine, through which the Beacon Hill-Ajax vein passes. This will be for 3 years on a 25% royalty basis.

EL PASO EXTENSION CORP'N OF WEST VIRGINIA COLORADO

Address: C. W. Hays, gen. mgr., Cripple Creek, Colo.

Property: Rocky Mountain and North Slope claims; 9.55 acres on Beacon Hill. First named claim has old 250′ shaft.

In 1918, company was reported to have taken a 5-year bond and lease on the Index mine, formerly operated by the Index Mining Co. The mine, situated on the southwestern slope of Gold hill, was idle for about 7 years. In 12 months' operations the shaft was sunk 200′ to the 1,150′ level, and company and sublessees have shipped regularly about 7 cars of ore a month, averaging better than $30 per ton.

Work has shown a promising quartz vein, 665′ from surface, and a highly mineralized dike of basalt containing sylvanite, reported to average $80 per ton.

In August, 1919, company acquired control of the Lexington Gold Mining Co.'s 13 acres on Gold Hill and the Laura D mine.

EL PASO GOLD KING MINE COLORADO

Owned by Gold King Mining Co., of Cripple Creek, in Poverty Gulch, Cripple Creek district, developed by 1,007′ shaft. Lessees were reported to be making shipments in 1918.

EXCELSIOR MINING, MILLING & ELECTRIC CO. COLORADO

Office: Interstate Trust Bldg., Denver, Colo.

Officers: F. B. Wiborg, pres.-treas.; W. F. Robinson, sec.; E. J. O'Flaherty, supt.

Cap., $250,000; $1 par, fully issued.

Property: the Excelsior mine at Frisco, Summit county, Colo., operated under lease and bond by E. Flood of Frisco, and carrying lead-copper ore with gold and silver. Developed by 2,600′ tunnel and 120′ shaft. In 1917, the mill was remodeled to a 50-ton capacity, and a flotation unit added.

Company has a lease from the Stratton Cripple Creek Mng. & Dev. Co. on the Longfellow mine, consisting of 2 claims adjoining the Golden Cycle and Vindicator mines, at Victor, in Cripple Creek district, Colo. The Longfellow mine was operated through the Golden Cycle shaft in 1916, but is now being worked through its own shaft. In 1918, a 4′ vein, with an ore band 16″ thick which assays 3 oz. gold per ton, was opened in the Longfellow mine; it is believed to be the Legal Tender vein.

Company also has a lease on the Polar Star group at Georgetown, Colo.

FAUNTLEROY GOLD MINING CO. COLORADO

Office: 317 Exchange National Bank Bldg., Colorado Springs, Colo.

Officers: Verner Z. Reed, pres.; L. L. Aitken, v. p.; A. D. Aitken, sec.-treas.

Cap., 1,250,000 shares; $1 par. In treasury Jan. 1, 1919, $29.69; no stock. All taxes paid. Liabilities $3,563. Last stockholders' meeting, April 18, 1911. Listed on Colorado Springs Exchange.

Property: 5 claims, 20.3 acres, patented, on Gold hill and Mineral hill, Cripple Creek.

Development: on the Little Fauntleroy, consists of 900′ of work done from the Ophelia tunnel at 278′ from surface. Shaft from surface also connects with tunnel. On the Garfield claim is an 80′ shaft with 100′ of drifting.

Gross production to date, $8,311.

In March, 1919, company reported the mine idle, and that no work was done in 1918.

FINDLEY MINES CO. **COLORADO**

Address: Cripple Creek, Colo.

Officers: L. G. Carlton, pres.; A. E. Carlton, v. p.; V. H. Mann, sec.-treas.

Inc. Jan. 1, 1912, in Wyoming. **Cap.,** 2,000,000 shares; par value 2½c. In treasury, Jan. 1, 1919, 750,000 shares.

Dividends: total, $337,500; last dividend paid September, 1906, by original company; amount, $12,500. Colorado Title & Trust Co., Colorado Springs, transfer office. Annual meeting 2nd Wednesday in June. Last meeting, June, 1913. Stock listed on Colorado Springs Exchange. Liabilities, $3,000 demand note.

Property: 5 claims, patented, 12.5 acres, on south slope of Bull hill, Cripple Creek, Colo.

Ore: carries gold and occurs in fissure veins. Underground workings are extensive, aggregating about 6 miles. Property fully equipped with machinery.

Litigation: Stratton C. C. M. & D. Co. vs. Findley, re extra-lateral rights to the Basket and Luce vein. The vein is being worked by lessees and royalties are being deposited in escrow pending settlement.

Production: gross to date is $1,651,183. None of this company's mines are being worked.

FLOWER OF THE WEST GOLD MINING CO. **COLORADO**

Address: Cripple Creek, Teller county, Colo.

Officers: K. C. Schuyler, pres.; N. S. Gandy, sec.-treas.

Cap., $1,500,000; $1 par. In treasury Jan. 1, 1916, 69,500 shares; cash, $10,000. Exchange Registry and Guarantee Co., Colorado Springs, transfer office. Listed in Colorado Springs.

Property: 2 claims on Squaw mountain, and 2 on Gold hill, 15 acres, patented. No recent returns available.

FOREST QUEEN MINES CO. **COLORADO**

Operating the Forest Queen mine, on the eastern slope of Ironclad hill, Cripple Creek, Colo.

Officers: R. A. Sullivan, pres.; Edwin Gaylord, v. p.-gen. mgr.; J. H. Redding, sec.-treas. Company has a five-year lease from May, 1917. Ore is said to average $15 per ton.

Regular shipments were made to the Golden Cycle mill in 1919.

FREE COINAGE CONS. MINES CO. **COLORADO**

Address: Killen, Reinert & Downey, 717 Cooper Bldg., Denver, Colo. **Mine office:** Independence, Colo.

Officers: D. L. Killen, pres.; L. N. Neff, v. p.; E. G. Reinert, sec.-treas. John B. Neville, mgr., Altman, Colo., at last accounts.

Company is successor of Free Coinage Mng. Co.

Inc. 1917, in Colorado. **Cap.,** 1,500,000 shares, one mill per share par; 395,710 outstanding.

Property: the Free Coinage group, 5 patented claims, 40 acres, in Cripple Creek district, said to carry the Pinto, Wilson, Black Dick and Pueblo veins. The Delmonico, adjoining them, was acquired for $500,000 in April, 1917. Gold production is over $1,700,000.

Development: will be through the 1,125′ Delmonico shaft, into Pinto and Wilson ground, two mines that have a $2,000,000 production. Mines are being operated by lessees. L. F. LeBrun, who had a lease on the Wilson claim, has secured a three-year extension; he has also obtained additional ground. The

lease now covers 1,300′. It was reported in 1919, that A. Edwards, of Boulder, would lease and reopen the Free Coinage mine.

GOLD BOND CONSOLIDATED MINES CO. COLORADO

Office: 234 First National Bank Bldg., Denver, Colo.

Officers: G. A. Hummer, pres.; S. R. Herber, v. p.; C. R. Slusser, sec.-treas., with I. W. Herber and Dr. Geo. L. Dewey, directors.

Inc. 1900, in Colorado. **Cap.**. $1,350,000; shares $1 par; outstanding, 1,255,000 shares.

Gross production to 1919 said to be $110,000. Company office transfers stock. Listed on Colorado Springs Exchange. Last shareholders' meeting held in 1900. No sale of stock since 1916.

Property: 4 patented claims, 18 acres, on S. W. slope of Gold hill, Cripple creek.

Ore: gold in fissure veins in granite, said to average $5 to $32.50 per ton, with 1918 shipments of $18 ore.

Development: 400′ vertical shaft with over 2,500′ workings. Worked by lessees, 1916-18, but production unknown.

GOLD BOND LEASING & DEVELOPING CO. COLORADO

Operating under lease the Cripple Creek claims of the Gold Bond Consolidated Mines Co., which see.

GOLD COIN MINING & LEASING CO. COLORADO

Office: Colorado Springs, Colo.

Officers: H. E. Woods, pres.; F. M. Woods, sec.

Cap., $1,000,000; $1 par.

Property: 280 acres in Greeley district, Weld county, through exchange of Gold Coin property at Victor, Colo. Company also reported to own 66,667 shares in the California Southern Oil Fields Co., which owns fields in Wyoming, Arizona, and California, 80% of stock of Crown Point Gold Mng. Co., and a large number of shares in Lexington Arizona Mining Co.

The Crown Point Gold Mining Co. is operating a lease on the 1,000′ level of the Gold Coin shaft.

GOLD CAMP SYNDICATE COLORADO

Address: W. Y. Seaman, 1842 Stout St., Denver, Colo.

Property: 16 acres, said to be favorably situated at Cripple Creek, Colo., but the method of raising money by boom literature, memberships ($35 per membership, three for $100), and shares of an adjoining property, were not conducive of confidence. In July, 1917, property was transferred to a trustee, then to a new company, the Victory Gold Mining Co, which see. No 1919 reports received.

GOLD DOLLAR CONSOLIDATED MINING CO. COLORADO

Stockholders voted to dissolve, in April, 1919, their interests to be conserved by surrender of old stock for shares in the New Gold Dollar Mining Co., on payment of one cent a share.

Dividends: paid to 1919, $1,000,000; last dividend, $12,500, paid Dec. 1, 1912. Company's indebtedness in 1919 was $16,310.

GOLD KING MINING CO. COLORADO

Company inactive. Fully described in Vol. XII. The El Paso Gold King mine at Cripple Creek is operated by lessees.

GOLD SOVEREIGN MINING & TUNNEL CO. COLORADO

Office: 218 Burns Bldg., Colorado Springs, and Cripple Creek, Colo.

Officers: Jas. F. Burns, pres.-treas.; John T. Hawkins, v. p.-sec., with Daniel Thatcher, A. Feringher, directors. C. G. Jackson, supt.

Charter renewed Oct. 31, 1915. Cap., $2,000,000; $1 par; in treasury Jan. 1, 1917, 195,228 shares; cash, $8,471. Listed on Colorado Springs Exchange.

Dividends: $32,559, last dividend of $5,000 paid in 1912.

Property: Gold Sovereign and J. G. Blaine claims, 7.2 acres, patented, on Bull hill (Sec. 20), adjoining the Cresson, reported under lease to the Union Leasing Co. Management believes firmly that rich Cresson veins extend into the Gold Sovereign ground. Shoots reported as 3′ wide and assaying $50 per ton in gold said to be disclosed on the 15th level.

Development: 1,350′ shaft, to be sunk an additional 200′.

Production: gross production of lessee, Union Leasing Co., for 1916, $38,559, which netted company $5,554. No later information could be obtained from company, but it is known that lessees are extracting ore from No. 9 level.

GOLDEN CYCLE MINING & REDUCTION CO. COLORADO

Office: Colorado City, El Paso county, Colo.

Officers: A. E. Carlton, pres.; E. P. Shove, v. p.; I. T. Snyder, sec.-treas., with Spencer Penrose, Richard Roelofs, H. McGarry and L. G. Carlton, directors.

Inc. in West Virginia. **Cap.,** $1,500,000; $1 par; all issued. No bonded indebtedness or preferred stock. Listed on Colorado Springs Exchange. Stock selling at $1.45 Dec., 1919.

Besides owning 50% of capital of East Colorado Springs Land Co., company controls Pikes Peak Consolidated Fuel Co., which has lands containing 15,000,000 tons of marketable coal. The Golden Cycle also holds 1,515,000 shares out of 4,000,000 in the United Gold Mines Co. of Cripple Creek.

Balance sheet for year ended Dec. 31, 1918, showed current assets totaling $1,132,616, and current liabilities $215,027.

Dividends: to Jan., 1920, total $9,453,000. The rate is 36% per annum, payable monthly.

Property: 400 acres in the Cripple Creek district. In March, 1915, the Golden Cycle mine was sold to the Vindicator Cons. Gold Mining Co. for $1,300,000. At Colorado City the Golden Cycle operates a custom mill treating up to 40,000 tons monthly of Cripple Creek ore. Plant includes rolls, roasting furnaces, and cyanide equipment.

Net earnings of mill have been as follows: $571,108 in 1909; $687,689 in 1910; $571,047 in 1911; $670,333 in 1912; $583,292 in 1913; $672,191 in 1914; $682,990 in 1915; $643,004 in 1916. No later figures available, but the plant worked continuously during 1919, save for 3 weeks when coal supply was given to the city of Colorado Springs.

These earnings do not include about $100,000 per year income from various coal properties which are owned by the company.

It is said that the company has decided to construct an electric power plant near the Pikeview coal mine, Colorado Springs, to cost $200,000. The plant will furnish power and light to its subsidiaries nearby.

GRANITE GOLD MINING CO. COLORADO

Offices: 301 Mining Exchange, Colorado Springs, and Victor, Colo.

Officers: C. M. MacNeill, pres.; C. C. Hamlin, v. p., treas. and gen. mgr.; Spencer Penrose, sec.; C. B. Garnett, asst. treas., with Michael Finnerty, E. P. Shove, C. L. Tutt, directors. A. T. Holman, supt.

Inc. 1905, in Wyoming. **Cap.,** $1,750,000; $1 par; outstanding, $1,650,000; stock transferred at company's office. Colorado Title & Trust Co., Colorado Springs, registrar. Annual meeting, 4th Monday in April. Stock has been very closely held, but was listed in Colorado Springs Exchange in July, 1915.

Owns all the stock, excepting 3 shares, of the Little Montana Mining Co. Those portions of the Granite Gold property lying within the City of Victor were incorporated as a separate company, the Little Montana Mining Co. Stock of the Mohican G. Mng. Co. was purchased in 1916 for $22,580.

Receipts in 1917 from ore sales were $411,253, including 25,763 tons of $20.21 company ore, 17,441 tons of $19.47 lessees' ore, $6,007 (1,494 tons of $14.54 ore) from the Little Montana lease, and $18,400 (817 tons of $41.99 ore) from Bonanza lease. Profit was $126,378, less $49,500 for 3 dividends; and $129,999 for depreciation and depletion. The loss, charged to surplus account was $53,121. In addition to charge for depletion of ore reserve in 1917, there was a charge of $269,275 for depletion of ore reserves from March, 1913, to Dec., 1916, so as to comply with Government income tax regulations.

Dividends: paid to date, $369,000. Last dividend paid March 10, 1918, $16,500.

Property: 11 claims, 40.5 acres, patented, in the Cripple Creek district. In 1914, to avoid apex litigation, the Dead Pine claim, owned by the Raynor

Gold Mining Co., was bought for $87.500. The main production of the company is now from this claim. (For geology of the Cripple Creek district, see U. S. G. S. Prof. Paper 54.)

Development: by shafts with several miles of workings. The Dillon shaft is 1,750′ deep, the Gold Coin shaft, 1,300′ deep. The Roosevelt tunnel drains the Granite Gold ground and deeper development will be possible. During 1918, a new vein known as the Campbell vein was developed from the Coin shaft and opened up on Coin levels 10, 11, 12 and 13; company reports fair values. There is about 550′ of unprospected ground between the bottom of the Dillon shaft and the Roosevelt tunnel level. Upper levels of the various properties are operated under lease; lower levels are worked by company.

Equipment: mines are well equipped; a hoisting plant good for 2,000′ installed at the Dillon shaft.

Production: total up to 1918 about $15,182,989.

The mine has been one of the best at Cripple Creek. In Nov., 1919, it was reported that machinery at the Gold Coin shaft was to be dismantled as most of the ore had been extracted.

HAHNEWALD LEASING CO. **COLORADO**

Had lease on Abe Lincoln mine in Poverty Gulch, near Pitkin. In 1918, reported to have operating lease on the Gold Sovereign mine, of Gold Sovereign Mine & Tunnel Co., Bull hill, Cripple Creek. Operations are mainly on the 1,450′ level.

HENRY ADNEY GOLD MINING CO. **COLORADO**

A close corporation that operated the Henry Adney mine on Rosebud hill, Cripple Creek.

HONDO GOLD MINING & MILLING CO. **COLORADO**

Dissolved January, 1918. See Volume XIII.

ISABELLA LEASING CO. **COLORADO**

Address: Independence, Teller county, Colo.

Inc. in Oct., 1919, by R. M. Carson, William Gray and C. B. Garnett. **Cap.**, $25,000; $1 par; to be subscribed for by shareholders of the Isabella Mines Co. The money will be used to develop the Isabella Mines Co.'s Bull hill estate under a 5-year lease, with a 3-year extension privilege. Royalties will be on a sliding-scale from 8 to 30%.

Property: includes the 11th to 15th level of the Lee shaft in 13 claims. Work was to be started on the 15th level to cut several producing veins at depth. In December, 1919, this level had been unwatered and crosscutting started.

ISABELLA MINES CO. **COLORADO**

Office: Box 569, Victor, Colo. R. J. Huff, sec.-treas. **Mine office:** Independence, Colo.

Officers: E. E. Quentin, pres.; R. M. Carson, v. p.; C. G. Mitchell, mgr., with H. S. Lunt and J. H. Nicholls, directors. Frank K. Gunn, supt.

Inc. 1903, in Wyoming. **Cap.**, $3,000,000; $1 par; 2,528,331 outstanding. Stock listed on Colorado Springs Exchange. Colorado Title & Trust Co., registrar. Annual meeting 1st Monday in February, at Cheyenne, Wyo. In Oct., 1919, a controlling interest was taken in the Isabella Leasing Co., which see.

An initial dividend, 1%, or $25,283, was paid in 1916. Deficit in 1917 amounted to $20,303.

Property: 116 claims, patented, about 118 acres, in N. E. ¼ of Sec. 20 and N. W. ¼ of Sec. 21 on Bull hill, Cripple Creek district. Lands show typical Cripple Creek veins in breccia, carrying ore with gold and some silver.

Development: by 2 main vertical shafts, the Lee, 1,274′, and the Empire, 1,407′. During 1917, 10,169′ of development work was done, compared with 18,587′ in 1916. The Buena Vista vein was cut in December, 1917, on No. 16 level. The winze sunk below the 1,250′ level of the Lee shaft is 250′ deep, and drifts have been run on the East Victor vein. The Empire shaft was closed in Oct., 1917, due to scarcity of lessees.

Equipment: includes a 100-ton concentrating mill, entirely remodeled in 1915, to use a cyanide process with sand leaching, pump, furnace, boiler, etc. This plant recovers 76% from $3 ore.

Recent production has been as follows:

	Tons Mine ore	Tons Dump ore	Total tonnage	Gross Value
1917	9,151	658	9,809	$192,924
1916	18,752	625	19,377	412,962
1915	23,861	837	24,698	507,791
1914	15,706	2,040	17,746	345,819
1913	11,385	6,903	18,288	243,251

Of the 1917 output, 15 sets of lessees mined 8,334 tons, worth $144,129 Late in 1918, lessees Beebe & Nelson reported opening a rich vein of rusty gold and sylvanite near the surface. In 1919, lessees were mining upwards of 400 tons monthly.

Total production to date estimated at $8,812,000. Company is one of the oldest in the Cripple Creek district, and is operated successfully along conservative lines.

JENNIE SAMPLE CONSOLIDATED MINING CO. COLORADO

Idle. **Office:** 218 Burns Bldg., Colorado Springs, Colo.

Officers: Daniel Thatcher, pres.; R. M. Frank, sec.; F. H. Gay, treas.; John T. Hawkins, gen. mgr.

Inc. in Wyoming. **Cap.,** $25,000; 1c par; 1,668,885 shares issued. Stock listed on the Colorado Springs Stock Exchange. Company has no debts, all taxes have been paid, and a small reserve was reported in treasury, May, 1919.

Property: 5 patented claims, 31 acres, on S. slope of Raven hill, in Cripple Creek district, shows fissure veins with streaks of gold. Developed by shafts and drifts to depth of 1,100′. Equipped with hoist, drills and steam power. Mine worked by lessees in 1916.

JERRY JOHNSON GOLD MINING CO. COLORADO

Office: 427 Symes Bldg., Denver, Colo. **Mine office:** Cripple Creek, Colo.

Officers: A. P. Mackey, pres.-mgr.; C. F. Potter, v. p.; J. W. Graham, sec.-treas., with J. F. Mackey and C. A. Graham, directors. D. C. Smith, supt.

Inc. 1902, in Wyoming. **Cap.,** $250,000; 10c par; all issued; has paid $187,500 in dividends to date. Last payment of $5 per 1,000 shares in Nov., 1914. Stock listed on the Colorado Springs Exchange. Company derives income from royalties on leasing operations.

Property: 35 claims patented, in Cripple Creek district, shows gold-silver ore in contact veins. Developed by 975′ vertical shaft to depth of 850′. The mine is being worked from surface to the 650′ level by Frank Caley, and below the 650′ level by P. H. Denham, former superintendent of Cripple Creek Deep Leasing Co. This lease, operated since 1915 by the Cripple Creek Deep Leasing Co., expired in 1918.

Equipment: includes steam power, 8 drills, concentrator and 75-ton cyanide mill, erected in 1915 by Frank Caley. Total output to 1917, $1,783,126. During 1918, lessees found ore averaging $30 per ton.

JOE DANDY LEASING CO. COLORADO

Company believed to be idle.

Operated a lease on the Joe Dandy mine on Raven Hill, Cripple Creek district, Teller county. Mine developed to about 1,000′ depth by shaft and drifts, exposing an orebody, 2′ to 4′ wide, said to average $30 per ton.

The Joe Dandy cyanide leaching plant, operated under lease by Thos. Kavanaugh, treated about 2,000 tons of ore per month, partly $2 per ton dump ore, at last accounts. No recent returns.

KITTIE LANE GOLD MINING CO., THE COLORADO

Address: Transfer office, 507 Exchange Bank Bldg., Colorado Springs, Colo.

Officers: Marx Lorig, pres.; B. F. Webster, v. p.; Arthur Cornforth, sec.-treas.

Inc in 1912. **Cap.,** 2,000,000 shares; par 1c; 265,000 shares in treasury. On Jan. 1, 1919, company had $240 in cash, a certificate of deposit for $1,000, and bills receivable, $516. Stock listed on Colorado Springs Exchange.

Property: about 30 acres on Raven hill, adjoining the Elkton, at Cripple Creek, includes the Nil Desperandum, Rhinocerous, Kittie Lane, and Sitting Bull No. 1 and 2 claims. The Kittie Lane has been leased. Company is inactive.

KOMAT MINING CO. **COLORADO**

Mine office: Bull Cliffs, Cripple Creek, Colo. Math Korf, gen. mgr.

Was reported to be operating the Victor mine under lease from the Smith and Moffat Mines Co., owners. Property developed by shaft, 1,000′ deep. Shipped $14 ore in 1918, and produced 400 tons averaging $12 in January, 1919.

LAST DOLLAR GOLD MINING CO. **COLORADO**

Property: the Last Dollar mine, 18 acres, adjoining the Portland and Modoc mines, Cripple Creek district, Teller county. Mine is credited with a past production of $30,000,000.

Bond and lease on Last Dollar mine reported taken in 1917 by Catherine Gold Mng. Co., which see.

Development: by 1,517′ shaft with levels at 500′, 1,000′, 1,200′, 1,300′ and 1,500′. The West vein, opened on the bottom level, is said to be 2½′ wide. Shipments are made to the Golden Cycle mill at Colorado City.

LELAND MINING & DEVELOPING CO. **COLORADO**

Address: Chas. Howbert, Cripple Creek, Colo., gen. mgr.

Property: the Conundrum and Anchoria Leland mines on Gold hill, Cripple Creek district. The Conundrum is developed by an 800′ incline shaft and the Anchoria Leland mine is operated through the Gold Hill tunnel.

No recent returns.

LEXINGTON GOLD MINING CORPORATION **COLORADO**

Property acquired August, 1919, by El Paso Extension Corporation, which see.

LINCOLN MINES & REDUCTION CO. **COLORADO**

Operates property, is under lease from Rex Gold Mining & Milling Co., which see.

Office: 10 S. La Salle St., Chicago, Ill. **Mine office:** Cripple Creek, Colo. F. G. Gasche, mgr.

Officers: Jos. Ballin, pres.; F. A. Altmeyer, v. p.; C. A. Grieb, sec.-treas.

Inc. in Colorado. **Cap.**, $1,000,000. A close corporation. Property on Ironclad hill, Cripple Creek. In 1919 company reported that mine was in process of development, but that owing to recent acquisition it could state nothing definite about its plans. A mill was erected by November, using the Gasche process, a patent treatment.

MARY McKINNEY MINING CO. **COLORADO**

Address: Colorado Springs and Cripple Creek, Colo.

Officers: Chas. Castello, pres.; Daniel Thatcher, v. p.; John L. Nichols, sec.-treas.; preceding, with J. H. Nicholls, and W. H. Spurgeon, directors.

Inc. 1892, in Colorado; renewed March, 1912. **Cap.**, $1,500,000; shares $1 par; outstanding June, 1918, $1,309,252. Transfer office: 306 Exchange Bank Bldg., Colorado Springs. Colorado Title & Trust Co., Colorado Springs, registrar. Annual meeting, 2nd Monday in February. Listed on Colorado Springs Exchange.

Income Account—years ended December 31:

	Ore Sales	Oper., etc. Expenses	Net Earnings	Other Income	Paid Lessees	Taxes and Legal Exp.	Balance for year
1918.....	$98,307	$61,728	$36,579	$4,444	$42,362	$2,892	(def.)$4,231
1917.....	107,151	109,805	(loss)2,654	1,528	32,525	8,166	(def.)41,817
1916.....	228,346	173,333	55,013	4,698	50,689	8,147	875

Dividends: to 1919, $1,182,398; last paid Oct. 26, 1916, $13,093.

Property: several claims, 144 acres patented, on west slope of Raven Hill, at Cripple Creek. First claim was discovered in 1891. In 1906, the property of the Anaconda Gold Mining Co. was purchased.

Ore: gold in LeClair and Mary McKinney quartz veins in phonolite. Ores carry tellurides in fluorite, quartz and altered wall rock. (For geology of the Cripple Creek district, see U. S. G. S., Prof. Paper No. 54.)

Development: by shafts to the 1,300′ level. Total underground work-

ings, about 17 miles. In 1918, 6,713′ of new work was done, compared with 6,488′ in 1917. Mine was examined Dec., 1916, by J. T. Milliken and L. S. Noble, who recommended that No. 9 and 10 levels be extended N. to the West vein, until they reach its intersection with No. 5 vein. The latter vein and others are then to be explored. Junctions in upper levels showed good shoots.

Equipment: includes two plants, with 100-h. p. electric hoist, 200-h. p. electric compressor, boiler-plant, machine-shop, etc.

Production: gross to end of 1918 was $9,169,685. In 1918, company produced 1,086 tons worth $10,294, compared with 2,962 tons, worth $40,560, in 1917. Lessees produced 6,549 tons worth $88,012 in 1918, compared with 4,960 tons, worth $66,591 in 1917.

Property is well managed, and a policy of extensive exploration will be commenced as soon as steel and powder drop to a reasonable price. Company employees were cut to 7 men, or just enough to keep property open. Management reports 7 sets of lessees at work, 1919.

MARYANA MINING & LEASING CO. **COLORADO**

Mail returned unclaimed, July, 1919, from former address, Cripple Creek, Colo. Probably dead.

Inc. in 1914. Company had a lease on the Mary McKinney mine from the 8th level down.

MARY NEVIN GOLD MINING CO. **COLORADO**

Mail returned unclaimed, April 15, 1919, from Cripple Creek, Colo.

Officers: H. J. Gehm, pres.-treas.; R. S. Ellison, v. p. and sec.

Cap., $1,500,000; $1 par. In treasury, Jan. 1, 1916, 38,000 shares. Listed on Colorado Springs Stock Exchange.

Property: the Mary Nevin and Hibernia patented claims, 10 acres, on Rosebud hill.

Development: by a 385′ shaft on the Hibernia claim, a 200′ shaft on the Mary Nevin claim and some drifting. Property was operated through the Henry Adney shaft. Probably idle.

MIDGET CONSOLIDATED GOLD MINING CO. **COLORADO**

Office: Cripple Creek, Colo.

Offices: J. F. Doepke, pres.-mgr.; J. H. Heckemey, v. p.; A. T. Labba, sec.-treas.

Cap., $1,000,000; $1 par.

Property: about 27 acres on Gold hill, Cripple Creek, Colo. Leases property to other operators, the Bonanza King being leased to the Keystone Development Co.

Development: by 800′ shaft.

Reserves said to be 150,000 tons low-grade ore on dump and 100,000 tons of low-grade ore exposed by mine development.

MILLASIER MINES CORPORATION **COLORADO**

Owns and operates the Clyde mine on Battle mountain, Cripple Creek, Colo. Chas. Fish, supt.

Is a close corporation composed of Michigan men. Developed by shaft to 1,400′ level. Shaft to be sunk to 1,600′ level.

MINING DEVELOPMENT CO. **COLORADO**

Office: 2030 Land Title Bldg., Philadelphia, Pa.

Officers: L. H. Taylor, Jr., pres.; F. M. Kurie, v. p.-gen. mgr.; P. W. Meyers, sec.-treas., with Percival Chrystie and E. B. Bronson, directors.

Inc. Jan., 1915 in Delaware. **Cap.,** $100,000; $10 par; 6,000 shares outstanding. Annual meeting third Tuesday in January. Is a close corporation.

Property: consists of leases on certain blocks of the Stratton Cripple Creek Mining and Development Co. (Stratton Estate), on Bull Hill. The ground carries the Eagle vein and the Basket & Luce vein with other parallel N.-S. veins, also the Eagle cross vein running N. E.-S. W.

Equipment: includes complete hoisting plant. Operations are conducted through the Star of Bethlehem shaft, 300′ deep and also through the main Eagles shaft 1,500′ deep. In the Eagles shaft the Stratton Company operates the hoist.

Operations were begun March, 1919. The ore, shipped to the Eagle Ore Co. at Victor averaged $30 per ton.

MODOC CONSOLIDATED MINES CO. **COLORADO**

Address: Victor, Colo.

Officers: F. Cannon, pres.; A. H. Frankenburg, v. p.-mgr.; with R. Roelofs, T. Arneal, M. A. Skinner, and E. D. Avery, directors.

Property: a rich old Cripple Creek gold producer, credited with production of about $2,000,000 since 1892. Bought by T. M. Pettigrew and others of Denver, late in 1916.

Development: by 600′ incline shaft and 500′ winze. A 1,500′ vertical shaft is being. At 1,200′ depth a shoot 400′ long, carrying $30 ore, is said to have been cut. About 15,000 tons of ore was broken in stopes by Nov., 1919, and shipments were from 60 to 75 tons daily.

Reported that merger arrangements between this company and the Catherine Gold Mining Co. have been completed. If this is true, company should operate the Last Dollar mine, an adjoining property.

MODOC MINING & MILLING CO. **COLORADO**

Property operated by Modoc Cons. Mines Co., which see.

MOFFAT TUNNEL & TRANSPORTATION CO. **COLORADO**

Address: care War Eagle Consolidated Mines Co., Cripple Creek, Colo.

Company will operate the Moffat or Ophelia tunnel which is to serve as a public transportation outlet from Raven Hill properties at Cripple Creek, owners of which have deeded right-of-way through them. At present, a drift is being driven from the Blue Flag Company's 1,200′ level to connect with the tunnel to perfect ventilation, after which tracks will be re-laid and work resumed. This is expected to be finished by 1920.

NEW GOLD DOLLAR MINING CO. **COLORADO**

Mine office: Cripple Creek, Colo.

Directors: A. E. Carlton, Colorado Springs; R. J. Gaffney, and E. E. Quentin, Denver.

Inc. in 1919. **Cap.,** $150,000; 5c par. Is a reorganization of Gold Dollar Consolidated Mining Co.

Property: 62 acres, patented, being part of the Arequa townsite, on eastern slope of Beacon hill, Cripple Creek district. Gold occurs in vein 2 to 4′ wide, said to average $20 per ton. Property was purchased at Sheriff's sale in 1919 by the judgment creditor, First National Bank of Cripple Creek, and deeded by the Bank to present company.

Development: 1,050′ Mabel M. and Union shafts, from which considerable drifting and crosscutting has been done.

NEW GOLD KING MINES **COLORADO**

See Gold King Leasing Co.

OCEAN WAVE MINING CO. **COLORADO**

Address: Matt. Edwards, supt., Cripple Creek, Colo. C. H. Hurst, Springfield, Ill, pres.

Cap., $100,000, Controlled by Eastern parties.

Operating under long-term lease the Ocean Wave and Little Mary claims on Battle mountain, Cripple Creek, owned by Portland Gold Mining Co.

Development: by 400′ shaft. Mine said to have vein 4′ wide seamed with streaks of gold-bearing quartz. The ground has been sub-leased, but company operations were to be resumed late in 1919.

OSTON LEASING CO. **COLORADO**

Frank Crawford, supt. Company has leased the Howard dump of the Mary McKinney Mining Co., Cripple Creek, and is shipping about 2,000 tons per month.

PATTERSON-BRADLEY LEASING CO. **COLORADO**

H. MacDonald, mgr., Cripple Creek, Colo.

Operating under lease the Specimen claim of the Stratton Cripple Creek Mining & Development Co. Ore developed by 300′ Pratt shaft and worked through the Orpha May claim.

PHARMACIST GOLD MINING CO. COLORADO

Officers: L. G. Carlton, pres.; Thos. J. Ward, v. p.; V. H. Mann, sec.-treas.

Inc. Jan. 3, 1912, in Wyoming. **Cap.,** $15,000; shares 1c par. In treasury Jan. 1, 1917, 55,000 shares and $437 cash. Stock listed on Colorado Springs Exchange. Exchange Registry & Guarantee Co., Colorado Springs, Colo., transfer office. Paid dividends to Feb., 1910, $7,500; none since.

Property: 10 patented acres on Bull hill, Cripple Creek district, Teller county.

No recent reports received. One or two lessees were working and making an occasional shipment, at last accounts.

PORTLAND GOLD MINING CO. COLORADO

Office: 310 Mining Exchange Bldg., Colorado Springs, Colo. Mines at Victor, Colo. Mill at Victor, Colo.

Officers: Irving Howbert, chairman; Frank G. Peck, pres.; Dr. D. H. Rice, v. p.; Thos. F. Burns, sec.-treas., with J. H. Parker, Jr., directors. T. F. Burns, purch. agent. Geo. M. Taylor, gen. mgr.; Fred Jones, mine supt.; Thos. B. Crowe, mill supt. at Victor; L. W. Lennox, asst. supt.; V. G. Hills and F. G. Willis, cons. engrs.

Inc. 1894, in Iowa. **Cap.,** $3,000,000; reorganized 1905, in Wyoming, same capitalization; shares $1 par; all issued. Colorado Title & Trust Co., registrar. Stock transferred at company's office. Listed on Colorado Springs Exchange. Annual meeting, third Monday in February, at Cheyenne, Wyo.

Comparative General Balance Sheet:

Assets—January 1st—

	Property	Equip.	Supplies	Sec't's, Ins. Furn., etc.	Current	Total
1919.....	$3,471,894	$220,382	$215,632	$78,158	$180,335	$4,166,401
1918.....	3,744,477	211,608	256,938	85,452	338,483	4,636,958
1917.....	3,782,639	193,284	287,970	74,841	460,867	4,799,601
1916.....	3,823,771	165,915	189,522	68,628	564,303	4,812,139
1915.....	3,717,408	184,509	141,702	40,344	592,883	4,678,846

Liabilities—

	Capt. Stock	Current	Surplus	Total
1919.....	$3,000,000	$14,053	$1,152,348	$4,166,401
1918.....	3,000,000	13,478	1,623,481	4,636,958
1917.....	3,000,000	14,157	1,785,444	4,799,601
1916.....	3,000,000	8,695	1,803,444	4,812,139
1915.....	3,000,000	14,968	1,661,878	4,678,846

Comparative Profit and Loss Account, on Jan. 1st.:

	Net Optg. Profit	Total	Balance prev. yr.	Deduct's Deprec.	Divid's	Balance
1919.....	$196,596	$212,733(a)	$1,623,481	$383,865	$300,000	$1,152,349
1918.....	663,254	663,998	1,785,444	465,962	360,000	1,623,481
1917.....	768,810	772,571	1,803,444	370,571	420,000	1,785,444
1916.....	798,460	799,739	1,661,878	298,172	360,000	1,803,444
1915.....	590,594	591,046	1,767,789	336,957	360,000	1,661,878

(a) Net loss to surplus, $171,132.

Dividends: 16% per year, paid quarterly, from Jan. 15, 1907, to and including January 15, 1909: April 15, 1909, 3%; July 15 and October 15, 1909, 2% each; 1910, 1911, 1912, 8% each; 1913, 10%; 1914, 12%; 1915, 12%; 1916, 14%; 1917, 12½; 1918, 10%. Total dividends to October 20, 1919, were $11,497,080.

Property: the Portland and Independence mines, 253 acres, in Cripple Creek district, Teller county, carrying gold ore in quartz veins. The Independence mine and mill, comprising 110 acres on Battle Mountain, were purchased from the Stratton-Independence, Ltd., a British corporation, in July, 1915, for $325,000. The Independence mine has over 16 miles of workings and is credited with a gross production to July, 1915, of $23,621,728.

For geology of the district, see U. S. G. S. Prof. Paper, No. 54; also Vindicator Cons. G. M. Co.

Development: the Portland mine, which has been continuously worked for 25 years, has a total of over 62 miles of workings; 8,071′ of new work was done in 1918, compared with 12,506′ in 1917.

Mine has 2 shafts. No. 2 shaft being 2,280′ deep. The Roosevelt tunnel drains the mine, a branch from the Roosevelt tunnel will connect with Portland Shaft No. 2 when completed. The company's share of the cost of the Roosevelt tunnel and the lateral to its own shaft is $144,591. In December, 1918, rich ore was opened on the 21st level of No. 2 shaft, and at 2,280′ a year later. The 2 pumps on No. 23 level are lifting 1,000 g. p. m.

The No. 2 vein at the tunnel-level has been opened for 1,200′, all in ore.

Company also operates the Independence mill at Victor, Colo., which can treat 1,400 tons of ore daily. Since the mill was acquired in July, 1915, it has been completed remodeled and is now an up-to-date cyanide plant. Flotation was tried, but was discarded.

In March, 1918, the company's Colorado Springs mill was closed down because the output of high-grade ores from Cripple Creek had declined so much that operations were no longer profitable. The Victor mill, which company also operated at Victor, was closed down July, 1918, due to labor conditions. Much of the machinery has since been moved to the Independence mill. The Colorado Springs mill will be reopened if conditions improve.

Chilean-mill practice at the Portland mill was described by L. W. Lennox in Bull. 153, September, 1919, of the A. I. M. & M. E. The primary grinders consist of six 6′ Chilean mills, taking as feed the product from two 20 by 72″ Garfield type rolls. Secondary grinding on the classified sand from the mills is done by six 6 by 6′ ball mills. These discharge to Akins classifiers, which return the sand in closed circuit. The mills were put in as the result of 8 years' experience on Cripple Creek ores at the Victor plant. Fine grinding costs for 1918 were 30.82 cents per ton, for 441,435 tons treated.

Production: from the Portland mine in 1912, 44,562 tons, gross value, $987,416; in 1913, 53,245 tons, gross value, $1,380,713; in 1914, 62,997 tons, gross value, $1,467,005; in 1915, 72,192 tons, gross value, $1,710,277; in 1916, 96,045 tons, gross value, $2,236,842; in 1917, 86,668 tons, gross value, $1,768,971; in 1918, 53,887 tons, gross value, $1,120,851; with a grand total from April, 1894, to January, 1919, of 1,620,682 tons, gross value, $42,961,390.

In addition the Victor mill produced from 1910-1919, 2,328,566 tons, gross value, $5,811,987.

Management estimates from 12 to 15 million tons of low-grade ore in the mines and on dumps.

Company has a co-operative insurance fund and maintains a hospital at Victor, jointly with the Vindicator company, for the benefit of the employees. The management is excellent, and the outlook is still promising for many years of profitable operations.

PRIDE OF CRIPPLE CREEK MINING CO. COLORADO

Address: W. H. Trask, gen. mgr., Denver, Colo.

Company has leased its Pride of Cripple Creek mine, on Ironclad hill, to Cox, Beebe & Nelson, who mined ore running 2 oz. gold from the 600′ level.

Mine is near the Jerry Johnson, Forest Queen and W. H. P. mines.

PRINCE ALBERT MINE COLORADO

Formerly owned by the Prince Albert Cons. Mining Co., and purchased at foreclosure in December, 1914, by Frank Johanningmann, of Cincinnati, for $31,496.

Property: on Beacon hill, near Cripple Creek, Teller county, was operated under 3-year-bond and lease from 1916 by Frank Vetter, who organized the Albert Beacon Gold Mining Co., which see.

QUEEN BESS MINE COLORADO

A fractional claim on Tenderfoot hill, owned and operated by August Hahnewald, Cripple Creek, Colo. The mine is developed from the 500′ and 900′ levels of the El Paso Gold King.

Shipped 3 to 5 cars per week, averaging $50 per ton, in 1917. In 1918, production was light, mine being under development. Ore is of 2 oz. grade.

QUEEN GOLD MINING CO. **COLORADO**

Address: John Lind, supt., Cripple Creek, Colo. A close corporation T. B. Burbridge, pres.; Thornton Brown, sec.-treas.

Property: 90 patented acres on Butte mountain, and Raven hill, including the Eclipse mine, between the Elkton and Cresson mines, at Cripple Creek, Teller county, formerly owned by the El Oro Mng. & Dev. Co., and purchased by present company in 1915. Mine is said to show 2 parallel veins, carrying $15 gold ore.

Development: by 1,000′ shaft, with levels every 100′. Equipped with machine-drills, hoist, pumps, and electric power. Shipped 2 cars of milling ore daily during part of 1916. No recent information.

RAVEN & BEACON HILL GOLD MINING CO. **COLORADO**

Believed to be idle.

Office: 309 Exchange Bank Bldg., Colorado Springs.

Officers: W. W. Price, pres.; John T. Hawkins, v. p.; W. B. Price, sec.

Cap., $170,000; shares 10c; in treasury Jan. 1, 1917, 328,000 shares stock and $4,500 in cash. Listed on Colorado Springs Exchange.

Property: 17 acres of the Arequa townsite and 7 acres of the Cameron townsite, at Cripple Creek crosscut by the Roosevelt tunnel. Developed by 554′ shaft. The mine has been blocked out for leasing; the Elkton Cons. M. & M. Co. operates Blocks 1 and 2 from the Roosevelt level of the Elkton main shaft.

Gross production to date, $85,691; none in recent years.

REQUA-SAVAGE MINES CO. **COLORADO**

Formerly the Requa-Savage Gold Mining Co.

Address: 112 Tejon St., Colorado Springs, Colo.

Officers: J. S. Geyer, pres.; J. Yeomans, v. p.; A. Schumacher, sec.-treas.

Reincorporated November, 1915, as original incorporation had expired by limitation.

Cap., 1,250,000 shares; 1c par; 393,000 shares in treasury, Jan., 1917, also note, secured for $1,713. Stock listed on Colorado Springs Exchange. Total dividends, $8,070.

Property: Roman, Savage and Trojan claims, on Beacon hill, and 1 acre on Gold hill, Cripple Creek district, Colo. Developed by several shafts, deepest 700′ and a 100′ tunnel. Production to 1917 was $161,378. No recent returns received.

REVA GOLD MINING CO. **COLORADO**

Address: J. H. Nicholls, supt., Cripple Creek, Colo.

Property: operating under 6-year lease, the Rose Nichol mine of Rose Nichol Gold Mining Co., Battle mountain, Cripple Creek, Teller county.

Shipments were started in March, 1919, after company had spent $105,000 in development work in past two years. Ore has been opened on No. 6 and 7 levels, at 800′ and 1,000′ below the surface, respectively. Ore was also reported opened on Roosevelt tunnel-level about 2,100′ below the collar of shaft.

Equipment: includes aerial tram extending from mine to Midland Ry. terminal. Ore is treated at Golden Cycle Mng. & Red. Co., at Colo. Springs. Occasional shipments are made.

ROSE NICOL GOLD MINING CO. **COLORADO**

Offices: 315 Exchange National Bank Bldg., Colorado Springs, Colo.

Officers: L. L. Aitken, pres.; Ira Harris, v. p.; A. D. Aitken, sec.-treas.; with R. H. Forbes, directors.

Inc. in Colorado. **Cap.,** $1,500,000; $1 par; all outstanding. Colorado Title & Trust Co., Colorado Springs, registrar. Expenses in 1918 were $1,033.

Property: 11 acres on Battle mountain, between the Portland, U. G. M., and Cresson mines, Cripple Creek, Teller county, Colo. Property was reported leased in 1917 to the Camp Bird Mining, Leasing & Power Co. for six years.

The lease on the Rose Nichol mine of the company was transferred to the Reva Gold Mining Co., which see.

Development: by lessees for 8 years. Workings aggregate over 5,000′ with a depth of 1,032′. The Roosevelt deep drainage tunnel, which passes through the property at depth of 2,000′, cuts a vein 3′ wide, that shows ore. Lessees have installed an ore-house and an 1,800′ aerial tram.

Production: company expected a big production in 1919, but no figures have been received as yet. In past two years, nearly $100,000 has been spent in opening the Hidden Treasure, Dexter and Rose veins.

RUBY MINING & MILLING CO. **COLORADO**

Company reported dissolved early in 1918. Had a 5-year lease on Ruby and Lafayette mines, Bull hill, Cripple Creek, Teller county, owned by Erie Mines Company.

SCHOOL SECTION LEASING CO. **COLORADO**

Address: Victor, Colo. Operated under lease from the State, block 8 of School Section 16, on Bull hill, near Cameron. Company was reported to have operated for 15 years consecutively and to be a steady producer up to 1917. No recent reports received. Presumably idle.

SEEMANN INVESTMENT & FINANCE CO. **COLORADO**

Address: Box 1375, Denver, Colo.

Officers: Henry I. Seemann, pres.; K. R. Seemann, v. p.; W. S. Lippincott, sec.-treas.

Inc. July 12, 1904, in Colorado. **Cap.,** $100,000; $100 par.

Property: company owns the following claims at Cripple Creek, Teller county: Black Crow Lode, Mayflower Lode, Pride of Grassy Lode, W. E. S., E. F. C., & Rittenhouse, the 4-11-44, Idlewild & Mexican, Dark Cloud and Nada Lodes; and in Clear Creek county; Golden Star Lode, Ace of Diamonds Lode, Deuce of Diamonds Lode, Jack of Diamonds Lode, and ½ Surprise Ext. West, Vindicator Lode.

The company is not a mining company, but wishes to lease or sell, or probably form a mining company, and turn the properties over to such company.

STRATTON CRIPPLE CREEK MNG. & DEV. CO. **COLORADO**

F. M. Keeth, supt., Cripple Creek, Colo. (Stratton Estate.)

Property: about 600 acres including the American Eagle, Abe Lincoln, Longfellow, Orpha May and other mines on Bull hill and Globe hill at Cripple Creek, with the typical veins of the district. Company is operating the American Eagle mine and has 30 sets of lessees at work on other properties.

Matoa Gold Mng. Co. is a subsidiary, and there are a half dozen or more incorporated leasing companies working on Stratton ground.

Litigation with the Findley Mines Co., over extra-lateral rights to the Basket and Luce vein in the American Eagle mine continued during 1918. An agreement has been reached whereby lessees can work the vein, placing the royalties in escrow pending settlement.

STRATTON'S INDEPENDENCE **COLORADO**

Out of business. See Vol. XIII.

STRONG GOLD MINING CO. **COLORADO**

Address: Victor, Colo. Is a close corporation, owned in Colorado Springs.

Property: the Jolly Tar claim, 7½ acres near Victor, in the Cripple Creek district, shows a cluster of veins in granite, carrying large shoots of ore. The yield of gold per acre is said to be the richest of any mine in the camp. Mine closed in October, 1918, owing to labor shortage and high costs. Reported leased to Owen Roberts in April, 1919.

Development: by 1,700′ shaft with extensive levels and drifts. Has 20-drill compressor. Production reported in excess of $10,000,000.

TENDERFOOT HILL CONS. MNG. CO. **COLORADO-SO. DAKOTA**

Office: 317 Exchange Nat'l. Bank Bldg., Colorado Springs.

Officers: W. A. Otis, pres.; L. L. Aitken, v. p.; A. D. Aitken, sec.; Russell H. Forbes, treas.

Cap., $1,500,000; $1 par; all issued. Listed on Colorado Springs Stock

Exchange. No liabilities and no production. Cash in treasury, January 1, 1919, $11,036; securities, $3,675.

Property: 61 acres on Tenderfoot hill, Cripple Creek district, and 93 acres in the Black Hills, South Dakota.

Development: main shaft on Cripple Creek property, 511′ deep with 600′ of drifting. Black Hills property has drifts, tunnels and crosscuts totaling about 1,350′. Mine idle, 1919.

UNION LEASING CO **COLORADO**

Mine office: Cripple Creek, Colo. C. G. Jackson, supt.

Reported operating the property of Gold Sovereign Mining & Tunnel Co., which see.

UNITED GOLD MINES CO. **COLORADO**

Office: Exchange Nat'l Bldg., Colorado Springs, Colo.

Officers: A. E. Carlton, pres.; H. McGarry, v. p.-gen. mgr.; H. D. McDonald, sec.-treas.; Lynn Richmond, supt.; R. Roelofs, A. E. Carlton, H. McGarry, W. D. Wright and C. S. Davis, directors.

Inc. in Colorado. **Cap.**, $5,000,000; par $1; in treasury, 9,159 shares unissued January, 1919, 990,931 shares. Total dividends to date, $561,179; last dividend paid January, 1920, amounted to $40,000. Stock listed on Colorado Springs Stock Exchange.

Controls several subsidiary mining companies at Cripple Creek, Teller county, including the W. P. H., Damon and Montrose Co., Ironclad Hill, May B., Squaw Mountain, Deadwood, Wild Horse, Requa Gold Mining & Milling Co., B. H. & S. M. Co., on Bull hill. In October, 1917, the B. H. & S. Co.'s property was purchased outright for $31,642.

Company leases its mines. Receipts for year 1918 were $53,644; developments cost $23,266, other expense, $10,165, gain, $20,213. Balance sheet showed total debits of $6,377,546, which included cash assets of $79,383, and ore reserves, $1,311,475. Royalties received in 1919 totaled $60,326.

Development for 1918 totaled 4,694′ compared with 4,538′ in 1917.

Production: for 1918, 21,069 tons gross value of $393,839, of which lessees produced $209,015. Average per ton, $18.69. The heaviest production came from the Anderson & Benkelman lease in the Trail mine, which expired on Jan. 10, 1920. Since 1915 this lease has yielded gold worth $1,500,000. The Bonanza mine, leased to the Granite Gold Mining Co., is also a big producer.

UNITED STATES MINING CO. **COLORADO**

W. R. Benzie, 502 Majestic Bldg., Denver, Colo.

Inc. in Colorado. **Cap.**, $50,000; shares $1 par. "No individual liability." Organized to operate leases in the Cripple Creek district. Company also reports owning 4 claims in the Boulder-Gilpin counties tungsten belt. Is a stockholders' mail order promotion.

U. S. REDUCTION & REFINING CO. **COLORADO**

After several forced sales in 1916, the entire assets (1,500 acres of land, etc.) were sold to the Golden Cycle Mining Co., Colo., which in turn sold the extensive machinery to Morse Bros., of Denver. The plants contained 15,000 tons of machinery, 5,000 tons of structural steel and buildings, 12,000,000′ of lumber, etc.

VICTOR GOLD MINING CO. **COLORADO**

Address: Cripple Creek, Colo. Controlled by Moffatt-Smith estates. Owns the Victor mine, with reported production of $2,250,000 to 1900. Operated 1917, under lease by Math Korff. Mine had been inactive for many years and was supposedly exhausted when lessees began operations.

Main shaft, 1,100′ deep, has 14 levels. For geology of district see U. S. G. S. Prof. P. 54.

Production: varied from 200 to 500 tons monthly, of milling ore yielding $10 to $20 per ton. No recent reports received.

VICTORY GOLD MINING CO. **COLORADO**

Frank Vetter, supt., Cripple Creek, Colo. H. J. Newton, president, promoter, and effusive "slush writer."

Property: said to have title to 45 acres, patented, in Cripple Creek mining

district. A consolidation of the Albert Beacon, Cripple Creek General Mining and Exploitation and Gold Camp Syndicate companies in May, 1917, headed by the notorious promoter, Harry J. Newton, with a capital of 5,000,000 shares at 10c par. Some of the claims have produced a good deal of gold.

In September, 1917, said to have bought a 1/3 interest in the Leora V. mine, also at Cripple Creek, and in 1918 company purchased the Smith lease on the Howard shaft of the Mary McKinney mine. The Howard is credited with $2,000,000 production. Four sets of sub-lessees at work.

VINDICATOR CONSOLIDATED GOLD MINING CO. COLORADO

Office: 603 Symes Bldg., Denver, Colo. **Mine office:** Independence.

Officers: G. S. Wood, pres.; A. F. Zang, v. p.; P. A. Zang, treas.; G. A. Stahl, sec. and gen. mgr., with A. E. Carlton, C. Sigel, Jr., and D. W. Strickland, directors. W. E. Ryan, gen. supt.; T. H. Sheldon, purch. agt.

Inc. Nov. 20, 1896, in Colorado. **Cap.**, $1,500,000; $1 par; all issued; non-assessable; no bonded indebtedness. Annual meeting, second Thursday in February. International Trust Co., Denver, transfer agent and registrar. Listed on Colorado Springs Stock Exchange.

General Balance Sheet:

Assets—

	Property	Equip.	Ore Res.	Secur.	Current	Surp.	Total
1919.....	.....	.....	.....	.....	$625,541	.....	.....
1918.....	$1,269,613	$537,641	$870,129	$4,935	$574,928	.....	$3,257,246
1917.....	1,229,069	452,823	1,423,216	4,935	165,747	$565,237	3,841,028
1916.....	2,430,491	212,694	.....	202,589	217,044	.....	3,062,818

Liabilities—

	Capital Stock	Surplus	Res. for Dep.	Other	Total
1919.....	$1,500,000	.....	.....	$59,683	.....
1918.....	1,500,000	1,516,955	116,378	123,913	3,257,246
1917.....	1,500,000	.....	66,552	2,274,476	3,841,028
1916.....	1,500,000	878,580	628,226	56,012	3,062,818

Other income includes credit arising from valuation of ore deposits in Vindicator, March, 1913, which in 1917 was $2,245,539, and in 1918 it is the credit less charges for subsequent depletion to December, 1918, amount being $42,317.

Comparative Income Account:

	Mine Receipts	Mine Expense	Operating Profit	Other Receipts	Dividends	Other Deduc.	Surplus for year
1919.....	$692,041	.....	$98,958	.....	$60,000	.....	.....
1918.....	1,167,182	$631,318	535,864	$8,289	60,000	$605,183(a)	$121,030(c)
1917.....	896,621	717,775	178,846	17,503	180,000	.....	16,349
1916.....	1,328,006	780,485	547,511	84,274	270,000	631,794(a)	270,000(c)
1915.....	1,969,646	703,783	1,265,862	84,302	225,000	1,046,939(b)	78,225
1914.....	636,568	335,708	300,860	10,818	270,000	60,521	18,843(c)

(a) Includes depreciation and mine depletion, $631,794 in 1916, and $605,183 in 1918.
(b) Includes notes paid, $910,000. (c) Deficit.

Dividends: 1900, 17½%; 1901, 15½%; 1902, 23%; 1903, 16%; 1904, 9%; 1905, 13%; 1906, 12%; 1907, 13%; 1908, 15%; 1909, 7½%; 1910, 1911, 1912, 1913, 12% each; 1914, 18%; 1915, 15%; 1916, 18%; 1917, 12%; 1918, 4%; 1919, 4%; 1920, 1% to Jan. 24. The total is $3,832,500.

Property: a number of patented claims, about 130 acres, at Independence on Bull hill, Cripple Creek district, Teller county, including former holdings of the Keystone M. & M. Co., the Golden Cycle mine and that of the Christmas Gold Mining Co.

In September, 1918, company acquired a chromite mine at Deer creek, in Wyoming, 23 miles S. W. of Glenrock, consisting of 3 patented claims, which see, under company's name. At same time, company acquired the business, material, stocks, and plant of the Ferro Alloy Co. of Denver. The basis of sale was the payment of Ferro Alloy Co. debts amounting to $100,411, which was covered by liquid assets of the company, and a further payment to Ferro Alloy Co. stockholders of the amount of their investment plus 6% interest to be paid when realized from operations of the plant. Recent results at these works have been satisfactory.

Geology: the plateau on which Cripple Creek is located is mainly made up of red granite. Breaking through this is a plug of volcanic breccias and tuffs, composed of phonolite, and including many granite fragments torn off and carried up from below. This volcanic core is cut by dikes and intrusive masses of syenite and phonolite, and latest of all, the basalt dikes.

The ores occur in veins which follow a system of steep fissures, the veins being mere fissures with a central film or streak of ore filling and an impregnation of the wall rock on both sides. The low-grade ores are formed by mineralization of the country rock adjacent to such narrow seams. Most of the veins occur in sheeted zones ranging in width up to 40′.

The gold occurs chiefly as the telluride, calaverite, with but little silver, but associated with it there are small quantities of iron, copper, zinc, and molybdenum sulphides. The gangue is either quartz and fluorite with some carbonate or merely altered rock. The greatest horizontal extension of any pay shoot thus far opened is about 1,300′. Such pay shoots are many and usually vary from 4′ to 40′ in length. The vertical extension has not yet been reached in some shoots. For detailed geology, see U. S. G. S. Prof. Paper No. 54; "Nature of Ore Deposits," by Beck and Weed, or Lindgren's "Mineral Deposits."

Development: by Vindicator shaft, 1,950′ deep, and Golden Cycle 2,200′; linear extent of workings, about 265,000′. Mining methods, filled stope and square set. Development in 1918 amounted to 5,112′ of which 2,899′ were driven by lessees, which compared with 10,327′ in 1917, 5,514′ of which driven by lessees. No commercial ore had been opened on No. 20 level of the Golden Cycle during 1916-1917 and work was discontinued there in 1918. Only a small quantity on No. 19 of the Vindicator; but only 25% of the mineralized area has been prospected. There is no geologic reason why ore-shoots should not be found at these points. The present condition is a repetition of the experience of other mines in the Cripple Creek district, but management believes there would not be enough commercial ore to warrant the expense of deeper sinking and exploration in the Golden Cycle mine. Reserves are estimated at 104,230 tons in January 1, 1919. In addition are 2,000,000 tons of ore-house reject dumps, which contain from 50 to 75c per ton profit. Mining cost $2.81 per ton hoisted. By November, 1919, the shoot on the 18th level of the Vindicator shaft had been opened for over 250′, showing good ore.

Company expected the Cripple Creek drainage tunnel to reduce pumping costs, but as the tunnel reached the neighboring Portland property in 1918 and no improvement is apparent, the indications are that there is an impervious dike lying between Portland and Vindicator properties and tunnel will not assist in draining Vindicator. Three 4-stage centrifugal pumps were installed in 1916 on No. 20 level of the Golden Cycle shaft, but when operations were discontinued, 1918, pumps were placed, working on the 18th level.

Equipment: includes two hoists, Sullivan electric and Ingersoll-Sargent compressors, 3 electric triplex 175-h. p. pumps, electric locomotive on No. 17 level, and steel sharpening shop on No. 16 level. Power is steam and electric. Treatment plants consist of one 300-ton washing and concentrating mill, which handled in 1916 a total of 127,947 tons of ore $1.68 ore at a cost of 17.4c per ton. This ore and the reject from the Golden Cycle ore house, averaging about $2 per ton, is now treated, with the 2,000,000 tons mentioned above, in a 500-ton flotation plant started in October, 1916. Ball-mills and the Minerals Separation flotation system are employed. On $2.26 ore the recovery in January, 1917, was 84.4% and the process deemed a success. This plant reported closed late in 1919.

Production: in 1917, 252,810 tons, sorted down to 86,918 tons, yielding $1,690,340; in 1918, 283,767 tons crude ore, or 45,712 tons sorted ore, valued at $1,629,809; in 1919, 143,400 tons crude ore, yielding 19,922 tons sorted ore, valued at $718,136 gross. Royalties from lessees amounted to $153,683 in 1917; $151,265 in 1918, and $92,525 in 1919. The mill was closed for several weeks in September, 1919, due to shortage of labor.

Like other Cripple Creek mines, the Vindicator has passed its zenith, although good ore will be mined for some time; the future lies in a profitable treatment of the lower-grade ores.

WAR EAGLE CONSOLIDATED MINES CO. **COLORADO**

Address: Cripple Creek, Colo.

Officers: T. Scott, pres.; M. E. O'Bryan, sec.-treas.; with S. J. Burris, T. Annear, T. E. Munson, Tully Scott and T. R. Countryman (cons. engr.); C. Kissell, supt.

Cap., 5,000,000 shares; par value not reported; in treasury at last report 4,000,000, to be used in acquiring and developing additional property. Financed by T. M. Pettigrew & Co., Denham Bldg., Denver.

Property: originally 17.3 acres, since increased to 41 acres, in Cripple Creek district, upon which in January, 1916, there was a bond of $50,000, due in 3 years.

Development: mainly by lessees. The Scott shaft was sunk to 500′ in the Happy Year claims and $10 to $15 ore was opened in this ground. On the 400′ level the shoot is 110′ long, and shipments were made. Great results were anticipated from connections with the Moffat tunnel on Raven hill, which company controls. In August, 1919, an arrangement was made with the Blue Flag Gold Mining Co., whereby the properties were to be connected by means of the tunnel, whose ventilation would be improved; it acts as a public transportation outlet. During this work, in December, a new shoot had been opened at depth of 1,100′. It was 2′ wide and 70′ long, assaying $24 in gold and 13 oz. of silver.

W. H. P. LEASING CO. **COLORADO**

Operating under lease the W. H. P. mine, on Ironclad hill, Cripple Creek, Colo., owned by the United Gold Mines Co. Company said to have opened a vein of brecciated quartz with some calaverite ore worth about $40 per ton.

YELLOW BIRD GOLD MINING CO. **COLORADO**

Holdings reported sold at Sheriff's sale in November, 1918, to Hildreth Frost, the judgment creditor.

Property: about 40 acres, on Gold hill, Cripple Creek, Teller county, including the Yellow Bird, Red Bird, Cottontail, Volcano, Mound Rock and Red Jacket, which had been idle for years.

Early in 1919 lessees operating the Yellow Bird mine reported opening a vein of commercial ore 25′ below the surface.

LEADVILLE DISTRICT

ARKANSAS VALLEY SMELTER **COLORADO**

Subsidiary of American Smelting & Refining Co.

Works are complete with 6 blast-furnaces, capable of reducing over 20,000 tons of ore from Leadville and adjacent mines monthly.

A. Y. & MINNIE M. & M. CO. **COLORADO**

Leadville, Colo. Is a subsidiary of the Western Mining Co., which is controlled by the American Smelters Securities Co. S. D. Nicholson, gen. mgr. Produces lead-zinc sulphide ore, which is shipped to Sand Springs, Oklahoma, and to Pueblo, Colo. Developed by shaft.

BANKOK-CORA BELL MINING CO. **COLORADO**

Located on Fryer Hill, Leadville mining district, Colorado.

Inc. in Colorado. **Cap.,** $600,000; $1 par.

The mines were operated for years under the leasing system, first shipment being made, 1886. A heavy flow of water finally caused the abandonment of the property. Prior to closing down, company is reported to have paid dividends at the rate of four cents per hundred shares.

In 1916, the United States Smelting, Refining and Exploration Co. took a five-year lease on the Bankok-Cora Bell mines, but after two years work, dropped the option and all the equipment was removed. It is said this was due to labor conditions and the fact that the orebodies are worked out.

BARTLETT MINE **COLORADO**

In the Sugar Loaf section, Leadville, Colo. Operations are conducted through a winze 50′ below the main tunnel-level, which is 300′ from surface. This winze is equipped with a 250-gal. electric pump and a 37-h. p. hoist. At the end of February, 1918, it was reported that $30,000 in silver ore had been extracted during the previous year. In April, 1918, a streak of gold ore, from 5 to 12″ wide,

assaying from 2 to 16 oz. per ton had been encountered. During 1917, the property shipped silver ore assaying over 3,000 oz. per ton. The discovery of gold in this mine is the first evidence of persistency in the gold veins of the Sugar Loaf area.

BOHN MINE **COLORADO**

Mine office: East Second St., and Toledo Ave., Leadville, Colo. Peter Horrigan, mgr. Property situated on Carbonate hill, Leadville.

Development: a large manganese deposit of blanket type, estimated to be 150′ long, 60′ wide, and 30′ thick, was exposed. The work completed had not reached the limits of the ore-shoot at last advice. Ore assays 35% Mn.

Production during April and May, 1918, averaged 600 tons.

BREECE MINING CO. **COLORADO**

Office: 734, 5th Ave., New York, N. Y. **Mine office:** Breece Hill, Leadville, Colo.

Officers: E. B. Schem, pres.; C. G. Raynor, v. p.; W. J. Walworth, sec.; Emil Ritchter, treas., with T. W. Wagner, H. P. Chilton and R. J. Spettel, directors.

Inc. in New York. **Cap.,** 200,000 shares, par $25; all outstanding. Listed on Boston Stock Exchange. Transfer office: 734 Fifth Ave., N. Y. Registrar, American Exchange National Bank, New York. Annual meeting, second Wednesday after first Monday in October.

Property: in Breece hill, Leadville, leased to several individuals whose royalties cover all company expenses.

DERRY MINING & LAND CO. **COLORADO**

Address: R. F. Lafferty, gen. mgr.

Inc. March, 1915, in Colorado. **Cap.,** $100,000.

Owns placer land near Leadville, on which Derry Ranch Gold Dredging Co. (which see) operates a dredge.

DERRY RANCH GOLD DREDGING CO. **COLORADO**

Office: 2 Rector St., New York. **Operating office:** R. F. Lafferty, mgr., Leadville, Colo.

Officers: A. C. Ludlam, pres.; R. F. Lafferty, v. p.; George Sommer, sec.-treas., with John Nisbet and N. D. Wanless, directors.

Inc. in Colorado. **Cap.,** $100,000; $100 par; all issued.

Property: 1,800′ acres of placer ground near Leadville, Colo., owned by the Derry Mining & Land Co., and under lease to the Dredging company.

Development: drilling proved an average depth of 30′, containing 25c per yard.

Equipment: modern 5½ cu. ft. dredge, digging 75,000 yards per month, using electric power. No work is done during the winter.

Monthly production of gold throughout 1917 is said to have averaged $15,000 in comparison with $10,000 in 1916. Dividends are reported to total $50,000 or 50% on capitalization.

DOLD MINING CO. **COLORADO**

Address: C. J. Dold, Leadville, Colo.

Property: the old Northern mine of 8 acres, adjoining the Coronado on the north, held under a 10-year lease from the Leadville Basin Mines Co., which see.

Development: by two 640′ shafts. There are three ore horizons at as many contacts, which are porphyry and limestone. Early in 1918 the Newell shaft was reported re-opened, and plans had been made to sink the Northern shaft to 690′. Production was 25 tons of manganese ore daily. Rich lead carbonate ore, high in silver, was opened at 640′ in July, 1919.

DOTY MANGANESE CO, THE **COLORADO**

Office: 627 E. 11th St., Leadville, Colo.

Officers: S. P. McDonald, pres. and mgr.; Geo. Bennett, v. p.; Florence Doty, sec.-treas.

Inc. August 5, 1918, in Colorado. **Cap.,** $100,000; $1 par; 75,000 issued.

Property: 10 patented acres in Poverty Flats, Fryer hill, Leadville, formerly worked through Seeley shaft, now caved.

Development: $10,000 was expended in 1918 deepening the shaft to 500'. The ore-zone is reported to be extensive and to contain 30% manganese, 30% iron and 8 oz. silver. Company expects to sink 100' more and develop vein by drifting. This new work to be financed by selling more stock.

DOWN TOWN MINES CO. COLORADO

Offices: Chemical Bldg., St. Louis, Mo., and 129 West 8th St., Leadville, Colo.

Officers: J. C. Waldeck, pres.; H. W. Mann, v. p.; C. J. Walker, sec.-treas.; Jesse F. McDonald, mgr., with W. T. Nardin, directors.

Inc. March, 1914, in Colorado. **Cap.,** $600,000; $10 par. Stock entirely owned by Western Development Co., which see. Company has 20-year leases on several of the Down Town mines at Leadville.

Property: 400 acres, includes 15 old mines which have produced several millions of dollars. These mines had been idle for many years, and it was thought that all the valuable ore had been extracted, but in former mining no zinc ore was taken out.

Unwatering was started in May, 1915, at the Penrose shaft with 4 electric vertical, centrifugal pumps. Property was drained to the 875', or lowest level, in the summer of 1916.

Development: by shafts 400' to 875' deep, and 158,400' of underground workings.

Production: for the year ended June 30, 1918, company produced 60,934 tons of ore valued at $755,000. Operating expenses were $350,000. Company planned in 1918 to reopen the Coronado shaft.

Equipment: compressor, 175-h. p. electric hoist, electrically-driven pump.

Early in 1919 the company's output was reported to be 200 tons of lead, copper, silver and manganese ore daily. In September, it was double this quantity.

DUBUQUE MINING & TUNNEL CO. COLORADO

Out of existence several years. Described, Vol. XIII.

EDNA MINING CO. COLORADO

Company was operating the Carbonate mine at Leadville, Colo., in 1917, through the Hagerman shaft. Said to show large bodies of silver-bearing iron pyrite. No later information.

FAIRVIEW MINE COLORADO

M. L. Buchanan, mgr. Property situated near Leadville, Lake county, Colo. In 1918, mine was producing a low-grade manganese ore containing iron, but in 1919 the management reported the property shut-down on account of market and labor conditions.

FANNY RAWLINGS MINING CO. COLORADO

Office: 6 N. Nevada Ave., Colorado Springs, Colo.

Officers: John A. Himebaugh, pres.; Charles D. Hayt, v. p.; Walter C. Frost, sec.-treas.; W. R. McConihay, mgr.

Cap., $1,000,000; par value $1; cash in treasury, Jan., 1920, $13,307. Has $5,700 loaned at 5½% and secured by lien on first-class improved real estate; U. S. savings stamps, $1,000; stock, 5,551 shares. Last stockholders' meeting held June 29, 1912. Listed on Colorado Springs Exchange. Total amount of dividends paid to date, $55,000; last dividend, $5,000, paid Feb. 16, 1920, the first since Dec., 1908. All taxes paid and company has no debts.

Property. the Fanny Rawlings lode mining claim, about 10 acres, on Breece Hill, near Leadville.

Development: on south half of claim said to have cost $255,000. The entire plant and shaft, costing about $13,000, was burned October 19, 1918. A new plant, costing over $8,000, using electric power in place of steam, was erected. This has been fully paid for and is now in operation. Property is leased to Charlestown, W. Va., parties, who are operating on the 600' level.

Shipments in 1918 said to run 4.25% copper, 15 oz. silver, and a little gold. The Fanny Rawlings company receives 20% to 35% royalty on all shipments made by the lessees. In Dec., 1919, the lessee shipped 391 tons of $40 ore.

FIDELITY GOLD MINING CO. **COLORADO**

Controlled by Chas. J. Fox, Philadelphia, Pa.

Property: 12 patented claims in the Lackawanna gulch section, 6 miles from Twin Lakes, near Leadville, developed by several tunnels. A 4′ vein of smelting ore was opened up on the 1,200′, or lowest tunnel level, reported to assay $200 per ton in gold, with silver and copper values. In September, 1919, new work opened ore running 3 to 7 oz. gold and 100 oz. silver in an old tunnel. The two streaks of high-grade ore were 6 to 10″ wide in a vein of 48 to 60″.

FORTUNE MINE **COLORADO**

Address: John McNeece, mgr., Leadville, Colo. The mine is an old-time producer in Evans gulch, developed by 2-compartment shaft, which connects with the Yak tunnel at depth of 1,000′. Ore carries mainly lead-zinc, with some gold and silver.

Six sets of lessees reported operating, 1917, but no recent information concerning production has been received.

GARBUTT LEASING CO. **COLORADO**

Address: John Cortellini, mgr., Leadville, Lake county, Colo.

Property: adjoining the famous Little Jonny mine on Jonny hill, has a 1,200′ shaft, producing copper with good gold-silver values. Ore milled said to average $15 per ton.

Equipment: includes a steam hoist and 15-drill air-compressor. A 200-ton mill was designed during 1916, but whether erected or not is not known. Company is a close partnership and does not divulge results of its operations.

GREENBACK MINING CO. **COLORADO**

Address: A. K. McDaniel, gen. mgr., Denver, Colo., and Hugh Watson, supt., Graham Park, Leadville, Colo.

Property: at Graham Park, Leadville, Lake county, Colo. In April, 1918, it was said that Patrick Mulrooney had sold the mine to the Western Chemical Co. of Denver. Property is reported to have a big reserve of low grade ore, largely quite pure iron pyrite, carrying a little silver. Most of the output is shipped to the Western Chemical Co. for acid manufacture.

Developed by 1,350′ shaft.

IBEX MINING CO. **COLORADO**

Office: 929 Equitable Bldg., Denver. **Mine office:** Leadville, Colo.

Officers: A. V. Hunter, pres.-treas.; John A. Ewing, v. p.; Chas. Cavender, sec.; J. F. Campion, mgr., with Gerald Hughes, F. L. Smith, J. C. Mitchell and J. J. Brown, directors. Geo. Becker, supt.

Inc. March, 1891, in Colorado. **Cap.,** $100,000; $1 par; all issued. Annual meeting, first Monday in June. Company is operated as a close corporation.

Property: 10 claims, patented, 52 acres, on Breece hill, Leadville, Lake county, includes the Little Jonny claim, which has produced about $25,000,000 worth of ore. Ore occurs in blanket deposits carrying silver, lead, copper and zinc. Bodies of contact metamorphic ore encountered at depth were low-grade and not valuable. Vein structure is very complicated, owing to faulting.

Development: by 4 vertical shafts to depth of 1,250′. On the 900′ level an ore-shoot, opened for 2,000′, is reported to be 70′ wide and 55′ high and to run from 0.80 to 1.30 oz. gold per ton. Reported to have a zinc content of 23%. In 1918, a body of zinc carbonate ore was discovered on the fourth level.

Equipment: includes 18 machine-drills, breaking about 350 tons of ore per day. Mine is worked by lessees, the Garbutt and C. D. G. being the largest operators, employing 100 men jointly. Operations were normal in 1918, and presumably so throughout 1919. No production figures are available.

IRON SILVER MINING CO. **COLORADO**

Offices: Room 926, No. 52 Broadway, New York City, and 615 Stevens Bldg., Detroit, Mich. Mine near Leadville, Lake county, Colo.

Officers: W. R. Cobb, pres.; Henry G. Stevens, v. p.; Homer A. Hoit, sec.; Fremont Woodruff, treas.; preceding, with Bruce G. Broad, R. H. Webber, Isaac J. Meyer, Eber W. Cottrell, H. C. DuVal, Samuel E. Reinhard and Chas. E. Hilton, trustees. Geo. O. Argall, gen. mgr.; Philip Argall & Sons, cons. engrs.

Inc. March, 1880, in New York. **Cap.,** $10,000,000; shares $20 par;

Stock listed on N. Y. Consolidated Stock Exchange and the Detroit Exchange. Farmers Loan & Trust Co., New York, registrar. Annual meeting, first Tuesday in March.

Net earnings were $267,034 in 1904; $515,127 in 1906; $65,366 in 1907; $6,960 in 1908; $183,121 in 1909; $138,308 in 1910; $187,639 in 1911; $274,322 in 1912; $123,927 in 1913; $174,629 in 1914; $184,199 in 1915; $210,595 in 1916; $41,574 in 1917, and $186,143 in 1918.

In 1917 and 1918, equipment depreciation and ore depletion were deducted from net earnings. In 1917, these amounted to $41,574, and in 1918 to $186,143 leaving no surplus to be transferred for either year.

Dividends: $400,000 in 1906; $300,000 in 1907; none in 1908; $50,000 in 1909; $200,000 in 1910; $100,000 in 1911; $200,000 in 1912; $200,000 in 1913; $100,000 in 1914, 1915, 1916 and 1917; $50,000 in 1918, with total dividends, to January, 1919, of $5,300,000.

In 1917, company mined 29,976 tons of ore net value of $293,889. Lessees mined 10,099 tons with net value of $74,850. Total income was $326,109 and expenses, $284,535. Balance sheet, December 31, 1917, showed an operating surplus of $268,187.

In 1918 company mined 33,226 tons of ore of net value of $372,196. Lessees mined 23,207 tons, net value, $171,212. Total income was $427,183 and expenses, $241,040. During 1918, adjustment on account of additional depletion required by the Treasury for years 1916-1917 amounted to $165,378; leaving an operating surplus, December 31, 1918, of $52,809.

Property: the Moyer, Tucson and Blind Tom mines, on Iron hill, about 2 miles E. of Leadville. Also controls through stock ownership, the Nisi Prius Cons. Mining Co. and the New Marian Cons. Mining Co., which see. In 1915, company purchased an undivided ½ interest in the Proserpine and Cumberland Lode mining claims, U. S. Survey No. 5214, which secured for the Iron Silver Co. a ⅝ interest in these claims, consisting of 9.9 acres, adjoining the company's property on the N. W. During 1917, company secured a 5-year lease of the Alleghany group, consisting of about 19 acres adjoining property on north and located on trend of Mikado fault.

The Moyer mine yielded 12,784 tons of ore in 1917, net value of $95,933. The mine had over 2 miles of workings and contained large orebodies of very low-grade complex lead-zinc ore from which large tonnages have been extracted for several years past. The "East" orebody opened and stoped in 1912, 18′ thick, 70′ wide, and 360′ long, was completely exhausted in 1915, and ore production was secured from other workings. Mine was closed on October 13, 1917, the commercial ore being exhausted. Lessees were extracting from narrow streaks, at last reports.

The Tucson yielded 3,094 tons of ore, worth $30,905 net, in 1918, which compares with 9,708 tons valued at $126,487 in 1917. Exploration amounted to 836′ in 1918 and 2,288′ in 1917. In July, 1918, mine was closed owing to lack of ore. The Tucson had a 1,200′ aerial tram, of 12 tons hourly capacity from the shaft to the railway siding, which cut the cost of ore-transportation from 60c to about 12c per ton.

To drain and develop an old area in the Graham Park basin of Leadville, Colo., the company erected in 1916 a plant costing $500,000 at the Mikado shaft. This shaft was widened and sunk to 1,135′ in 1917. Two 1,000-gal. per minute pumps were installed.

In 1918, company reopened the old Pyrenees shaft on the Pyrenees claim, southwest of the Mikado, in which it owns an interest, besides having a long-term lease on the property. The Pyrenees shaft has been enlarged and re-timbered to 1,200′ and will hereafter be the main shaft. When finished, the levels will connect with the Marian workings. This project was taken up owing to difficulty and expense of keeping the Mikado, and also to develop the southern end of property.

Lessees mined 8 classes of ore totaling 23,207 tons, valued at $171,212 net in 1918; which compared with 7 classes, 10,099 tons, and a value of $74,850 in 1917.

In 1918, lessees produced 1,396 tons of zinc carbonate ore, 5,993 tons of lead

carbonate ore, 511 tons of iron oxide ore, 4,688 tons of zinc sulphide ore, 3,331 tons of zinc-lead sulphide ore, 2,433 tons of manganese ore, 4,748 tons of iron sulphide and 106 tons lead sulphide, which compares with 5,350 tons zinc carbonate, 2,691 tons lead carbonate, 219 tons iron oxide, 459 tons of zinc sulphide, 256 tons of zinc-lead sulphide, 738 tons manganese ore, and 376 tons iron sulphide in 1917.

Development in Marian mine in 1918 was 3,758, in 1917, 2,439′, and on leases in 1918, 962′; in 1917, 1,665′.

Recent production: of the mines as a whole:

	Copper lb.	Gold oz.	Silver oz.	Lead lb.	Zinc lb.	Iron lb.
1918....	902	402.04	163,809	2,661,131	21,847,947	6,446,825
1917....	26,914	689.25	163,493	1,893,020	13,342,256	5,956,671
1916....	1,420,713	134.5	336,277	2,401,089	12,994,318	5,597,605
1915....	33,694	575.	136,674	4,205,616	16,674,848	2,957,235
1914....	12,751	923.1	327,976	10,608,734	17,396,362	5,247,433
1913....	7,230	509.	391,603	12,105,921	25,658,913	2,745,511
1912....	58,543	323.92	470,403	12,874,099	21,601,428	2,816,079

Property is well equipped and well managed.

JASON MINE **COLORADO**

Address: G. P. Goodier, owner, 302 Majestic Bldg., Denver, Colo. Chauncey Bonnell, supt., Leadville, Colo.

Property: 4 claims, 40 acres, on Poverty Flats in N. E. part of Leadville, Lake county.

In 1918, lessees shipped $10,000 worth of ore from a 14′ vein on 180′ level to the Colorado Fuel & Iron Co., Pueblo, Colo., to be used as flux. Ore is reported to have assayed 3 oz. silver, 26% iron, 30% manganese. There are two deposits of manganese ore under development on the 250′ level; one 22 by 17′, and the other 16 by 11′, said to carry 34% manganese and 5% silica.

JULIA MINING CO. **COLORADO**

Address: Clarence Jarbeau, mgr., Leadville, Colo.

Property: the Home Extension and Cloud City mines in the Down Town area of Leadville. Daily shipments in 1917 averaged 75 tons of manganese-iron-silver ore. No recent report received.

KATINKA GOLD MINING CO. **COLORADO**

Letters returned; no late information obtainable.

Owned property at Guyot Hill, Leadville, Lake county, operated under lease 1915, by Progress Mining and Milling Co. Chas. Warden, mgr. Work stopped January, 1916, by threatened apex litigation.

KEEN MINE **COLORADO**

Mine office: Yankee Hill, Leadville, Colo.

The Keen mine is said to be in an ore-belt that has yielded lead-zinc ores, to the companies on both sides of the Keen. Mine is developed by 335 shaft.

Equipment: includes electric hoist. Reported in 1918 that Austin Blakey, Sr., and J. P. Hepburn had reopened the Keen shaft on Yankee hill.

LEADVILLE BASIN MINES CO. **COLORADO**

Address: S. M. Carleton, Leadville, Colo.

Officers: J. K. Carleton, pres.; S. W. Eckman, treas.; S. M. Carleton, sec.; with I. B. Humphreys, directors.

Property: the Northern mine (leased to Dold M. Co., which see) and Capitol Clipper, Congress and Castle claims at Leadville, Colo.

Development: the porphyry-lime contacts were to be explored by deep work. Rich silver-bearing lead carbonate has been mined by former owners. No recent reports obtainable from company.

LILIAN MINE **COLORADO**

Officers: J. Clarence Hersey, mgr.; R. I. Hughes, supt., at last reports.

Property: on Printer Boy Hill, between Iowa Gulch and head of California Gulch, Lake county, Colo.; developed by a tunnel, ½ mile long and much drifting. Ore carries gold, silver, lead and zinc.

Worked by lessees in 1916 and output estimated at 250 tons per month.

Oxide ore from the Lovejoy claim containing lead-gold values, was shipped to the Ohio-Colorado smelter at Salida. Zinc carbonate ore from the Lilian was sold to the Western Zinc Oxide Co. No recent report.

LUEMA MINING CO. **COLORADO**

Address: Leadville, Colo. Warren F. Page, mgr., at last accounts.

Property: the Valley and Forest Rose mines, on Prospect mountain, developed by a 500′ shaft and 2,000′ tunnel, said to show silver-bearing, copper and lead ores. On the 1,500′ point in the tunnel, drill-holes down to 200′ have proved valuable ore-bodies and management plans sinking interior shaft on the course of the drills. Has electric power, hoist and all necessary machinery. Surface buildings, destroyed by fire in 1914, were re-built the following year. No recent returns.

MATCHLESS MNG. & LEASING CO. **COLORADO**

Address: Dr. Bailey, Leadville, Colo.

Reported late in 1917 that Edward Huter was operating the Matchless property on Fryer hill, near Leadville, Lake county. The old shaft had been re-timbered throughout its 246′ depth and deepened through quartzite and porphyry. A diamond-drill was being used for exploration as it is believed that white limestone exists under the porphyry, forming the sulphide zone. A vigorous development policy is being pursued.

MAY QUEEN LEASING CO. **COLORADO**

Dave Harris, mgr. P. C. Madsen, supt. Operating on Yankee hill, near Leadville, Lake county, through the Hayden shaft. On the 150′ level, zinc carbonate was opened in a body 30′ long and 18′ deep. Reported to have shipped 25 tons ore daily to the Western zinc oxide plant at Leadville, in 1918.

MILLER GOLD MINING & MILLING CO. **COLORADO**

Address: Mrs. M. Miller, mgr., Twin Lakes, Lake county, Colo. J. G. Buehler, pres.

Reported late 1917 to have cut a vein 2′ thick, yielding a gold ore averaging $75 per ton.

Development by 1,200′ tunnel. Company has a 100-ton mill and was to erect a compressor plant at last accounts. The plants and upper workings of the mine were leased to the Mt. Champion Company in September, 1919.

MT. CHAMPION MINING CO. **COLORADO**

Address: 55 Congress St., Boston, Mass., and Leadville, Colo.

Officers: C. H. Huff, pres.; C. Q. Adams, v. p.; W. E. McKee, sec.; H. A. Wentworth, treas.; all of Boston. Lucien W. Smith, mgr. Company is a close corporation, incorporated in Maine, 1910.

Property: 12 patented, several unpatented claims, in Lackawanna and Half Moon gulches, near Leadville, Lake county, and 4 miles from Malta, the railway and loading station. The Colorado Power Co.'s transmission-line connects with mine and mill. The Ozark mine is under lease to company and possibilities are considered good.

Geology: ore zone is a granite intrusion in gneiss, accompanied by an alaskite dike with several branches passing through the granite, the latter being mineralized and faulted. Ore contains gold, a little silver, and an occasional shoot carrying some copper and lead. About 30% of the gold is amenable to amalgmation. Values are mainly in the sulphides, which assay $200 per ton. Mill ore averages $8.42, other ore, $75.25.

Development: by tunnels, mostly in ore. Total workings, 10,000′.

Equipment: 1,000 cu. ft. compressor 6,600′ aerial tram, and 75-ton mill using breaker, Hardinge and tube-mills, and concentrators.

On account of abnormal conditions mine was closed in 1918, but reopened in April, 1919. Company planned a new mill employing cyanidation. In September, company leased the mill, tram, and upper workings of the Miller Mining Co. No production figures obtainable.

NEW MARIAN CONSOLIDATED MINING CO. **COLORADO**

Company dissolved and property taken over by Iron Silver Mining Co. of Leadville, Colo. See Vol. XII for description of mine.

NEW MONARCH MINING CO. **COLORADO**

Office: care J. C. Kortz, pres. Cuyahoga Bldg., Cleveland, Ohio. **Mine office:** Leadville, Lake county, Colo. Frank Fuller, supt., at last accounts.

Property: the New Monarch and Cleveland mines carrying lead and zinc sulphides. Developed by shafts and crosscuts. A crosscut to the N. E. was being driven in virgin ground at the bottom of the Monarch shaft.

Equipment: included a steam plant, compressor, etc. Operated by lessees since 1914 and at last accounts were producing over 1,000 tons of ore per month, which averaged $20 in gold, silver, lead and zinc.

Letters sent to company unanswered.

NISI PRIUS CONSOLIDATED MINING CO. **COLORADO**

Controlled through stock ownership by Iron Silver Mining Co.

Officers: J. B. Grant, pres.. J. A. Ewing, v. p.; Fremont Woodruff, sec.; G. O. Argall, treas.

Property: at Leadville, Lake county, worked by two sets of lessees in 1916, 1917 and 1918.

During 1918 a new body of lead-silver ore was opened up that was 8′ wide by 15′ long, the ore assaying 15% lead and 11 oz. silver per ton.

Production: in 1918 was 1,569 tons of manganese ore, 169 tons iron and 117 tons lead carbonate ore, with a total value of $15,029, compared with 3,202 tons, 952 tons, and 24 tons, $21,999, respectively, in 1917.

ONTARIO TIGER & GREEN MTN. LEASING CO. **COLORADO**

E. A. Smith and Hector McDonald, of Leadville, Colo., lessees, at last accounts. Inc. in 1916.

Property: near the head of Iowa gulch, Lake county, was discovered in 1878 and is credited with past production of $80,000. Strong flow of water caused shut-down.

Reopened in 1916, and 300′ lower tunnel was extended to 700′, where a 4′ vein was cut carrying $20 to $40 ore. Values are in silver, lead, gold and copper. Reported shipping in 1917; no recent returns.

PONSARDIN MINE **COLORADO**

Address: W. E. Bowden, mgr., Leadville, Colo.

Property: on Yankee Hill near Leadville, Lake county. Lessees reported to have uncovered a body of sulphide ore, 70′ long and 15′ high, on the 430′ level, containing 23 to 31% zinc, 19% lead, 6 oz. silver. Were shipping at the rate of 50 tons daily in 1916. No recent information.

P. O. S. MINE **COLORADO**

Address: M. M. McGinniss, Leadville, Lake county, Colo.

Operators have leased the P. O. S. properties, on Carbonate hill, Leadville, containing manganese and iron-silver ores. Mine was idle for several years and is controlled by the Down Town Mines Co., which see.

PROSPECT MOUNTAIN MINES & EXPLORATION CO. (THE) **COLORADO**

Office: A. A. Garrett, Bank Annex Bldg., Leadville, Colo.

Officers: John Cortellini, pres.; W. G. West, v. p.; A. A. Garrett, sec.; G. M. Spangler, treas., with P. F. Hart, Frank Zaitz, and M. A. Nicholson, directors.

Inc. 1919, in Colorado. **Cap.,** $500,000; shares $10 par; non-assessable.

Company is backed by influential Leadville residents, and was organized to drive a 7,000′ tunnel through Canterbury hill, towards Big Evans gulch, to crosscut veins and dikes believed to extend from Fryer hill. Property consists of 465 acres on the west and south slopes of Prospect Mountain (which will eventually be served), and of Canterbury hill. The portal of the tunnel is nearly 2 miles from Leadville at the foot of Canterbury hill. The tunnel cuts the Blue limestone. The first objective is the Roseville shaft, reached at depth of 225′; followed by the Minneapolis shaft, 508′; Canterbury hill, 1,100′; Canterbury shaft, 700′; and Big Evans gulch, 600′. The "basins" beyond are drained by the Yak tunnel, but could also be reached by the new tunnel, 200′ deeper. About 200′ advance can be made each month. The orebodies lie in the lime contacts. The tunnel as projected is expected to drain and explore thousands of acres of

ore-bearing ground. The Roseville tract itself yielded rich gold-silver ore up to 1882. This is another project, the fourth in the past 6 years, to revive Leadville by draining a large area of old workings, and to prospect virgin ground.

SILVER MINING & REDUCTION CO. **COLORADO**

Mine office: Leadville, Colo.

Officers: A. P. Craft, pres.; W. B. Brooks, treas. and gen. mgr.; J. W. Smith, sec., preceding with J. L. McLean and J. F. Cleveland, directors.

Inc. in Colorado. **Cap.**, $1,000,000; shares $1 par; non-assessable. National Security Co., New York, registrar and transfer agent.

Property: company holds bonds and a lease on several properties around Leadville, one being the Resurrection lease; also owns nearly all the stock of the Colorado Concentrating Co., which has a lease with option to purchase, on the Pingrey mill at Leadville, a plant with a 100-ton daily capacity.

Company will separate the zinc-iron minerals from the silver-lead ore and then extract the zinc by a magnetic separation system known as the Campbell-Ethington process, by which the iron is removed from the concentrate and product that runs 25% zinc, raised to one running around 50% zinc.

Management predicts net profits of between $400 and $700 per day solely from mill operations.

In October, 1919, a Wall St. house made a pre-organization offer of the stock at 50c per share, issuing a 24-page booklet, "Silver, the Opportunity of Today," describing the district and marketing of ore, including much extraneous matter interwoven with what the company plans to accomplish.

SMALL HOPES-BOREEL MINING CO. **COLORADO**

Property: the Robert Emmet mine at Leadville, a great producer of lead-zinc ore, is now owned by the Empire Zinc Co., which see. (See New Jersey Zinc Co.)

STARS CONSOLIDATED MINING CO. **COLORADO**

Operating properties on Carbonate Hill, Leadville, Colo. Have erected the first 100-ton unit system of a 300-ton mill, which will be used to dress low-grade iron-manganese ore deposits. Properties being worked for most part by lessees.

WESTERN MINING CO. **COLORADO**

Office: Leadville and Lake City, Colo.

Subsidiary of the Am. Smelters Sec. Co. Is an important producer of zinc carbonate ores from Big Chief, Maid of Erin, and other mines through the Wolfton shaft, Carbonate hill, Leadville, Lake county.

The Leadville unit of the U. S. S. R. & M. E. Co., unwatered the Fryer Hill section and carried on extensive operations through the Harvard shaft. Work started February, 1916, and was discontinued August, 1918. The company hoped to discover a second contact in that section. In 1917 the Western Mining Co., was shipping about 200 tons daily, but all from the upper contact. Company exhausted all available ore-bodies in July, 1918.

WESTERN ZINC OXIDE CO. **COLORADO**

Office: C. H. Collins, pres.; W. A. Young, sec.-treas., Leadville, Colo.

Formed in 1915 to take over and operate the 50-ton plant of the Western Zinc Mining & Reduction Co., west of Leadville.

Employs the Wetherill process of producing zinc oxide by volatilization and collecting fume in flues. Plant operated continuously. Late in 1919 it was decided to double the capacity. Improvements have been made in method of hauling residue.

YAK MINING, MILLING & TUNNEL CO. **COLORADO**

Office: Marbridge Bldg., W. 34th St., New York. **Mine office:** Leadville, Colo.

Officers: Myron T. Herrick, pres.; Harry C. James, v. p.; Walter W. Davis, v. p. and gen. mgr., Leadville and New York; J. C. Mitchell, sec.-treas., Denver National Bank, Denver. J. G. Hardy, mine mgr.; E. L. Hartwell, supt.

Cap., $1,000,000; reduced Jan. 10, 1918 to $500,000, when the company declared a distribution of liquidation capital which amounted to $500,000; shares $1 par; all outstanding and assessable.

In December, 1917, company sold an undivided half interest in the property

to the American S. & R. Co. By the terms of the sale, the American S. & R. Co. paid $500,000 for the half interest; this full amount, $500,000, although not a lien, is to be returned to the American S. & R. Co. out of the profits of operations, after which both companies will shares in the profits equally. The A. S. & R. Co. will carry on the company operations. The mining department of the A. S. & R. Co. has been at work since January 1, 1918.

Comparative General Balance Sheet:

Assets:

	Tunnel & Prop.	Equip.	Cash	Other Current	Total
1918 (a)	$485,119	$49,621	$105,227	$222,446	$862,415
1917	1,094,676	73,759	77,221	330,992	1,576,650
1916	1,126,934	61,011	184,310	313,529	1,685,785
1915	977,543	66,386	.....	724,383	1,768,312
1914	1,087,013	81,139	276,571	181,678	1,626,401
1913	1,000,611	85,582	259,705	93,889	1,439,789

Liabilities:

	Capital Stock	Accounts Payable	Undiv. Profits	Reserve	Total
1918 (a)	$500,000(b)	$13,013	$349,402	.....	$862,415
1917	1,000,000	67,758	513,892	.....	1,576,650
1916	1,000,000	101,935	511,360	$72,490	1,685,785
1915	1,000,000	.....	768,312	.....	1,768,312
1914	1,000,000	96,331	530,070	.....	1,626,401
1913	1,000,000	29,022	410,765	.....	1,439,789

(a) To October 31, 1918. (b) Capital stock, $1,000,000, less, liquidation dividends, $500,000; total capital stock, $500,000.

Comparative Income Account:

	Mng. Co. Acct.	Total Net	Div.
1917	$59,690	$141,611	$140,000
1916	382,588	503,046	760,000
1915	268,264	428,568	160,000
1914	217,949	306,545	110,000
1913	154,928	210,985	80,000
1912	69,247	120,216	80,000

The profit in 1918 amounted to about $200,000 and to $15,000 for the first four months of 1919.

Dividends: quarterly, commenced March 31, 1904, and were continuous up to September 30, 1918, when the amount distributed totaled $3,497,685. Dividends were then discontinued until July 1, 1919, when 1½% was declared. The above total includes a stock dividend of 12½%, declared October 31, 1904; it also includes a distribution of liquidated capital, January 10, 1918, of $500,000.

Property: owns 250 acres and controls an additional area of 1,133 acres at Leadville. Also holds agreements covering several hundred additional acres, under which agreements company has the right to drive the Yak tunnel into such ground at its option.

The Yak tunnel is a 4-mile transportation and drainage tunnel which drains an important part of the Leadville camp, including the White Cap and Cord properties on Iron Hill. The portal of the tunnel is in California Gulch, about 1 mile from Leadville. In March, 1917, the surface track to switches, dumps, etc., was 9,100′; the main Yak tunnel, by way of Louisville and North Moyer, equipped with 30-lb. rails and trolley line for operation of 50-h. p. locomotives, was 23,032′; laterals equipped with trolley line, 6,207′; laterals equipped with track but not trolley line, 1,922′; miscellaneous laterals suitable for equipment for electric locomotives, about 5,912′.

The ore developed by the tunnel are chiefly a complex sulphide containing gold, silver, lead and zinc. For geology of the Leadville district, see U. S. G. S. Bull. 320, by S. F. Emmons and J. D. Irving.

Production: in 1918, there were mined 34,152 tons of iron-silver ore;

22,653 tons of lead-zinc ore, and 1,802 tons of pyrites for acid-burners, a total of 58,607 tons.

CONNECTICUT

NEW HAVEN COPPER CO. **CONNECTICUT**

Inactive, and probably defunct

Property at Seymour, Conn., shows a copper-bearing band of horn-blende schist, carrying chalcopyrite with some bornite. Operations were carried on intermittently for several years, the last work being done in October, 1911. Company had power plant on the border of the Naugatuck river.

TUNGSTEN COMPANY OF AMERICA **CONNECTICUT**

Owns a tungsten property at Trumbull, Conn., long famous for its minerals. Company organized in 1916, but became involved in litigation soon afterward, and is now inactive. See Vol. XIII for description. The deposit is said to be well worth exploitation.

GEORGIA

AMERICAN VENTURE & MINES CORPORATION **GEORGIA**

Office: 351 Bullitt Bldg., Philadelphia, Pa.

Officers: Meyer Schamberg, pres.; H. Hoopes, v. p.; N. S. Keith, sec.-treas.

Inc. 1914, in Arizona. **Cap.,** $2,500,000, of which $1,000,000 is preferred and $1,500,000 common. Outstanding $275,000 preferred and $750,000 common; shares $1 par. Registrar, Corporation Guarantee & Trust Co., Philadelphia, Pa. Transfer agent, office of corporation.

Property: the Columbia mines, 1,705 acres consisting of 40 acre lot, Parks tract, Wyllie tract, Mountain lot, Hamilton tract, and mineral rights to Walker and Mote tracts, all situated 11 miles north of Thompson, McDuffie county, and 45 miles N. W. of Augusta, Ga.

Geology: the property: shows a number of fissure veins, of usual Piedmont type, carying up to 20′ in width. The ores, are quartzose and carry sulphides containing gold, silver and traces of copper and lead. The rocks are mica schists with some gneiss cut by veins with 45° dip. Ore is said to run $10 in gold and silver, principally gold, which seems high for an average assay. Company reports 30,000 tons blocked out.

Developments: by shafts and 5,000′ of workings, the deepest being 450′.

Equipment: 40-h. p. steam hoist, 100-h. p. compressor, 75-ton mill which uses a continuous current cyanidation method.

Mine has been under development since 1916, and output, from experimental work reported as $3,500. Property said to have produced almost $2,000,000 before 1861. Expected to ship early in 1919.

ARIZONA & GEORGIA DEVELOPMENT CO. **GEORGIA**

Inactive. **Address:** Wm. Tudor, Temple, Haralson county, Ga. **Mine office:** Draketown, Ga.

Organized in 1916 to operate the Tallapoosa mine of the Georgia Pyrites Co., under lease and bond expiring March, 1919, and not renewed. Corporation apparently still alive.

Production: for past 3 years was 20,000 lb. of cement copper, (mostly above 50% copper content), and 500 tons pyrite concentrate averaging 49.7% sulphur, total proceeds $10,000. Company said to have spent $50,000 reopening mine.

It was hoped "that 500,000 tons could be mined yearly from which 50,000 tons of shipping ore could be sorted that would average 43% sulphur, 3.12% copper and $2.50 in gold and silver; also 150,000 tons of concentrate that will average 47% sulphur, 4% copper and $3 in gold and silver. The remaining 200,000 tons should, after roasting, give 150,000 tons cinder averaging 5% copper and $3.50 gold and silver. The pyrite of this mine is said to bring 5 cents a unit above market price, due to its purity."

Is a property of merit if properly financed and developed.

BARTOW MINING & MANUFACTURING CO. **GEORGIA**

Address: M. G. Dobbins, agent, Cartersville, Ga.

Mine leased to the Republic Iron & Steel Co., Birmingham, Ala.

Property: 325 acres, known as Dobbins mines, 4 miles N. E. of Cartersville, Bartow county. Mine first opened 1866; has been operated by lessees at different times up to present.

Geology: Weisner quartzite, strike being N. 45° E. Overlying the quartzites are yellow and reddish yellow clays, showing a decomposed formation. The depth of decomposed mass depends on irregularities of underlying quartzite. Ore deposit is in the decomposed material on surface varying from ferruginous and manganiferous nodules, to masses of manganese oxide, deeper. High grade manganese ore with pyrolusite and psilomelane formed output to 1916. Present lessee concentrating on production of manganiferous iron. See Bull. 35, Geol. Survey of Ga.

Development: six shafts, 50′, 80′, 100′, 106′, 110′ and 190′ in depths, and 8 cuts 100-150′ long, 50′ wide and 25-30′ deep. Ore produced by Republic Iron & Steel Co. averages 15.84% manganese, 25.71 iron and 0.188 phosphorus.

BELL-STAR MINE **GEORGIA**

Address: J. J. Westerman, Woodstock, R-3, Ga.

Property: 3 lots, 222 acres, in Cherokee county, known as Bell-Star mine, 3.8 miles from Woodstock; shipping point, Kenshaw, 6.7 miles away.

Geology: country rock is mica gneiss, with bands of horn-blende gneiss. Property has a pyrite vein, about 100′ wide containing iron, sulphur, manganese and zinc. The gossan is silicious, indicating a low-grade ore. There is a gold vein to the E. and a schistose zone belt called the Sandstone vein to the W. of the gossan, the last named worked for gold from 1846-1860. The quartz of the Sandstone vein carries magnetite and garnet; vein is opened to a depth of 900′. See Bull. 33, Geological Survey of Ga.

Mine has not been worked in many years, owing to lack of money.

Developed by 6 shafts, including an incline, 200′ deep, a second 200′ shaft, vertical for 150′, and four others varying from 40′ to 60′ in depth. The two deeper shafts have considerable work on the vein.

CARRIBEE MINING CO. **GEORGIA**

Address: Phil Dorn, mgr., Cartersville Poor Farm, White, Ga.

Property: 320 acres, 12 miles W. of Cartersville, Bartow county, shipping point White 2¼ miles away. Mine was leased, 1918, to J. W. Brockman and Philip Dorn of Birmingham, Ala., by the Bartow County Commissioners, who are in charge.

Geology: ground shows Cambrian formations of gray quartzite, schist and gray slate, whose folds and faults are obscure. Manganese ore occurs in soft yellow clay, both as a soft, granular material and a hard concretionary masses, not over 5″ in diameter. This is treated in log washers and jigs producing ore carrying 40% metallic manganese. An average sample of the ore assays 17.41 manganese, 0.40 phosphorus, 5.54 alumina, 5.60 iron and 46.58 silica. See Bull. 35, Geol. Survey of Georgia.

Development: 5 open cuts, from 60′—100′ long, 20′—80′ wide and 10′—30′ deep.

Equipment: steam shovel, double log washer, steam engine boiler, 600′ tram, tram cars and motor-trucks. Several hundred tons of manganese ore were produced during 1917-1918.

CHEROKEE MINING CO. **GEORGIA**

Address: F. W. Padgett, mgr., Blue Ridge, Ga. E. L. Hertzog, pres.

Company is a North Carolina firm, operating the McKinney property in Blue Ridge, Tanin county, since 1918. Mine was worked long ago for its brown iron ore, but present company produces manganese ore from old open cuts. Ore is gravelly, occurring in pockets and veins in clay, schist and slate. The ore deposit is not believed to be over 20′ in width. Several car loads of ore containing about 34% manganese are reported to have been shipped during 1918.

CHEROKEE OCHRE CO. **GEORGIA**

Office: Cartersville, Ga., J. T. Norris, pres.-mgr.

Inc. Dec., 1904, in Georgia. **Cap.**, $30,000; $100 par, all outstanding.

Property: about 170 acres, including the Freeman property: just outside Cartersville, contains streaks of yellow "Peruvian ochre," and barite in sandstone. This is reported to assay: iron peroxide, 52.53%; alumina, 11.75; silica, 22.05.

Company has 15-ton mill with flotation unit. Mine openings are 30'-40' deep.

CHESTATEE PYRITE & CHEMICAL CORPORATION **GEORGIA**

Office: Third National Bank Bldg., Atlanta, Georgia.

Officers: N. P. Pratt, treas.; G. L. Pratt, v. p.-treas.; Palmer Pratt, sec.; T. H. Tulloch, supt.; C. E. Julihn, cons. eng.

Property: the Chestatee pyrite mine, in Lumpkin county, 6 miles E. of Dahlonega, and on S. side of the Chestatee river, on which mining was started in 1892.

Geology: Mica gneiss and hornblende gneiss, are cut by granite, which is also metamorphosed. The important pyrite and gold deposits of the district all occur in a belt of more basic rock that lies within a mile of the granite contact. At the Chestatee mine the granite border is but a few hundred feet S. E. of the vein. The orebody has a gossan outcrop of commercial iron ore 5,800' long. This exposure runs N. 45° E., and the dip is 60° N. W. A parallel vein occurs not far away. The ore occurs as a tabular mass, showing a number of rolls or minor folds.

The ore is classed as either lump or concentrating material, according to the pyrite content. The first named occurs as lenses or shoots, is massive, and consists mainly of pyrite and a little chalcopyrite, in a gangue of quartz, garnet, and sericite. It averages 43.52% sulphur, 39.70% iron, 1.60% copper, 9.26% silica, 2.53% alumina, and 0.72% zinc. The concentrating ore is lower grade, but of similar mineralogic character.

Development: by 205' incline shaft and main haulage-level over 1,200' long, with crosscuts to the vein every hundred feet. The levels are equipped with ore pockets. Reserves are estimated at 1,300,000 tons.

Equipment: electric power-plant, loading bins, crushing and sorting plant for 800 tons of run-of-mine ore daily, and mill for concentrating 400 tons daily. The mill employs a 24 by 12" crusher set at 3", one dry trommel, washer, picking belt, lump ore being shipped at this point; crusher set at 1½", 9 mm. trommel, rolls, 2mm. trommel, Hancock jig, tables, and storage bins for concentrates.

Production: no figures are available. In 1919, the company applied to the War Minerals Relief Commission for $900,000. Of this, $223,000 was awarded, but the company was not satisfied, as it alleged that it had spent $914,000, partly at the request of the Government.

COGGINS & SMITH MINING CO. **GEORGIA**

Address: R. R. Smith, mgr., care C. E. Reed Oil Co., Atlanta, Ga.

Inc. March, 1918, in Georgia.

Property: Mt. Tabor mine, 77 acres, in Paulding county, 5 miles east of Dallas. Shows granite cut by a pyrite vein, 25' wide, containing gold, silver and copper values and reported to assay 42.49% sulphur; $1.43 gold per ton and 1.8% copper. Vein dips about 70° NE-SW.

Developed: by 50' shaft. **Equipment:** includes mill, pump and engine. Little work has been done since 1907, but company planned to reopen deposit in 1919.

COLLEY MINE **GEORGIA**

Address: J. D. Colley, Lincolnton, Ga.

Property: a manganese mine about 80 acres, east of Lincolnton, owned by J. D. Colley and J. H. Boykin. Had been leased to J. R. Whitman, Healey Bldg., Atlanta. Operations ceased at close of war, late in 1918

Property developed by small open cuts. Assays show a content of

32.8 manganese, 9.57 alumina, 3.28 iron and some barium. Production, 1918, reported as a few hundred tons of manganese.

CROWN MOUNTAIN M. & P. CO. **GEORGIA**

Mail returned unclaimed, March 11, 1919, from last address, Dahlonega, Lumpkin county, Ga. W. D. McGinniss, mgr. Had planned to erect 100-ton cyanide plant to treat $6 gold ore.

ETOWAH DEVELOPMENT CO. **GEORGIA**

Address: R. S. Munford, gen. mgr., Cartersville, Ga.

Property: Brown iron and manganese mines, embracing several thousand acres near Cartersville, and including the Iron Hill and Hebble mines. The Etowah River runs through the land, giving a river frontage of four miles on two sides, with a fall of 70′, giving 12,000 h. p. energy that can be developed.

Property has been worked at intervals since the early forties, mainly for iron ore in 1918; present company developing iron ore at the Iron Hill mine, while lessees were mining manganese on other sections of the property. Most important property is Hebble mine, 2 miles east of Cartersville, leased to J. C. Hebble and producing ore with 45% metallic manganese. This mine developed by shaft 36′ deep, tunnel 150′ long, some underground working and considerable open cuts. See Bull. 35, p. 78, Geol. Survey of Georgia.

Equipment on property includes 4 steam shovels, 8 log washers, 3 jigs and about 4 miles standard gage railroad and locomotives.

ETOWAH MILLING & POWER CO. **GEORGIA**

Office: 420 Healey Bldg., Atlanta, Ga.

Officers: J. P. Given, pres.; J. H. Simms, v. p.; C. H. Butts, sec.; D. S. Walraven, treas.

Inc. April, 1916, in Georgia. **Cap.**, $500,000; $10 par; 26,496 issued, U. S. Corporation Co., transfer agent and registrar.

Property: gold claims and water rights near Atlanta, Fulton county. A prospect.

EXPERT PROSPECTING & DEVELOPMENT CO. **GEORGIA**

Address: W. F. Aldrich, pres., Birmingham, Ala. **Mine office:** Drake-town, Ga.

During 1918 it was reported that company was to reopen the Douglas properties, 230 acres, 2 miles north of Draketown, the mineral rights to which are owned by J. W. Douglass, Temple, Ga.

Development: by 3 shafts, the first 96′ deep, exposing a quartz vein 12′ thick, which was cut at 56′ and extends to bottom of workings. There are two other shafts, one 40′, the other 25′ deep. Analyses indicate a good grade of manganese ore, intimately mixed with an amount of silica, necessitating thorough crushing and jigging.

FLOWER MINING CO. **GEORGIA**

Address: John Baker, mgr., Higdons Store, Fannin county, Ga.

Property: a copper prospect on Mt. Pisgah, 1 mile of Higdons Store, secured by company in 1917. Average strike is E. with dip of 45° N., the principal ore mineral is chalcopyrite with some pyrrhotite.

Developed: by 150′ tunnel, three shafts, some test pits and open cuts.

FOX & DOWLER MINE **GEORGIA**

Address: F. H. Dowler, Chattanooga, Tenn. **Mine office:** Tunnel Hill, Whitfield county, Ga.

Property: 6 lots, 730 acres and the mineral interests on two lots, 3 miles north of Tunnel Hill built in Catoosa county. Property had been worked around 1890 by Catoosa Mining Co.; this company made large open cuts and drove an adit 160′ on the vein, the deepest workings being 225′ below surface. See Bull. 35, Geol. Surv., Ga.

The ore deposits occur along a fault zone, in Knox dolomite, the ore showing manganese oxide, mixed with clay and chert breccia. Some ship-

ments made in 1918 were said to be high in silica, but containing iron and manganese. Prospecting under way.

FREEMAN MINE **GEORGIA**

Address: Cartersville, Ga. Owned by M. J. Freeman, Dallas, Texas, J. L. Smith and F. L. Smith, Cartersville, Ga.

Property: located just outside Cartersville, Bartow county, operated in 1918 by Cherokee Ochre Co., which see

Geology: manganese occurs as gravel, nodular and boulder ore. Mine has been worked at intervals by hand methods and several hundred tons have been reported produced. According to the Geol. Survey of Georgia (Bull. 35), the whole ore deposits should assay: silica, 71.02; alumina, 10.22; manganese, 2.40; iron, 5.15; phosphorus, 0.073%.

GEORGIA COPPER CO. **GEORGIA**

Office: Washington, Ga. **Mine office:** Lincolnton, Ga.

Officers: M. N. Whittaker, pres.-gen. mgr., Lebanon, Tenn.

Cap., $1,000,000; par $1.

Property: the Magruder or Seminole mine, 24 acres, held in fee simple, and mineral rights to 901 acres in Wilkes and Lincoln counties and 12 miles from Washington, Ga., within a mile of Lovelace, on Washington and Lincolnton R. R., which connects with Georgia R. R. Shows gray sericitic schist intruded by eruptive dikes of 2 different ages, with 6 veins in schist and between schists and eruptive rocks. Lodes have an average strike of N. 30° E., to N. 40° E., and dip of 50° to vertical, averaging 3 to 14′ in width, and traceable 2,200′. The ores contain pyrite, chalcopyrite, some bornite, cuprite and melaconite, and are estimated by company to average 7.3% copper, 32% lead, 7 oz. silver and $5 gold per ton.

The mine, opened 1852, and closed 1862, on account of American Civil War, reopened 1880-1884, as Magruder Mine and operated 1889-1906 by Seminole Mining Co., which company was succeeded by Lincoln Gold & Copper M'g Co. The Georgia Copper Co. purchased the property in 1917.

Development: by 4 shafts, the main being 220′ deep, the others ranging from 40′-80′, a 100′ air shaft and 1,200′ underground workings.

Equipment: includes 175-h. p. boiler, 2 hoists 15 and 20-h. p. and 8 drill Rand air-compressor. During 1918 a 250-ton mill with W[illegible] tables was erected. Company expected to ship in 1919.

GEORGIA IRON & COAL CO. **GEORGIA**

Office: Atlanta, Ga. **Mine address:** White, Ga. Joel Hurt, pres. Center of operations is Aubrey, one mile south of White.

Property: about 12,000 acres, 8 miles N.-N.E. of Cartersville. The Iron Belt R. R., owned by the company, connects the various mines and the main railroad at McCallie, 1½ miles S. W. of Aubrey. Holdings include Bishop, Peachtree, Chinnley, Moccasin and Red Mountain mines.

Geology: property shows brown iron and manganese deposits, but in 1918 only manganese was produced. Manganese properties are about 12 by 3½ miles in area. Ore is found in quartzite and limestone, and has high percentage of barium oxide. The deposit is reported to be very large, extending from Bishop mines, one mile south of Aubrey to Sugar Hill mines, six miles away. Bull. 35, Geol. Survey of Georgia.

Development: by open cuts at Stevenson, Bufford, Chumley and Aubrey tracts, each being about 300′ long, 250′ wide and 70′ deep. Many shafts have been sunk, deepest being 149′, and considerable tunneling accomplished.

Equipment: 9 steam shovels, 10 miles standard gage R. R., 2 locomotives, dump cars and 4 washeries, only one of which, the Aubrey, is in operation.

Daily output of Aubrey concentrating mill is 50 tons. Enough development has been accomplished in past to guarantee an output, at present production rate, for many years. Employed 225 men in 1918.

GEORGIA MANGANESE CO. **GEORGIA**

Address: James Weisel, pres., 1720 12th Ave., South Birmingham, Ala. Mine leased by J. E. Hill, Birmingham, Ala.

Property: the mining rights to 1,150 acres on Greene-Taliaferro county line, 8 miles N. E. Union Point, Greene county, and 4 miles N. of Robinsen, Taliaferro county. Robinsen is on the Georgia R. R. Shows two parallel lodes about ½ mile apart, each one 3′ wide, striking N. 62° E. and with dip of 63° N. W., carrying high-grade tungsten ore readily separated from impurities. In 1917 shaft was sunk 80′ on main vein.

Equipment: includes 12-h. p. hoist and 12-h. p. engine and boiler, believed idle 1918-19.

GEORGIA MINING CO. **GEORGIA**

See Shirley Mining Co. **Address:** 727 Union Central Bldg., Cincinnati, Ohio.

Officers: D. C. Collins, pres.; R. L. Tilton, v. p.; T. S. Doheman, sec.-treas., with M. L. Kirkpatrick and S. Hickenlooper, directors.

Inc. in April, 1917, in Kentucky. **Cap.**, $7,500; $1 par; all outstanding. Bonds authorized $75,000, outstanding $71,500; interest 7%. **Dividends:** 20% in 1917 and 33 1-3% in 1918.

Property: 36 acres at Copper Mine Station on Seaboard R. R., Paulding county; includes the Little Bob mine, which is owned by the American Minerals Co., leased to the Georgia Mining and sub-leased by them in August, 1918, to the Hanna Minerals Co., 1300 Leader News Bldg., Cleveland, Ohio. Produces pyrites, with average composition of 40% sulphur and 2½% copper; developed by 175′ incline shaft.

Equipment: includes 500 ton mill, compressors and pumps.

Production: 9 months 1917, 7,500 tons; 9 months 1918, 7,700 tons.

GEORGIA PYRITES CO. **GEORGIA**

Controlled by Georgia and Tennessee Copper Co. **Mine office:** Drake-town, Ga.

Property: 400 acres, including the Tallapoosa mine in Haralson county, 9 miles from Buchanan and same distance from Morgan. Property owned in fee simple was first opened in 1856 and developed at different times up to 1884; practically unworked from that time to 1916. (Bull. 33, p. 68, of Geol. Surv. of Ga.)

Geology: main lode 180′ wide on surface has a dip of 30°. This extends 500′ with average width of 50′ workable ore. A second lode lying 250′ S. E. of main lode is said to be 10′-15′ thick, but no work has been done, though good surface assays have been reported. Outcrops traceable for 3,500′ over the tract. Ore is iron pyrite, carrying low values in gold, silver and copper with a general average of 17½% sulphur, 1.15% copper and $1 in gold and silver values. Eighty per cent. of the ore will require concentration about a 2½ to 3 into 1 ton concentrate. Experimental concentration work using Hartz jigs only, gave an average close to 50%.

Development: by extensive underground workings and by 2 shafts, one 300′, the other a prospect shaft 800′ N. E. of old shaft.

Equipment: a small plant, costing $50,000, to handle surface ore and underground developments.

Mine leased 1916-1919 to Arizona and Georgia Development Co., of Temple, Ga., which see.

GEORGIA & TENNESSEE COPPER CO. **GEORGIA**

Controls 99.8% of the stock of the Georgia Pyrites Co., which see.

HAUCK MINE **GEORGIA**

Address: W. O. Hauck, Cartersville, Ga.

Property: 28 acres owned by C. J. & R. L. Smith, of Cartersville, Ga. Was leased July, 1918, to W. O. Hauck. Located 7 miles from Cartersville and 2¼ miles from the Louisville & Nashville R. R.

A vertical shaft sunk in 1918 to depth of 42′, is said to have cut 32′ of ore. Mine shows manganese oxides in yellow clay with underlying quartzite.

LANSKI MINE **GEORGIA**

Address: Samuel Lanski, 110 S. Dearborn St., Chicago, Ill.

Property: 6 lots, over 1,000 acres, near Parnell on Georgia R. R., in Whitfield county, Ga. Property said to show manganese ore, mostly psilomelane and some red iron ore.

Developments: carried on by G. M. McKinney in 1918, consisted of an open cut, said to show 57.50% manganese ore.

LIBERTY PYRITES CO. **GEORGIA**

Address: J. F. Ryon, Healy Bldg., Atlanta, Ga., or L. S. Berg, 47 Wall St., N. Y. City. D. S. Leonard, supt., Hiram, Ga.

Property: 3 lots, 100 acres, 3 miles north of Hiram and same distance south of Dallas, Paulding county, and within a few hundred feet of switch of Southern R. R. property adjoins the Shirley mine.

Developed by two shafts, 70′ and 100′ deep, put down in 1910. Ore reported as medium grade pyrite in gangue of siliceous material. Company was expected to start operations in 1919.

LINCOLN GOLD & COPPER MINING CO. **GEORGIA**

Lincolnton, Ga. Property purchased, 1917, by Ga. Copper Co., which see.

Inc. June 11, 1906, in Oklahoma. **Cap.**, $2,000,000; $1 par. Paid 1 dividend, of one-half of 1%. Was practically the successor of the Seminole Mining Co., which was a sad failure.

MARKSTEIN-DORN MINING CO. **GEORGIA**

Address: Phil. Dorn. mgr., Birmingham, Ala. **Mine address:** Rydal, Bartow county, Ga.

Reported to have a lease on the mineral rights on a part of the property owned by W. B. Vaughan, White, Ga. This tract consists of 9 lots, 1,400 acres, in Bartow and Cherokee counties, near Pinelog Mountain, about 3 miles from Rydal on Louisville and Nashville R. R. Mine contains manganese and manganiferous iron.

Developed: by 150′ shaft, 180′ underground passages and some veritcal test pits, the deepest 75′.

Equipment includes steam shovel, concentration mill, double log washer, 35 h. p. boiler, 15 h. p. engine and jigs.

PAGA MINING CO. **GEORGIA**

Office: Cartersville, Ga.

Reported to have a lease on the Wyvern mine, near Wyvern, about 4 miles north of Cartersville and the White mine, about 1 mile S. E. of White, both on the Louisville and Nashville R. R.

In 1916-1917 company shipped many carloads of hard manganiferous ore, said to contain 20 to 25% manganese, low iron and high chert silica from the Wyvern mine.

Development: on Wyvern, by open cut, hand method. Cut is about 75′ long, 70′ wide and varies from 20-30′ in depth; on White mine, by 2 vertical shafts, 40′ and 100′, an incline shaft 100′, and about 300′ of workings.

REPUBLIC MINING & MANUFACTURING CO. **GEORGIA**

Reported to be operating the Sweetwater mine, two miles W. of Flint River, Sumpter county.

Mine contains bedded deposit of bauxite running 56.3% alumina, 11.8% silica, and 1.8% ferric oxide. Outcrops about 1,300′ long, average thickness 4′.

Work done by manual labor. Production said to be about 1,000 tons monthly.

SHIRLEY MINING CO. **GEORGIA**

See Georgia Mining Co.

Office: 727 Union Central Bldg., Cincinnati, Ohio.

Officers: D. C. Collins, pres.; R. L. Tilton, v. p.; T. S. Doheman, sec.-treas., with M. L. Kirkpatrick and S. Hickenlooper, directors.

Cap., $1,500; shares $1 par

Property: a lease on the Shirley mine, adjacent to Southern Ry. and Seaboard Air Line Ry., 3 miles N. W. of Hiram, consisting of about 150 acres; produces pyrites for sulphuric acid; is located about a mile from the Little Bob mine. Property owned by American Minerals Co., and sub-leased by Shirley

Mining Co. to Hanna Minerals Co., Cleveland, Ohio, from August, 1918, to June, 1919.

Developed by 2 shafts and considerable workings. Equipment: includes Blake crusher, 3 compartment Hartz jig, boiler, drills and pumps.

SOUTHERN LEASING CO. **GEORGIA**

Address: B. C. Sloan, Cartersville, Ga.

Property: about 80 acres, south of Etowah river and two miles north of Emerson, leased from R. R. Rhea of Cartersville; also some manganese properties near Emerson, from the Pittsburgh-Georgia Mining Co. During 1917 some small shipments were reported from the Rhea properties, but no production was announced for 1918-19.

Equipment: includes a 15-h. p. boiler, pump and a log washer.

SOUTHERN MANGANESE CORPORATION **GEORGIA**

Office: Birmingham, Ala. **Mine office:** Doogan, Ga.

Said to be operating 160 acres owned by A. H. Green of Doogan, Ga. Mine about half mile from Doogan, near Conasanga river. Deposit is yellow clay with some quartzite, showing manganiferous iron ore with some phosphorus.

Development: in 1918 amounted to test pits and an open cut. See Bull. Geo. Surv. of Ga.

WISCONSIN-GEORGIA COAL & IRON CO. **GEORGIA**

Office: 808 Steger Bldg., Chicago, Ill.

Officers: A. H. Kluender, pres.; P. W. Butler, v. p.; E. D. Edgerton, treas.; A. E. Roberts, sec.; A. L. Roberts, mgr., with J. H. Nullamore, directors.

Inc. in Delaware. **Cap.,** $800,000.

Property: about 200 acres, at Cohutta, Whitfield county, Georgia, near the Georgia-Tennessee line, showing manganese and brown iron ore.

Developed by open cut 175′ long, 40′ wide and about 20-25′ deep. Some shipments have been made.

ZEIGLER PROPERTY: **GEORGIA.**

W. S. Champ, agent, 217 Broadway, New York City.

Property: 280 acres, about three miles N. E. of Cartersville on Rowland Spring Road, owned by the Wm. Zeigler Estate.

Part of property, operated by W. C. Satterfield during 1918, showed high-grade manganese ore and some manganiferous iron. Operator planned to install a single log washer and a 4-cell jig.

IDAHO

The great mines of the State are in the Coeur d'Alene region in Shoshone county, and the properties of that section are grouped under that name. All others are arranged alphabetically. The value of the gold, silver, copper, lead and zinc mined in Idaho in 1918 was $38,140,000, or $16,700,000 less than that of 1917. Gold alone showed no decrease, while the silver output was $600,000 less in value, despite an increased price per ounce. Many of the mines, particularly the smaller ones, were handicapped by a scarcity of labor, and even the larger mines were at a great expense on account of the increases in cost of freight, treatment, and supplies. The total production of the principal metals for 1919 was as follows: copper, 2,737,800 lbs.; gold, $710,400; silver, 6,042,016 oz. In 1918 the mines produced 300,274,000 lb. lead and 47,000,000 lb. zinc. Dividends paid by mining companies in 1918 totaled over $7,000,000. The Hercules Mining Company, a partnership dominated by the Day family, is the largest producer; the Hecla Mining Co., second, and the Bunker Hill & Sullivan Mng. & Concentrating Co. third in size.

During the first half of 1919, mining in Idaho, as in other Western mining States, was less active than it had been for many years. This general decline of mining was caused by the drop in prices of metals and the high cost of labor and material. In the first six months of 1919 the mines of the Coeur d'Alene region were shipping at the rate of only about 250,000 tons per year, or at 60% of their normal rate. The following table, from the records of the State Mining Inspector, shows the metal output of Idaho over a period of years:

Metal	1918	1917	1916	1915	1914
Gold, oz.....	36,308	41,326	53,079	60,746	62,238
Silver, oz.....	9,572,214	12,496,017	12,205,132	12,933,619	13,621,123
Lead, lb.....	290,848,425	395,883,000	366,594,000	369,242,000	345,334,000
Zinc, lb.....	51,691,000	96,123,000	98,700,740	93,410,000	49,239,000
Copper, lb.....	5,240,000	7,282,000	8,052,725	7,365,000	5,178,000
Antimony, lb.....	.....	.....	.....	70,950	.....
Tungsten, lb.....	.....	.....	120,000	54,000	.....
Total value.....	$37,320,082	..56,292,210	$49,102,693	$39,315,312	$24,976,706

The grand total value in 59 years is $846,829,076.

AEOLIAN COPPER CONSOLIDATED MINING CO., LTD. IDAHO

Idle. Described in Copper Handbook, Vol. XI.

ALLIE MINING CO., LTD. IDAHO

Officers: E. C. Ross of the Ross Syndicate, Gilmore, pres.-gen. mgr.; T. B. Cook, v. p.; H. R. Hyde, sec.-treas.

Inc. 1905, in Idaho. **Cap.**, $300,000; $10 par.

Property: 6 claims, including the Allie mine in the Texas district, near Gilmore, Lemhi county.

Geology: lead-silver ores occur in fissure veins in flat Devonian limestone underlain by Cambrian quartzite. The Allie vein, closely parallel to the lead veins, has gangue of iron oxide with no lead and only a trace of silver, the ore averaging 1 oz. gold and 50% iron. For geologic features see Umpleby, Bull. 528, U. S. Geol. Survey, 1913, p. 107.

Development: a 4,500′ tunnel has been driven into Gilmore mountain by the Gilmore, and the Pittsburgh-Idaho companies jointly. This tunnel crosses a dozen silver-lead veins and one carrying gold ore. Development work on the Latest Out lead vein is 800′ below the outcrop. Ore reserves were claimed 1914 to be 15,000 tons, averaging $12 per ton in gold. Extensive prospecting has not yet shown any commercial silver-lead deposits, though it has opened up good gold ore.

Production: first shipment in Feb., 1914, of 26 tons of gold ore gave smelter returns of $11,060. Total production for that year was 50 tons, averaging better than $300 per ton. Yield in 1917 reported to be $25,000. No later returns available.

ALPINE COPPER MINING CO., LTD. IDAHO

Address: Wallace, Idaho.

Officers: C. W. Beale, pres.; A. H. Featherstone, sec.-treas.

Cap., $100,000; 10c par.

Property: 6 unpatented claims, 2½ miles N. of Adair, in St. Joe district, which show veins containing copper ore.

No recent returns.

ALPINE MINING CO. IDAHO

Address: Charles H. Treacy, mgr., Banks, Boise county, Idaho. J. McNeill and T. Harrington, supts.

Officers: Judge Charles Kerr, pres.; R. J. Colbert, sec.-treas.; with C. P. Nevin; J. J. McCarthy, and W. H. Maloney, directors.

Inc. 1919, in Idaho. **Cap.**, $600,000. Capital was raised in Lexington, Kentucky.

Property: the Three Sisters claims near Banks on the Idaho Northern branch of Oregon Short Line. Ore carries silver and lead. An 8-mile road has to be constructed. Shipments were expected to start in summer of 1920.

ALTA COPPER MINING CO. IDAHO

Probably dead. Fully described Volume XII.

ALTA-IDAHO GOLD & COPPER MINING CO. IDAHO

Probably dead. Fully described Volume XI.

ALTA MINING CO., LTD. IDAHO

Address: W. B. Horn, pres., Salmon, Idaho.

Cap. $500,000; $1 par.

Property: 3 unpatented claims on Jessie creek, near Salmon, Lemhi county.

Development: by tunnels totaling 1,100′, revealing a considerable quantity of gold-silver-lead ore.

No data procurable regarding shipments.

AMBRO MINING CORPORATION **IDAHO**

Address: 600 West Pratt St., Baltimore Md., or Bellevue, Blaine county, Idaho.

Officers: J. H. Mencken, pres.; J. R. Kelly, v. p.-mgr.; Christopher Schaefer, sec.-treas.

Inc. in Delaware: **Cap.**, $1,000,000; 10c par. Listed on New York Curb.

Property: the Hidden Treasure and Idaho Central claims, 4 miles S. E. of Bellevue, and half mile from railroad between Hailey and Shoshone. Examined by Arthur Lakes, whose report is rather non-committal. A fissure vein, in limestone and slate is said to outcrop for 2,200′. Ore consists of iron oxide and galena, the latter averaging $100 per ton in silver. A 1,000′ crosscut tunnel is under consideration.

The house of Thompson & Co. of Philadelphia, has published a circular in which they say company has "10 special advantages over the average mine." To stimulate public interest and support the stock in the market until it will take care of itself, a syndicate has been formed, details of which will be supplied anyone interested in 'Playing the Game from the Inside.'"—*Caveat emptor.*

AMERICAN DEVELOPMENT MINING & REDUCTION CO. **IDAHO**

Address: E. E. Edwards, mgr., Gibbonsville, Idaho.

Property: 400 acres of gold lode, placer, and mill-sites at Gibbonsville, Lemhi county.

Development: by tunnels and shaft. **Equipment:** 15 stamp mill, tables, and small cyanide plant.

AMERICAN MINING CO., LTD. **IDAHO**

Office: 630 Monroe Ave., Helena, Mont.

Officers: A. H. Kleinschmidt, pres.; Maria Kuphal, sec.; and A. H. Kleinschmidt, treas.

Inc. Oct. 2, 1910, in Montana. **Cap.**, $50,000; $1 par; issued 25,000 shares, sold at $1.

Property: a half interest in the Blue Jacket and Queen mines in Seven Devils district, near Landore, Adams county. The Blue Jacket mine has a 400′ shaft, and the Queen has a 1,500′ tunnel; these properties said to have produced about $250,000 in ore, with smelter returns up to 47% copper.

Holdings also include a five-eighth interest in the Peacock, White Monument, a two-third interest in the Helena mines, held jointly with A. M. Holter and S. T. Houser; and a one-half interest in the Blue Jacket No. 2, Copper Queen, Norman, Legal Tender, Copper Crescent and Calumet mines, held jointly with A. C. Johnson and Amelie H. Kleinschmidt.

The Peacock mine, discovered 1869, is the most noted property and has been the largest producer in the Seven Devils district, having 1,500′ of workings, which have produced 25,000 tons of high-grade ore, estimated to show 200,000 tons of 4½% copper ore with about $5 combined gold and silver value on dumps now. Shipments, 1903, returned 13.3 to 18.3% copper, from 3 to 5 oz. silver and $1.33 gold per ton; and 11 shipments to the Oregon Smelting & Refining Co. gave returns of 20.5 to 40.2% copper, 1.15 to 8.7 oz. silver and $1.20 to $3.40 gold per ton. Production, 1905, was 5,000 tons of ore, of about 15% copper tenor, equal to 750,000 lb. fine copper. Property idle since 1909, owing to litigation. A reorganization was to be made in 1919, presumably by the people who operate the East Spring Hill Mining Co. in Montana.

See Mines Handbook, Vol. XII.

ARCO MINING & MILLING CO. **IDAHO**

Address: Angus McKellar, pres., Walker Bank Bldg., Salt Lake City, Utah.

Property: an antimony mine 18 miles S. W. of Arco, Blaine county.

Ore also carries small values in silver and gold. Vein 4′ wide, opened for 70′. A second vein cut 30′ from portal of tunnel, said to show ore in winze.

ARKANSAW LEASING CORPORATION **IDAHO**

Address: F. D. Smith, Landore, Adams county, Idaho.

Property: the Arkansaw mine of the Seven Devils Copper Co., near Landore. Contact deposits occur between diorite and limestone, and carry copper, silver, and gold.

Development: by tunnels.

ARMSTEAD MINES INCORPORATED **IDAHO**

(Formerly the Blacktail Mining Co.)

Address: Talache, Bonner county, Idaho.

Officers: Major H. H. Armstead, pres.-mgr., Washington, D. C.; A. H. Burroughs, v. p.; Karl Jungbluth, 2nd v. p.; H. D. Kingsbury, treas.; H. L. Brown, sec., with C. C. Dula and J. Peterson, directors. Daniel G. McLachlan, supt.

Property: the Keystone, or Blacktail mine, on Blacktail mountain, west side of Pend d'Oreille lake, near Talache landing. Originally owned by the Keystone Mines Corporation (See Volume XII of the Mines Handbook). Property sold by Blacktail Co. (Volney D. Williamson) for $250,000 in June, 1917, and 13½c per share was paid on the 1,746,440 outstanding shares of the old company.

Development: by 4,000′ Rainbow tunnel, intersecting vein at 3,500′ at a vertical depth of 1,000′; a 1,200′ raise and about 3,000′ of drifting are said to expose between 60,000 and 75,000 tons of gold-silver-copper ore, averaging $25 per ton, mainly in silver. Milling ore persists to 1,200′ vertical, where the vein is up to 7′ wide. A 60° three-compartment raise at 3,800′ connects with No. 2 level 600′ above. A concentrator is planned for 1921. Forty men employed in 1919.

ATLANTA MINES CO. **IDAHO**

Address: Daniel Kirby, mgr., Atlanta, Idaho.

Cap., $2,000,000; $1 par.

Property: 10 patented claims, mill-sites, and water-rights in Boise district, carrying gold-silver ore.

Development: by 600′ shaft and extensive workings.

Equipment: hydro-electric plant, hoist, compressor, aerial tram, 200-ton concentrating mill and cyanide plant. No recent data obtainable.

AURORA-SAMPSON MINING CO. **IDAHO**

Consolidated Jan. 14, 1916, with H. E. M. Mng. Co. to form the Western Union Mining Co., which see.

BACHELOR MOUNTAIN MINE **IDAHO**

Address: C. L. Kirtley, Challis, Idaho.

Property: 4 claims on Estes mountain, said to show gold and silver ore in a strong fissure vein in andesite, that runs E. W., and dips at 45° to the north. Developed by 300′ tunnel, depth on vein 200′. No ore shipped or milled.

BANNER AND CROWN POINT MINES **IDAHO**

Address: Charles Hussey, Empire State Bldg., Spokane, Wash.

Property: 2 old silver mines said to have produced $3,000,000, reopened in 1918 after being closed 25 years. One shoot stoped said to be 600′ long by 500′ high, and to have averaged 102 oz. per ton.

Development: by 1,500′ crosscut from 650′ shaft, 375′ below Banner tunnel. **Equipment:** 20-stamp mill and tables.

No figures available.

BANNER M. & M. CO. **IDAHO**

Address: August Grete, sec., Silver City, Idaho.

Inc. in Idaho. **Cap.,** $1,000,000; $1 par.

Property: 20 claims, at Silver City, Owyhee county, an old-time producer.

Authorized bond issue in 1915 to provide sufficient capital for develop-

ment work. **Ore:** quartz, carrying gold and silver. **Development:** by tunnel. **Equipment:** 4 (Nissen)-stamp mill, using pan-amalgamation and concentrators, compressor and electric power. Developing at last accounts. No recent returns.

BETHLEHEM GOLD MINES, LTD. **IDAHO**

Office: 408 Sherwood Bldg., Spokane, Washington.

Officers: Harry Dudman, pres.; J. I. Springer, v. p.; with Dr. E. A. C. Smith, David Ensley, Clay Lavinder, and J. H. Vehrs, directors. G. H. Van Dusen, sec.-treas.; C. W. Beckley, mgr.; C. A. Lowe, cons. engr.

Inc. in Washington and registered in Idaho. **Cap.,** $1,500,000; $1 par.

Property: 7 claims on Tungsten mountain, 20 miles N. E. of Bonners Ferry in Boundary county, and 4½ miles E. of Copeland on G. N. R. R. Examined 1919 by C. A. Low. Veins consist of quartz fissures cutting granite. Sulphides show near surface, and include iron pyrite, chalcopyrite, galena, and sphalerite. There is also some tungsten and molybdenite.

Development: 400′ of surface trenches exposed several large veins and a number of stringers paralleling and running into the Dora vein. These were opened by tunnels, revealing fair ore in places. The main tunnel followed the Dora for over 100′, showing 2 to 7′ of ore, and is being extended, a 100′ shaft being sunk in 1920.

Equipment and development to April, 1919, cost $35,000.

BIG BALDY M. & M. CO. **IDAHO**

Address: Jas. Petikan, pres.; G. W. Sommer, sec., Old Nat'l. Bank Bldg., Spokane, Wash.

Cap., $1,000,000; 50c par.

Property: 21 gold quartz and 3 placer claims in Buffalo Hump district, so far only developed by 600′ of workings.

BLACK BARB MINING CO. **IDAHO**

Office: 625 Rookery Bldg., Spokane, Wash.; and Hailey, Idaho.

Officers: Raymond Guyer, pres.-mgr.; Wm. Black, v. p.; J. M. Bengel, sec.-treas., with E. J. Clark and K. J. Dixon, directors. E. G. Bowen, mgr.

Inc. March 21, 1917, in Idaho. **Cap.,** $1,500,000; $1 par; all outstanding.

Property: 14 claims, 4 patented, 280 acres in Mineral Hill mining district, Blaine county Ore contains gold, silver, lead and zinc with iron pyrite, occurring in quartz fissure veins in limestone.

Development: consists of 2,700′ of workings, including tunnels, 600′, 200′ and 300′ in length. Reported 10,000 tons of ore blocked out in 1917. Some rich lead-silver ore was opened in 1918, also 1919, on the 550′ level.

BLACKBIRD COPPER & GOLD MINING CO., LTD. **IDAHO**

Idle. **Offices:** DuBois, Pa.; and 807 Newhouse Bldg., Salt Lake City, Utah.

Officers: John E. DuBois, pres.; Chas. J. North, v. p.; F. O. Frick, sec.; W. H. Watt, treas. and gen. mgr.; with L. N. Morrison, directors.

Inc. in West Virginia. **Cap.,** $2,000,000; $1 par. Bonds, $500,000, at 6%. Annual meeting, fourth Tuesday in January. Is a close corporation.

Property: Brown Bear mine and adjoining ground, covering 29 claims, patented, 482 acres, in the central part of the Blackbird district, Lemhi county.

Development: 3 shafts, with drifts and numerous short tunnels. Orebodies are irregular replacements along fracture zones in schist and quartzite. Property is in one of the best mineralized sections of the state and is said to show wide zones of disseminated ore carrying 2½% copper and 5 cents gold for each per cent of copper. Said to have spent $1,000,000 on exploration work and ore testing.

Company also owns 97 claims, 87 patented, adjoining the Cactus mine in the San Francisco district of Utah. This property has considerable development and was explored by diamond-drilling. Development of the 300′ level from an old shaft disclosed a vein of chalcopyrite.

BLACK PINE MINING CO. **IDAHO**

Office: 926 W. Lehigh Ave., Philadelphia, Pa. **Mine office:** Elk City, Idaho.

Officers: S. J. Rieben, pres.; Louis H. Michel, v. p.; Dr. Wm. H. Kinch, treas.; R. T. Moyer, sec., with J. B. Shourds, Dr. Fred Bridgland, E. Thompson and Jas. McGrath, directors.

Inc. Feb., 1913, in Arizona. **Cap.,** $1,000,000; $1 par.

Property: 41 claims, 700 acres, includes Black Pine and Crown Point mines, at Elk City, Idaho county.

Ore: carries gold and silver, in veins believed to be a continuation of the Mascot lead vein, and averaging $12 per ton in gold, silver, lead and zinc.

Development: by 1,400′ tunnel.

Equipment: compressor, drills, 5-stamp mill, and concentrators.

Production: 40 tons of ore daily early in 1918.

BLACKSTONE MINING CO. **IDAHO**

Address: J. H. Hawley, pres., Boise, Idaho.

Cap., $1,000,000; $1 par.

Property: 5 patented claims in Volcano district, carrying gold-silver-copper ore. Developed by 400′ tunnel.

Idle for years.

BLACKTAIL MINING CO. **IDAHO**

Address: W. L. Wakeley, sec., Grangeville, Idaho.

Cap., $200,000; $1 par.

Property: 6 unpatented claims, 9 miles from Grangeville, Idaho county. Ore carries copper, gold, and silver. Developed by short tunnel. Six feet of $7.60 silver ore opened in November, 1919.

BLAINE & EMMETT MINING CO., LTD. **IDAHO**

Address: M. Heblethwaite, pres., Union, Idaho.

Cap., $1,000,000; $1 par.

Property: 4 unpatented claims near Union, Shoshone county, carrying copper and lead ore.

BLUE GROUSE MINE **IDAHO**

Owned by V. W. Brasch, Paulsen Bldg., Spokane, Wash.

Property: in the Orogrande district, 1½ miles N. W. of Orogrande, Idaho county, said to have the extension of veins opened up in the adjoining Umatilla mine.

Development: 600′ of tunnels, said to show veins 4½ to 10′ wide, averaging $12 per ton in gold and silver.

BLUE JACKET COPPER CO., LTD. **IDAHO**

Company has discontinued operations. Fully described Vol. XI, Copper Handbook.

BLUE JACKET MINING CO. **IDAHO**

Address: Lucile, Idaho county, Idaho.

Officers: W. B. Clark, pres., Johns Hopkins University, Baltimore, Md.; B. N. Baker, v. p.; J. M. Lawford, sec.-treas., with F. T. Homer and Frank E. Johnesse, mgr., directors.

Inc. Oct. 20, 1908, in Idaho. **Cap.,** $50,000; $1 par, fully paid. Annual meeting, first Monday in January. Company is a close corporation.

Property: 7 claims, patented, about 132 acres, in Crooks Corral mining district, Idaho county.

Geology: ore occurs as replacement along contact between diorite and andesite porphyry. Orebody is from 50 to 70′ wide, runs east and west, and dips at an average angle of 35°. The orebody is more or less oxidized down to the 700′ level, though the greater part of the ore in the lower levels is original sulphide and the enriched portion lies between the 1st and 4th levels.

Development: by a 300′ shaft, tunnels, crosscuts, and drifts, aggregating 3,395′. These workings block out 33,000 tons of ore, carrying 3.7%

copper, 1.5 oz. silver, and $1.80 gold per ton. Reserves estimated at 542,000 tons. Property has no mill, hoist, or reduction plant of any kind and has been closed down since 1909 awaiting railroad transportation, which is still 40 miles away. Property is a good one and officers able and responsible.

BOISE KING PLACERS CO. **IDAHO**

Address: Wm. MacLeod, pres., Boise, Idaho.

Cap., $1,250,000; $1 par.

Property: 740 acres, gold-bearing ground, on middle fork of Boise river, Elmore county.

Equipment: 4-mile flume, 4 giants and 2 elevators.

BOISE ROCHESTER MINING CO. (INC.) **IDAHO**

Property sold. See Vol. XIII.

BONANZA MINING CO. **IDAHO**

Letters returned unclaimed from Montpelier, Bear Lake county, Idaho.

Officers at last accounts: Col. E. J. Parrish, pres.; E. M. Stewart, v. p.; A. D. Young, sec.; H. H. Hoff, treas., with Chas. Sweet, M. F. Whitman and Ira Chaffin, directors.

Inc. Nov., 1905, in Idaho., successor of Montpelier Copper Mining & Smelting Co. **Cap.,** $5,000,000; $1 par.

Property: 25 claims, unpatented, 500 acres, 9 miles S. W. of Montpelier, on the Oregon Short Line.

Geology: the U. S. Geological Survey report (Bull. 430-B., p. 49) describes the geological occurrence of the ore as an impregnation of sandstone and underlying shale, only 4′ thick in all, with copper carbonate stain associated with carbonized fossil plant stems. There is no well-defined orebody. Good specimens are obtainable but average value is very low. The copper bed is traceable for 8 miles on the east side of a red bed ridge of Permian rocks.

Development: includes a shaft 350′ on a dip of 50° and a 50′ shaft farther south. Property regarded as of doubtful value.

BOSTON IDAHO GOLD DREDGING CO. **IDAHO**

Address: E. Walker, sec., Idaho City, Idaho.

Property: placer ground in Boise basin, Boise county, on which a dredge was operating, but as gravel was exhausted the boat was dismantled in 1918.

The Gold Hill lode mine at Quartzburg was then acquired. It has been a gold producer for 54 years, and the new owners are increasing development and output.

BOSTON-IDAHO MINING CO. **IDAHO**

Office: 720 Scollay Bldg., 40 Court St., Boston, Mass. **Mine office:** Ketchum, Blaine county, Idaho.

Officers: Levi Diamond, pres.; Joseph Briggs, v. p.; Winthrop, Me.; M. A. Costello, sec.; E. M. Schwarzenburg, treas., with A. H. Bailey, Winthrop, Me.; David A. Calhoun, Portland, Me.; J. H. Hickey, Boston, Mass., and W. C. Smith, directors; C. Fred Howe, supt., Ketchum, Idaho.

Inc. May 28, 1907, in Maine. **Cap.,** $2,500,000, in 1,000,000 common; $1 par; and 150,000 preferred, $10 par. In treasury $200,000 common, $1,300,000 preferred. Bonded debt, $125,000 authorized, $110,000 issued.

Should not be confused with another company of same name, operating 2 gold dredges on Elk and Moore creeks, near Idaho City, which has a bond on the Banner mine.

Property: 500 acres, 29 claims, 7 patented, 12 held by location, 8 leased and bonded; 2 millsites at Boyle Mtn., Idaho, comprising one zinc and two lead-silver mines.

Geology: claims cover a granite-limestone contact showing fissure veins a few inches to several feet wide, cutting across the granite. Veins carry complex sulphide ores containing argentiferous galena, zinc blende and other sulphides in irregular stringers and replacements. The ore shipped is reported to show from 9% lead and 10 oz. silver to 79% lead and

36 oz. silver, per ton, with 19% to 54% zinc. Over a million dollars worth of ore is reported to have been taken out by former owners.

Development: 3,000′ tunnel work with depth of 900′.

Mine is said to have been taken over by the Wood River Mines, Inc. Property large, and company thus far has not been able to develop the lead-silver and to explore the zinc deposits.

Equipment: includes 100-ton Traylor mill. Buildings include an office, laboratory, 2 warehouses, boarding house, bunk house, 2 smithies, 2 stables, 2 powder houses, a 5,000′ sawmill, 2 ore houses and 8 dwellings.

BOULDER CREEK MINING CO. **IDAHO**

Address: A. F. Stevens, sec., Silver City, Idaho.

Cap., $5,000; 1c par.

Property: 7 unpatented claims, 12 miles S. of Silver City, Owyhee county, has been opened by 500′ tunnel. Ore carries gold and silver.

BROADFORD MINE **IDAHO**

Address: William Sowden, Box 92, Bellevue, Blaine county, Idaho.

Property: 2 patented silver-lead claims near the Mare mine, Mineral district. Said to show a fissure vein in limestone with S. E.-N. W. strike.

Development: a drift, tunnel and a shaft 50′ deep. Is a prospect.

BUFFALO HUMP-CRYSTAL LAKE MINING CO. **IDAHO**

Address: W. B. Chandler, sec., Paulsen Bldg., Spokane, Wash.

Cap., $100,000; $1 par; assessable.

Property: a gold quartz prospect in Robbins district, Idaho county.

BULLION MINING CO., LTD. **IDAHO**

Address: James H. Taylor, pres. and mgr., Wallace, Idaho.

Inc. 1902, in Idaho. **Cap.,** $1,500,000; $1 par; all issued; 9 assessments, one-half cent a share, levied up to Nov. 1, 1912, yielding $39,229.

Property: 16 claims, 2 patented, 320 acres, in Shoshone county, near Lookout, 2 miles from the C. M. & St. P. railway, and 4 miles from Borax station, on the No. P. line, on the Idaho slope of the Bitter Root divide, with a good wagon-road to Borax. Property has a quartz vein of 4 to 20′ width, with average of 6 to 12′, and nearly vertical dip, carrying shoots of copper ore, 2-4′ wide, mainly chalcopyrite.

Development: by shafts and crosscut tunnels, one 200′ vertically above the other. The upper one has 130′ crosscut and 186′ drift on vein. Diamond-drilling in 1919 indicated a large orebody, and in November a 50′ tunnel revealed 3-4% ore. One 40-ton shipment early in 1918 carried 6% copper, with some gold and silver.

Equipment: includes steam power, 12-h. p. hoist, Pelton wheel, 5-drill air-compressor, drills and dwellings.

BURNS M. & M. CO. **IDAHO**

Address: David Farmer, mgr., Nampa, Idaho.

Cap., $500,000; $1 par.

Property: 7 claims in Canyon county, carrying gold, silver, and lead. Opened by short tunnels.

Idle at last accounts.

CARBONATE CENTER MINING CO. **IDAHO**

Mine office: Mullan, Shoshone county, Idaho.

Officers: Archie Gillis, pres.; John H. Foss, v. p.; John E. Sherrard, sec.-treas., with John Erickson and Hans J. Rice, directors.

Inc. 1912, as successor of Tombstone Mining Co. **Cap.,** $1,500,000; $1 par. Last assessment of 1 mill per share called Nov. 5, 1914.

Property: 8 claims, near the Carney mine, on Stevens peak, south of Mullan, shows a promising vein of 8 to 15′ surface width, carrying a little silver-lead ore. The mine has a 500′ crosscut tunnel, with about 1,000′ of workings, showing ore that has given assays up to 15% copper and 2.5 oz. silver per ton. Idle at last accounts.

CARIBOU GOLD & COPPER CO., LTD. **IDAHO**

Office: Idaho Falls, Idaho.

Officers: Eric H. Wakeman, pres.; Joseph Empey, v. p.; with A. J. Wipperman, Wm. Arave and Frank A. Putnam, directors. A. V. Scott, sec.-treas.

Inc. Aug. 30, 1903, in Idaho. **Cap.,** $2,500,000; $10 par; assessable; 61,000 shares issued, 189,000 in treasury. Annual meeting, 3rd Monday in February.

Property: the Monte Cristo mine, near Bonanza, Custer county. Ore carries gold and silver. On 150′ level vein said to be 12′ wide. Late in 1918, company reported having given a lease on the mine.

CARIBOU GOLD MINES CO. **IDAHO**

Address: J. P. Fanning, Pocatello, Idaho.

Cap., $10,000; shares 1c par; all outstanding.

Property: 13 claims and a mill-site, 2 claims and mill-site patented, in Mount Pisgah district, Bonneville county, 42 miles from Soda Springs. The mine was first operated in the early 70's, but was closed down on account of poor management, after an accredited production of $200,000 from free-milling gold ore.

Development: by tunnels and 280′ shaft.

Ore reserves: were said to be 12,000 tons in 1915, averaging $6.14 gold per ton.

Equipment: 10-stamp mill, 100-h. p. engine, air-compressor, and hoist.

CARMAN CREEK MINING CO. **IDAHO**

Address: Salmon City, Lemhi county, Idaho. J. W. F. Halcombe, pres.-mgr.-sec.; John Harlan, v. p.; Wm. Wallace, treas.

Inc. Dec., 1905, in Washington. **Cap.,** $1,000,000; $1 par; 999,500 issued.

Property: 7 claims, about 140 acres, 16 miles from Salmon, said to carry an ore-shoot showing gold, silver, and copper. Assessment work only was done in 1916. No recent returns.

CARNEY COPPER CO., LTD. **IDAHO**

Address: Mullan, Shoshone county, Idaho.

Officers: J. L. Martin, pres.; A. P. McRae, v. p.; C. D. Miller, sec.-treas., with W. C. Richardson and Gust Almquist, directors.

Inc. 1906, in Idaho. **Cap.,** $1,500,000; shares $1 par; assessable; 1,400,000 issued.

Property: 11 claims, 4 fractional, 175 acres, carrying a good water-right, north of the Reindeer, on the northern slope of Stevens peak, about 4 miles from Mullan. Vein is in quartzite.

Development: by 3 tunnels, the uppermost showing a body of chalcopyrite ore that has not been found in the lower tunnel. The upper, or No. 1 tunnel, is 450′ long, with 3 crosscuts; No. 2 tunnel, 1,500′ long has 1,300′ of crosscuts and drifts; No. 3 tunnel was 350′ long, 1917, at last accounts. There also are several open-cuts and pits, showing ore of about 3% copper tenor. Workings show up to 4′ of solid ore, carrying chalcopyrite, with some chalcocite and bornite. No. 1 tunnel shows an ore shoot up to 40′ width, and about 175′ long, averaging about 2% copper, with small values in lead and silver, with a paystreak of 6 to 18″ assaying 5 to 35% copper. Company leased upper levels in 1917, but mine was closed in 1919.

CHAMPION MINING CO **IDAHO**

Idle since 1917.

Address: R. T. Badger, sec.-treas., Utah National Bank Bldg., Salt Lake City, Utah. **Mine office:** Mackay, Custer county, Idaho.

Officers: Edw. R. Hall, pres.; C. T. Mixer, v. p.; with O. D. Mallory and J. E. Frick, directors; H. A. Brown, supt.

Inc. 1905 in Utah. **Cap.,** $100,000; non-assessable

Property: 9 claims, unpatented, in the Alder Creek district, 6 miles from a railroad. Developed by tunnel, with 1,500′ of workings, showing silver, lead and copper ores.

CLARENCE RAY-BUFFALO HUMP GOLD MNG. CO. **IDAHO**

Address: Fred. Hasbrook, sec.-treas., E. 2629 First St., Spokane, Wash.

Cap., $100,000; 10c par.

Property: 8 claims in Robbins district, Idaho county, developed by tunnel.

CLARINDA COPPER MINING CO. **IDAHO**

Secretary's office: 50 Broad St., New York. **Mine office:** Clark's Fork, Idaho.

Officers: J. E. White, pres.; J. P. Delaney, v. p.-sec.; C. I. White, treas.; with Thomas Compton and J. E. White, directors.

Inc. April 1, 1916, in Arizona. **Cap.,** $1,500,000; $1 par; 875,000 issued; U. S. Corporation Co., New York, registrar and transfer agents.

Property: 5 claims, 102 acres, in Pend Oreille district, 3 miles W of Clarks Fork, Bonner county. Examined Sept., 1919, by J. K. Ashley.

Geology: country rock is quartzite and slate, cut by a diorite dike, which forms hanging wall of the Lone Pine vein. Ore consists of a calcite-quartz gangue with sulphides of iron, and copper carrying gold and silver. Property also contains the Woodman vein.

Development: the Lone Pine vein has been opened by 3 tunnels, one being 590′ long. Tunnel No. 3 cut 2′ of silver-lead ore, said to run $140 per ton. A crosscut tunnel with back of 1,200′ is expected to cut orebody in 1920. An 8″ vein of rich silver-copper ore was opened below No. 3.

Equipment: includes electric power, motor, compressor and drilling machinery.

CLAYTON MINING & SMELTING CO. **IDAHO**

Address: L. Greene, managing director, care Utah Fire Clay Co., Salt Lake City, Utah; also, the agent at Challis, Idaho.

Property: consists of extensive holdings near Clayton, Custer county, 60 miles N.-W. of the Oregon Short Line terminal at Mackay, including the Ella group at Clayton, Red Bird group on Squaw Creek, Silver Rule group on Slate Creek, Skylark group at Bayhorse, and a 100-ton smelter at Clayton. The Red Bird mine is the principal property, containing lead-silver-copper-gold ore. Ore occurs in well-defined veins opened to maximum depth of 900′ by shafts and crosscuts. The smelter was closed down, Nov., 1915, after an unsuccessful run of one month, during which it turned out 2,700 bars of bullion, containing high silver values. Development work is now being done under lease system. About 50 cars of ore shipped during 1918, averaged 40% lead and 30 oz. silver per ton.

CLEARWATER GOLD & COPPER MINING CO. **IDAHO**

Mine office: Wallace, Idaho.

Officers: Samuel Seidenfeld, pres.-mgr., 1027 W. 10th Ave., Spokane, Wash.; Herman A. Bush, v. p.; J. H. Wourms, sec.-treas.

Inc. August, 1907, in Idaho. **Cap.,** $2,500,000; $5 par, assessable; all outstanding.

Property: 16 claims, 13 patented, including the Cunningham group, on the north fork of the Clearwater river, 50 miles south of Wallace, Shoshone county; nearest rail point Amador, with 6 miles of wagon-road and 11 miles of trail. Property shows a vein in quartzite said to be traceable 5 miles, 1 mile on company's land, carrying oxidized ores near surface, with chalcopyrite and chalcocite at depth assaying up to 3½% copper 60c to $1 gold, and 1½ to 2 oz. silver per ton.

Development: by 3 tunnels, lower tunnel, 1,900′ long, cutting the vein at the face 300′ below surface. Management estimated 18,000 tons of ore on dumps, June, 1915, and total reserves at 300,000 tons.

Equipment: includes hoist and air compressor. A $250,000 bond issue was contemplated in 1917 to provide funds for aerial tram, necessary equipment and development, but latest report does not mention any production.

CLEVELAND MINING CO. **IDAHO**

Address: A. F. Parker, Grangeville, Idaho.

Property: 6 patented gold quartz claims and 20 acres of placer ground,

3 miles W. of Grangeville and 8 miles S. of Elk City, Idaho county. A stamp mill and water supply are available. No recent returns.

COLLINWOOD MINING CO. **IDAHO**

Office: 10 Gunn Block, E. 152nd St., Cleveland, Ohio. J. C. Northrup, mgr., Palouse, Wash.

Officers: F. G. Garrett, pres.; Gustav Kirchner, v. p.; E. N. Conrad, sec.-treas., with F. C. Lohiser, A. L. Cornwall, H. O. Hess and H. A. Brooks, directors.

Inc. August 29, 1917, in Ohio. **Cap.**, $12,500; $1 par; all issued. Annual meeting first Tuesday in September.

Property: 300 acres, (the Mizpah mine), 17 miles from Harvard in Latah county, leased for 3 years (to March, 1922), from Merger Mining Co., which see. Ore carries copper, with some precious metals.

Production: in summer of 1918 was 3 carloads of high-grade ore, 38 tons settling for $3,921. A mill is contemplated.

Examined by W. H. Linney, of Spokane.

COLONIAL MINING & MILLING CO. **IDAHO**

See Vol. XII for details of fake promotion.

COLUMBIA COPPER MINING CO. **IDAHO**

Address: J. F. Andrieux, Paulsen Bldg., Spokane, Wash.

Officers: Jos. Huber, pres.; J. F. Andrieux, sec.-treas., with O. D. Houle, directors.

Inc. May, 1914, in Idaho. **Cap.**, $2,500,000; $1 par; assessable.

Property: a consolidation of the properties owned by the Aeolian Cons. Copper Co., the Marguerite Mng. Co. and the California group, all near Mullan, Shoshone county, Idaho, and all long idle.

Development: by tunnels. Said to have spent $60,000 on property. Some high-grade ore opened.

COMBINATION MINE **IDAHO**

Address: Judson Spofford, principal owner, Boise, Idaho. A company was to be organized early in 1919.

Property: 5 unpatented claims near Profile, Valley county, Idaho. Veins in granite carry gold, silver, copper, and lead, opened by 300′ workings.

COMMONWEALTH MINING CO. **IDAHO**

Office: 401 Empire State Bldg., Spokane, Wash.

Officers: J. F. Sexton, pres.; M. A. Phelps, v. p.; C. H. Williams, treas.; L. B. Cornell, sec.; H. W. Wolfe, asst. sec.; all of Spokane, directors.

Cap., $1,500,000; $1 par. Annual meeting in January.

Property: 140 acres, on Hayden creek, 2 miles from Hayden lake, Kootenai county. Ore carries silver, lead and copper, but chiefly silver.

Development: by shaft, winze, and sump, 585′; tunnel, 740′; drifts and crosscuts, 680′. Engineer reports 15′ of ore, assaying $30.17, and 8′, assaying $25.48, with total width of milling ore on lower level, 24½′. Estimate of reserves, 80,000 tons, worth from $9.84 to $36.70 per ton. A strong vein, standing 90′ high and 60′ wide above the surrounding country, is traceable through three claims, engineers pronouncing it a contact fissure between quartzite and chlorite slate. Oxidized zone extends to 185′ level. Ore test carload gave $30 per ton.

Equipment: 120-h. p. steam plant, 100-h. p. water heater; 2 air-compressors, hoists, pumps and drills. Operations have been conducted for two years with a force of from 15 to 30 men.

COPPER BASIN MINE **IDAHO**

Address: H. W. Weiler or F. A. Stacy, Mackay, Idaho.

Property: 15 claims, formerly owned by Copper Basin Mining Co., 24 miles from Makay, Custer county. Ore shipped assayed 10½% copper, 13% iron, and some silver. A large quantity of ore was said to be ready for shipment in 1919. Transportation difficulties have been a drawback. The State Inspector of Mines reports that the deposit is encouraging.

COPPER BASIN MNG. CO. **IDAHO**

Described in Volume XIII. Property passed to new ownership in May, 1919. See Copper Basin mine.

COPPER CHIEF MINING & MILLING CO. **IDAHO**

Office: Troy, Idaho. P. Johnson, v. p.

Cap., $1,000,000; $1 par; assessable.

Property: 2 unpatented claims, 10 acres of homestead land, 7 miles E. of Troy, Latah county.

Undeveloped. Idle since 1917.

COPPER GIANT MINING CO. **IDAHO**

Officers: Rev. J. G. Lake, pres.; Rookery Bldg., Spokane, Wash.; Dr. M. McKinnon, sec.-tras.; with H. F. Thibadeau, Dr. H. J. Betton and P. D. Young, directors. B. Haberman, supt.

Cap., $1,500,000; $1 par; 1,100,000 issued.

Property: 5 claims and 3 fractions, 3 miles W. of Clarks Fork, Bonner county. Ore is chalcopyrite, carrying some silver.

Development: by 3 tunnels aggregating over 1,500′ in length. Results in Nov., 1918, were said to be good.

COPPER QUEEN MINING & SMELTING CO. **IDAHO**

Office: 608 Lonsdale Bldg., Duluth, Minn. **Mine office:** Salmon, Lemhi county, Idaho.

Officers: Geo. H. Crosby, pres.-gen. mgr.; Emerson Hill, v. p.; A. J. McLennan, sec.-treas., with C. W. McFadden, W. M. Harrison and E. F. Clarke, directors. A. F. Bennett, supt.

Inc. June 12, 1905, in Arizona. **Cap.,** $500,000; $1 par; issued, $282,000. Absorbed 1908, the Copper Queen & Crescent Mining & Smelting Co., giving 1 share for 8.

Property: the Queen of the Hills mine, 17 claims, 320 acres, in the Eureka district, 7 miles N. W. of Salmon, is said to show 3 nearly vertical fissure veins in granite and schistose quartzite, with a generally N. E. strike. The Eva, or westernmost vein, shows an 8 to 14″ quartz band on the wall of a brecciated zone 5′ wide. The central, or Queen, and the Nellie veins show 12 lodes of granite breccia partly cemented by quartz. The ore is coarsely crystalline quartz, carrying pyrite, chalcopyrite and some galena, with $3 to $5 in gold occurring in 5 known ore-shoots, 2 in the Nellie, 2 in the Queen and 1 in the Eva vein.

Development: by shafts of 105′ and 400′ with 5 levels and by 7 tunnels, longest 450′ with 4,700′ of workings.

Equipment: includes 100-h. p. electric plant, 24-h. p. hoist, good for 700′, 5-drill air-compressor, gyratory crusher, 15 stamps, and 2 Wilfley tables.

Property idle at last accounts.

COPPER & URANIUM MINING CO. **IDAHO**

Letters returned unclaimed in 1919 from Clyde, Butte County, Idaho.

Officers: N. P. Hansen, pres.; M. H. James, v. p.; Alfred J. Cole, sec.-treas. and mgr.; and James Shail, directors; H. Hill, supt.

Assessment of 1/5c a share levied July 30, 1917.

Property: known as the Automatic mine, near the Wilbert mine, in the Hamilton district, 40 miles from Arco, has a 125′ shaft on a 10′ contact vein between limestone and quartzite, said to show copper and uranium ores.

Development: by 800′ tunnel at a vertical depth of 400′. The last 30′ are reported to have been driven on 15′ vein with a narrow streak showing 7% to 17% copper. A new tunnel was contemplated, but no recent returns received.

CORONA MINING CO. **IDAHO**

Office: 833 S. 9th St., East, Salt Lake City, Utah. **Mine office:** Clayton, Idaho.

Officers: Horace Lewis, pres.; Clyde A. Torrey, v. p.-mgr.; J. A. Barclay, sec.; Horace Lewis, treas.

Inc. in Utah. **Cap.,** $50,000; 5c par.

Property: 5 unpatented claims in the Bay Horse district, Idaho, 5 miles above Clayton, Custer county.

Development: by 200′ tunnel being driven to encounter a 4′ fissure vein in limestone with N. W.-S. E. strike and dip, 45°. Sample as reported gave 63% lead, 40 oz. silver, and $5 gold.

CROESUS GOLD & COPPER MINING CO. **IDAHO**

Company dead. See Croesus Mining Co.

CROESUS MINING CO. **IDAHO**

Address: F. C. Robertson, Spokane, Wash.

Property: the Croesus mine, 4 miles west of Hailey, Blaine county, has an 800′ three-compartment vertical shaft, on a 20 to 60′ fissure vein of nearly vertical dip, in granite; pay streaks on both walls said to carry chalcopyrite, with value mainly in gold. There also is a nearly vertical blind vein, apparently joining the main vein at depth, carrying silver-lead ore at depth of 600′.

Equipment: includes steam and electric power, and a 12-drill electric air compressor. The 100-ton concentrator has 10 stamps, crusher, rolls, and Huntington mills.

Idle for some time. Under previous owners, output was $75,000 in 2 years.

CUSTER SLIDE MINING & DEV. CO. **IDAHO**

Property: 700 acres in Yankee Fork district, Custer county, Idaho, including the Montana and Sunbeam groups, also mill, power plant and dam of the Sunbeam Cons. Mines Co. An aerial tram connects the mine with the Sunbeam. The Montana mine was operated during 1916 and some rich gold ore is said to have been found. Mine is an old producer.

Active operations began in 1917, but were suspended in January, 1918. In March, 1919, company was forced into bankruptcy proceedings, and in July, 1919, the mine was bought by G. Von Brecht and J. I. Love, of Colorado Springs for $30,000. A new company is to be formed, and work resumed.

CYANIDE GOLD MINING CO. **IDAHO**

Address: J. B. Ellis or G. R. Caustin, Bonners Ferry, Boundary county, Idaho, also Sprague Ave., Spokane, Wash.

Inc. 1919. **Cap.,** $3,000,000; $1 par.

Property: that of the Deer Creek Gold Mining Co., 20 miles E. of Bonners Ferry. A cyanide plant was to be erected in 1919. In November, company opened offices in Spokane, where the Redemption gold machine was on view and stock sold.

DEER CREEK MINING & MILLING CO. **IDAHO**

Address: Forest, Lewis county, Idaho.

Officers: W. J. Orr, pres.-gen. mgr.; Philip Myers, v. p.; E. C. Orr, sec.-treas.; with S. Q. Orr, B. F. Pool, J. P. Lorang, W. K. Noble, A. J. Smith, and W. B. Frysinger, directors.

Cap., $1,500,000; $1 par.

Property: 17½ claims, 17 miles S. W. of Winchester, in the Salmon River district, shows orebodies 10 to 20′ wide, carrying copper ore with gold values. One vein has 4′ of chalcopyrite ore developed by a tunnel; $150,000 reported to have been spent in development and equipment, latter including 2,000′ of flume, water wheel, and compressor, and 125-ton mill, employing amalgamation, gravity concentration and flotation.

DEMMING MINES CO. **IDAHO**

Main office: Nampa, Idaho. **Mine address:** care M. T. Rowland, Demming, via Murphy, Idaho.

Officers: C. T. Payton, pres.; M. T. Rowland, v. p. and gen. mgr.; A. E. Badger, sec.-treas.; with E. A. Drake, W. L. De Remer, directors

E. W. Rowland, 1st asst. gen. mgr.; Harold Rowland, 2nd asst. gen. mgr.; J. H. Winchell, assayer; A. F. Mattern, met. eng.

Inc. in Idaho. **Cap.**, $15,000,000; $5 par. Bonds, $250,000 issued.

Property: 38 claims, 600 acres, 38 miles S. E. of Murphy, Owyhee county, shows fissure veins in granite that run N. E.-S. W. and are cut by cross fissures 5 to 12′ wide. Ore is sulphide carrying gold and silver.

Development: by tunnels and shaft. Over 4,000′ of new work done since June, 1918. Reserves in No. 1 were estimated as worth $400,000 in 1917.

Equipment: hoist, compressor, 100-ton mill using ball-mill, 6-cell Janney flotation machine, 4 Senn tables, Oliver filter, roasting furnace, cyanide plant, auto-trucks, etc.

Production: several carloads of concentrates were shipped to smelters during 1918. Producing 100 tons of concentrates daily in 1919.

DENVER COPPER CO. **IDAHO**

Address: H. M. Ross, incorporator, Spokane, Wash.

Property: 200 acres, in Pine Creek district, Shoshone county, Idaho, on which the Admiral vein is said to be exposed by surface workings for 3,000′. A 15′ shaft opened 8 to 10″ of 6% ore. No recent returns.

DREADNAUGHT MINING CO. **IDAHO**

Address: W. J. J. Smith, Wallace, Idaho.

Officers: M. P. Flannery, pres.; J. E. Codd, v. p.; C. P. Lindsley, sec.

Property: 7 claims near the New York and Manhattan claims of the Cons. Interstate-Callahan, Coeur d'Alene district, Idaho.

Development: by tunnels. At depth of 730′ No. 1 shoot is 42″ wide and said to contain 10 oz. silver, 12% lead, and 4% zinc. All ore carries a little copper and gold. In May, 1918, a shoot of fair-grade ore was opened.

DRILLING DEVELOPMENT CO. **IDAHO**

Address: C. W. Sherwood, mgr., Salmon, Lemhi county, Idaho.

Property: the Gold Dyke group of 18 claims, 13 miles E. of Salmon. Deposit consists of porphyry dike, estimated to contain 3,000,000 tons worth $5.50 per ton in gold and silver, with some zinc and lead. Mining is done by open-cut.

Equipment: a 200-ton cyanide mill employing the Koering process was completed July, 1919, and was enlarged in August. A hydro-electric power-plant was also under consideration. Costs are expected to be about $1.50 per ton.

DULUTH-LEMHI MINING CO. **IDAHO**

Company out of business. Described in Vol. XII.

EAGAN COPPER MINING CO. **IDAHO**

Address: Wallace, Idaho.

Officers: Roy A. Henkle, pres.; J. T. Dickinson, v. p.; L. L. Brainard, sec.-treas.; above with Tom Eagan, F. E. Rice and F. C. Blakely, directors.

Inc. 1916, in Idaho. **Cap.**, $125,000; 10c par.

Property: 2 miles from Adair in the St. Joe district, under development by Tom Eagan since 1892. Claims reported to show copper ore in the 220′ upper tunnel, and for 420′ in lower tunnel. In December, 1918, there was reported to be 5′ of 50-oz silver ore showing in a stope.

ELMORE COPPER CO. **IDAHO**

Address: 137 South La Salle St., Chicago, Ill. Wm. O. Reuss, pres.

Inc. in Idaho. **Cap.**, $5,000,000; $1 par.

Property: 8 claims, 160 acres, 10 miles from the Boise cut-off railroad, said to show ore throughout entire holdings.

Development: by 980′ of drifts and crosscuts and 200′ shaft. At depth of 150′ there was reported to be 8′ of 16.5% copper and 13.3 oz. silver ore. A compressor and machine-drills were to be installed.

EMPIRE COPPER CO. **IDAHO**

Office: F. G. Taylor, sec. and transfer agt., 322 Eccles Bldg., Ogden, Utah. **Mine address:** Mackay, Custer county, Idaho.

Officers: L. R. Eccles, pres.; J. M. Eccles, v. p.; Jos. Scowcroft, treas.;

with John Pingree, directors. Morton Webber, gen. mgr. and cons. eng. John Linn, gen. supt.

Inc. June, 1907, in Maine. **Cap.**, $1,200,000; shares $1 par; 1,000,000 shares issued. Stock listed on Salt Lake City and Kansas City Stock Exchanges. Annual meeting 3d Tuesday in May.

Company was free from debt at end of 1919.

Dividends: 23% in 1913; none in 1914; 18% in 1915; 17% in 1916; 20% in 1917; and 10% in 1918; a total of $880,000.

Property: the White Knob Copper Mine, 3 miles south of Mackay on the Salmon River branch of the Oregon Short Line, with 39 claims, 18 patented, 700 acres, also mill and smelter sites of 480 acres, and a railroad right-of-way, in the Alder Creek district, Custer county, Idaho.

Geology: property carries a great number of lenticular contact replacements, in quartz porphyry and granite porphyry. The property is remarkable for its peculiar ore deposits, varying greatly in size and shape, occurring in the metamorphosed garnetized margin of contact, garnetization existing in some instances for fully six hundred feet from the contact. The geology has been carefully studied and is described by Kemp in Transactions of A. I. M. E. for 1917, and in Genesis of the Mackay Copper Deposits, by Jos. B. Umpleby, Econ. Geol. The ore is largely a cupriferous pyrite with much chrysocolla derived from its alteration. The average assay of the 68.475 tons of ore mined in 1916 was copper, 4.008% gold, 0.04 oz.; silver, 1.97 oz. per ton.

Development: mine has a glory hole, 125 to 200′ wide, but mining is mainly by tunnel. The property is opened by 46 tunnels and five shafts, and has a total of underground workings in excess of 17 miles. The greatest vertical depth has been attained in the Cossack tunnel, which is 6,000′ long, having a depth of 1,800′. This tunnel opens ore at 900′ below the present producing level. Levels are at 125′ intervals, and the cost of establishing one level is $100,000. Only shipping ore is mined, the last 9 months of 1919 averaging 5.5% Cu., 2.5 oz. Ag., and $1 gold per ton.

Equipment: includes steam driven air-compressors having a capacity of 36 drills, machine-shop, blacksmith shop, bunk-houses, boarding-house and commissary.

At present the mine is reached by an 85-mile branch of the Oregon Short Line R. R. Co., running from Blackfoot to Mackay, and is connected by the 7¾ miles Empire Railroad, owned by the company, of 36″ gauge, equipped with two 33-ton and one 35-ton Shay mountain climbing locomotives and 34 cars. The line has a maximum gradient of 9%, with a rise of 2,000′, and has one 6% grade on a 34° curve. A 3-mile aerial tram of 100 tons an hour capacity was erected in 1918 to replace this railway, and reduce haulage charges 80%.

Smelter at mine is not operation, ore being shipped to the A. S. & R. Co.'s plant at Garfield, Utah, for treatment:

Year	Tons Mined	Lb. Copper	Oz. Gold	Oz. Silver	Value
1917.....	66,807	.....	.....	.....	$1,139,110
1916.....	69,475	4,999,147	2,860	123,253	.....
1915.....	54,295	4,702,119	3,155	125,135	.....
1914.....	18,251	2,012,244	962	53,768	.....
1913.....	34,722	3,565,479	1,812	92,805	.....

Thirty lessees, employing 100 men, are extracting 1,500 tons of 4 to 8% ore per month.

The number of men employed has been from 150 to 225. The Empire continues to be the principal copper mine of Idaho.

EUREKA DEVELOPMENT CO., LTD. **IDAHO**

Officers: W. A. Wilson, pres.-treas., Dooly Bldg., Salt Lake City; Judge A. C. Ellis, v. p.; Cansten Browne, sec.; with Judge Wm. Bradley, directors.

Cap., $100,000; par 50c; 51,000 shares in treasury.

Property: 6 claims, and a millsite and a ¼ interest in the Bay State

group of 4 claims, also a ¼ interest in the Idahoan and a ½ interest in the Richmond claims, located in Mineral Hill mining district, Blaine county, 7½ miles from Haley. Said to show a fissure zone in limestone and shale, with strike N. 40° W. and dip 70° N. E.

Ore: silver-lead, and a little copper and zinc. Reported that ore, as shipped, assayed 60 oz. silver and 50% lead; gold in the ore seldom exceeding 20c a ton.

Development: by a 425′ incline shaft with 6 levels, and several tunnels. Idahoan claim has a 750′ shaft, 1,800′ from the incline shaft on the Eureka claim. More than half the ground between the shafts is undeveloped, and possibility of finding new ore-shoots is said to be good.

The Eureka is said to have produced $300,000 and the Idahoan, $1,500,000.

Equipment: includes hoist, boilers, and a 75-ton mill.

Property has been idle for some time, but company planning to resume development.

FALLS CREEK MINING CO. **IDAHO**

Address: W. C. Ames, pres., Sandpoint, Bonner county, Idaho.

Cap., $500,000; $1 par, assessable.

Property: 4 claims, 3 miles E. of Pend Oreille Lake, near Sandpoint. Ore carries lead, copper, and silver.

Development: by tunnels. A 50-ton mill was erected in August, 1918. Over $50,000 had been spent on property to that date. The lower tunnel was being extended late in 1919.

FERN QUICKSILVER MINING CO. **IDAHO**

C. H. Richmond, mgr.

Property: a quicksilver mine at elevation of 9,000′, in Yellow Pine district, Valley county, 70 miles from Cascade, which is 40 miles from Knox, over bad roads. Freight costs about $100 per ton.

Surface work and tunneling has been done, and a 12-cylinder Johnson-McKay type retort furnace was treating 3 tons of 5% ore daily, at last accounts.

FORT HALL MINING & MILLING CO., LTD. **IDAHO**

Address: C. W. Pomeroy, sec., Pocatello, Bannock county, Idaho.

Officers: Wm. A. Hyde, pres.; C. W. Pomeroy, sec.; L. Fargo, treas., with M. A. Hendricks, W. H. Witty, and T. H. Doane, directors.

Cap., $350,000; $1 par. Stock listed on Salt Lake City Exchange.

Property: 23 unpatented claims, 7 mines from Pocatello, said by R. N. Bell, State Mine Inspector, to show big, low-grade deposits of copper-iron-sulphide ores, not as yet profitably mined.

Development: by 6,000′ of tunnels, 300′ shaft, 200′ winze, 100′ of raises and 300′ of crosscuts. Equipped with steam power and 50-ton mill.

No recent information.

GILMORE MINING CO. **IDAHO**

Offices: 222 Kearns Bldg., Salt Lake City, Utah; and Gilmore, Lemhi county, Idaho.

Officers: Edgar C. Ross, pres. and gen. mgr.; Frank Hahne, v. p.; Harry R. Hyde, treas.; Clarence Warnock, sec., with E. B. Critchlow, directors.

Inc. Feb. 10, 1912, in Utah. **Cap.,** $1,000,000; shares $1 par, assessable; outstanding $800,000. Bonds authorized, $100,000; none issued. Company is a close corporation. Annual meeting, January 2. All receipts from ores spent in development work. Has levied 2 assessments, last one December, 1918, payments to run until August, 1919.

Property: 12 patented claims, 250 acres, in the Texas mining district, at Gilmore, was purchased from the Allie Mng. Co., Ltd.

Ore: gold-silver in fissure veins in limestone, said to have an average value of $14.50 per ton. Veins strike N. 10° E. and dip 60°. See U. S. G. S. Bull., 528, p. 107.

Development: by a 60° incline shaft and tunnels, greatest depth of workings on the vein is 850′. Total workings, 8,800′. This company in conjunction with the Pittsburgh-Idaho and Allie Mining companies has run a 4,500′ development and transportation tunnel into Gilmore Mountain, which is said to cut a number of lead-silver fissures and one important gold vein.

Production: shipments early in 1917 totaled $72,084, ore averaging 0.025 oz. gold, 7.75 oz. silver, and 23.16% lead.

GOLD CREEK MINING & MILLING CO. IDAHO

Office: A. A. Kirby, sec.-treas., Paulsen, Bldg., Spokane, Wash.

Officers: E. V. Thompson, pres.; A. G. Crum, v. p.; Paul Bockmier mgr.; preceding with J. H. Fussy, C. C. Burr, directors.

Property: in Gold Creek district, Latah county, considered promising. Financial condition said to be satisfactory and work proceeding at last accounts.

GOLD FLOTATION DEVELOPMENT CO. IDAHO

Address: O. W. Lewis, Wallace, Idaho.

Officers: W. H. Havlin, pres.; Harold Williams, v. p.; H. G. Loop, sec.-treas.; with John Brizel and O. W. Lewis, directors.

Inc. in 1919.

Property: the old Singiser gold mine, a group of 18 claims in Lemhi county, 50 miles from Salmon, idle for past 12 years. The property has water power, and is equipped with compressor, drills, and stamp-mill with cyanide plant, which was kept in good order during the shut-down, and is to be improved by adding tables and flotation machines.

GOLD HILL & IOWA MINES CO. IDAHO

Controlled by Boston-Idaho Gold Dredging Co. of Idaho City, Idaho.

Address: Quartzburg, Boise City, Idaho, E. E. Carter, mgr.

Property: Gold Hill and Iowa group, at Quartzburg, also the Newburgh mine, a total of 43 claims, veins consist of porphyry, carrying quartz stringers, averaging $10 to $12 per ton.

Development: by 20,000′ tunnel work and a 550′ shaft.

Equipment: includes electric power, compressor, drills, and 150-ton plant using 8′ Hardinge mill, tables, and cyanide plant.

Production: total to date is given as over $7.000,000.

GOLD MINES CO. IDAHO

Address: W. H. Stowell, H. G. Twomey, or J. W. Higgins, incorporators, 401 Chamber of Commerce Bldg., Spokane, Wash.

Property: an old-time gold producer at Rock Bar, in Elmore county, 65 miles N. of Mountain Home.

GOLDEN AGE JUNIOR MINING CO. IDAHO

Address: B. R. Koering, cons. eng., Grimes Pass, Idaho.

Cap., $1,000,000; $1 par.

Property: 300 acres in Boise Basin district, Boise county, shows veins carrying gold-silver ore.

Development: by a 1,700′ tunnel; a second tunnel is to be driven 1,000′ lower, company mining ore and shipping concentrate 1919.

Equipment: 15-stamp mill. A 300-ton mill is contemplated. An old tailing dump of 3,000 tons, also 1,000 tons of concentrate, are being reconcentrated.

The Michigan Investment Co. of Grand Rapids, Mich., is said to be financing the company.

GOLDEN CHEST MINE IDAHO

Address: Vivian Green, gen. mgr., 45 W. 34th St., New York; R. T. Horn, supt.

Property: 51 claims, 1 mile E. of Murray, Coeur d'Alene, Idaho.

Geology: quartz vein in Prichard slate. Ore from upper levels was free milling, and the gold easily recovered. At depth the ore became pyritic and rebellious. Gold and tungsten occur in the same vein, but the scheelite

is confined to the disturbed part of the vein and is almost free from gold. The gold shoots are free of tungsten, though in mining, both become mixed to some extent.

Development: consists of over 13,000′ of workings.

Treatment: in Bull. 128 of the A. I. M. E., R. R. Goodrich and N. E. Holden described tests made on this ore, tungsten with a little gold. Considerable clean scheelite is sacked direct for market. It was found that gravity concentration gave 53.7% tungstic oxide concentrate, with much pyrite, not a marketable product; flotation does not clean the concentrate properly and loses tungsten in the overflow; roasting and magnetic separation of the pyritic tungsten material yields over 60% grade; and the net extraction of WO_3 is about 90%. A new mill was erected in 1918.

GOLDEN GATE PLACER MINES IDAHO

Office: Pendleton, Oregon.

Officers: C. E. Penland, pres.; B. Parlett, sec.; J. T. Lambirth, treas., with C. H. Norris and H. M. Elder, directors.

Cap., $75,000; $1 par.

Property: in Idaho county.

GOLDEN GLOW MINING CO. IDAHO

Office: 403 Commercial Bldg., Portland, Ore., T. Papworth, pres., sec. and treas. R. J. Haynes, supt.

Cap., $750,000; shares 50c par.

Property: 18 miles N. of Ketchum, Blaine county, contains low-grade silver-lead-copper ore, opened by tunnels. Operated intermittently. During 1918 a small force of men was employed, and in July, 1919, about 100 tons of high-grade ore was mined ready for shipment.

GRAY COPPER MINING CO., LTD. IDAHO

Mail returned in 1919, from former address: Osborne, Shoshone County Idaho. E. F. Hall, pres.; W. H. Herrick, sec. and mgr.

Cap., $375,000; shares 25c par.

Property: 7 claims, 2 miles from a railroad, on McFarren gulch, 12 miles from Osborne, shows a vein of 6 to 20′ surface width, developed by a combination crosscut and drift tunnel, showing mainly gray copper ore, said to average 17% copper, 20 oz. silver, and $10 gold per ton. Probably idle.

HAMILTON MINING CO. IDAHO

Office: 307 Benton St., Portland, Oregon.

Officers: R. E. White, pres.; A. N. Hamilton, sec.

Cap., $2,400; shares $1; all outstanding.

Property: on the South fork of Salmon River, Idaho county. Company reported, October, 1917, to have purchased the Grand Central mine, consisting of 2 claims in Cable Cove district, near Sumpter, Baker county, Oregon, formerly owned by Mollie Gibson Gold M. & M. Co.

Development: by 500′ of tunnels, said to show an ore-bearing vein from 2-4′ wide. The tunnel was to be extended 400′ at last report.

HARMONY MINES CO. IDAHO

Offices: 605 Hearst Bldg., Chicago, Ill., and Salmon, Idaho.

Office: A. W. Nieman, pres.-gen. mgr.; C. F. Nast, v. p.; O. G. Paasche, asst. sec.; with C. Nickelsen, Henry Cohen, A. C. Skafgard, C. V. Nieman, Morries D'Hoore, and Richard de Smet, directors. Gladys Nieman, sec.; J. W. Reihman, treas.; E. F. Nieman, cons. eng.-gen. supt.

Inc. Jan. 22, 1916, in Nevada. **Cap.,** $1,000,000; $1 par; assessable, 791,498 issued. Annual meeting, third Thursday in January.

Statement for 1916 shows income fom stock sales, etc., $46,866; operating expenses, $42,686; gross earnings, $1,191.

In 1918, the income was $69,811, including $7,018 carried over from 1917, $58,450 from sale of shares, and $4,090 from ore sold. Expenses were $56,001, including $10,000 payment on property, and $30,206 for development. Cash and notes at end of 1918 totaled $13,810. Current assets were $14,710,

and liabilities $12,998. The only debt was $10,000 on the property reported paid April, 1919.

Property: 15 claims, being patented, in Washington Creek mining district, Lemhi county. Examined by J. A. Herndon and J. F. Inglis of Salmon, Idaho; J. W. Coples of Leesburg, Idaho, and R. O. Clifford of Salt Lake City.

Geology: deposit consists of shear-zone in schist, dipping 70° with a N. 60° W. course. Orebody is from 2 to 12′ wide, and shoots average 4′ in width and 100′ in length. The principal mineral is chalcopyrite assaying from 3 to 5% copper.

Development: by 750 and 180′ tunnels, and various crosscuts, with total of 4,000′ of workings. Ore reserves estimated at 53,840 tons. The 300′ level or lower tunnel is to be driven along the Contention vein to explore the full length of the shoot.

Equipment: 2 aerial trams, one a jig back two-bucket plant of 50 tons a shift capacity, and 2,400′ long; the other a friction grip tram of 100 tons capacity and 2,800′ long. Also 2 fuel-oil driven compressors of 10-drill capacity, 7.7-mile transmission-line, and 100-ton concentrating mill constructed in 1919. Tests show that the mill recovery should be 77%.

Production: 32 tons of ore and 5,376 lb. of copper in 1916; 500 tons and 61,170 lb. in 1917, and 100 tons and 20,000 lb. in 1918. Total value of output to end of 1918 was $15,798. Last two carload shipments averaged 9.5 and 12% copper.

About $250,000 has been spent on the Harmony mine, which seems to be of considerable merit.

HARTWIG MINING CO. **IDAHO**

Out of business. See Vol. XIII for description of property.

HAYNES-STELLITE CO. **IDAHO**

Address: Salmon, Lemhi county, Idaho.

Property: a group of claims in the Blackbird district, 36 miles W. of Salmon. A wide ore-zone shows disseminations of cobalt-sulphide ore in schist, this rock changing to the northwest granite, both rocks being intruded by diorite dikes. This district has long been known for its copper ores. A 10-stamp concentration mill was in operation in 1919, testing out the ore.

HERMIT MINING CO. **IDAHO**

Address: Clayton, Custer county, Idaho.

Officers: H. L. Carpenter, pres., 800 1st Nat. Soo Line Bldg., Minneapolis, Minn.; W. E. Smith, v. p.; Wm. M. McCrea, sec., with S. C. Sherrill, all of Salt Lake City, directors; W. E. Smith, supt.

Property: a group of claims 15 miles from Clayton, on which development work on a vein 20′ wide has disclosed an ore shoot 2½′ wide, the ore carrying 50 to 73% lead, 114 to 211 oz. silver, and $3.80 to $6.80 gold per ton according to report. One carload shipped to the smelter netted $1,700. Only such rich ore can stand the long haul to the railroad.

HOLTE MINE **IDAHO**

Address: Holte & Woolfolk, Burgdorf, Idaho county, Idaho.

Property: a gold mine in the Marshall Lake district, on which there is a 25-ton mill erected 1918. Total output said to be $300,000.

HOMEBUILDER M. & D. CO. **IDAHO**

Address: W. C. Brower, pres., 1329 Old Nat'l Bank Bldg., Spokane, Wash.

Property: 43 claims, 18 miles E. of Coeur d'Alene, Kootenai county. Company's literature issued in 1916 said 200,000,000 tons of ore were exposed in the mine, and that it carried gold, silver, copper, uranium, cobalt, zinc, and other valuable elements. A reduction plant was planned 1918. The absurd statements made about the mine cause suspicions as to its value.

HOPE MINING & MILLING CO. **IDAHO**

Address: Hope, Bonner county, Idaho.

Officers: G. H. Martin, pres.; A. W. Bowen, treas.; John Larson, sec.; F. S. Hayes, supt.

Inc. June, 1916, in Idaho. **Cap.,** $1,500,000; $1 par.

Property: 11 claims and a fraction, total 225 acres, lying about 1½ miles E. of Hope, on main line of N. P. R. R. Ore said to contain 9 to 21% copper, 3 to 10 oz. silver, and up to 69% lead. Is a prospect, developed by a short tunnel.

HORSESHOE COPPER CO. **IDAHO**

Address: D. J. Archibald, sec., Mackay, Custer county, Idaho.

In August, 1919, it was reported that the U. S. S. R. & M. Co. had a lease and bond on the mine until December and was mining and shipping 3 carloads of copper ore per week, with a force of 25 men.

IDAHO ANTIMONY MINING CO. **IDAHO**

Letters addressed to H. L. Williams, Seattle, Wash., managing director, returned in 1919.

Property: in Yellow Pine mining district, near Cascade, Valley county, shows stibnite ore 18 to 30" wide, developed by 4 tunnels. Two carload shipments, 1915-16, are reported to have yielded 47% antimony. No later returns.

IDAHO CONTINENTAL CO. **IDAHO**

Address: Porthill, Idaho.

Officers: A. Klockman, pres. and gen. mgr., 711 Paulsen Bldg., Spokane, Wash.; J. B. Whitehill, v. p.; R. Schacht, sec.-treas., with E. M. Robinson, Wm. Wraith, directors. James Wilson, supt.

Inc. 1909, in Washington. **Cap.,** $1,500,000; shares $1 par; all issued. John D. Ryan, through the International Smelting & Refining Co., advanced $325,000 for the development of the property on condition that it be given a 10-year contract to treat the company's ores.

Property: 20 patented claims, 26 miles from Porthill, Boundary county, Idaho, N. of head of Priest lake, said to show a strong vein in quartzite with a succession of ore-shoots, 8′ to 20′ wide, carrying galena. These ore shoots have been opened to a depth of 700′ and on that level exceed 1,500′ in length.

Development: by 3 drift tunnels on the vein, the lowest (No. 4) being 1,600′ long with a back of 500′. Reserves above No. 4 tunnel were estimated to be 250,000 tons at the end of 1918, including 20,000 tons of broken ore in stopes.

Equipment: a hydro-electric plant 12 miles from the mine, sawmill, 15-drill compressor, assay office, shops, 1,750′ ground tram, 150-ton concentrator, replacing that burned in 1915, 2,000′ aerial tram across the Kootenai river, and 13 motor-trucks. A narrow-gage railway from the mine to Porthill, 26 miles is to be built.

Production: total shipments to Sept., 1919, exceed 19,000 tons of crude ore and concentrate. Daily output of concentrate is 13 tons. During 1918 the ore shipped contained 7,000,000 lb. of lead and 129,000 oz. of silver. Output from July to September, 1919, 2,400 tons of concentrate, assaying $62 per ton. About 100 men are employed, when property is in full operation.

The Idaho Continental is considered to be one of the important lead mines of the State, and has been rapidly developed despite its isolated position and high cost of operation.

IDAHO COPPER MINING & SMELTING CORP. **IDAHO**

Address: Simpson, Thatcher & Bartlett, 62 Cedar St., New York.

Property: the I. X. L. copper group, 60 claims, in the Heath district, Adams county, 75 miles N. of Boise, 10 miles from the Huntington branch of Oregon Short Line, and 16 miles by road from Pacific & Idaho Northern Line, a branch of the O. S. L. at Weiser. (Described by R. N. Bell, State Inspector of Mines, in E. & M. Journal of September 6, 1919.)

Geology: the district embraces Cudday mountain, 8,000′ high, with a

central boss of quartz hornblende diorite, or monzonite. The mountain is flanked to the N. S. and E. by horizontal lava flows of basalt. The western slopes of the mountain show monzonite, cutting large bodies of greenstone porphyry, with included masses of marbleized limestone containing typical contact metamorphic minerals and lenses of characteristic sulphide ore. The lower mountain slopes show slate, shale, and limestone, with dikes and intrusions of andesite, basalt, and other igneous rocks. The I. X. L. group covers a large part of an erosion basin; near the crest of the mountain there is also a well-defined zone, 400′ wide and a mile long, of more altered mineralized monzonite, in which the numerous shallow pits and trenches show copper carbonate stains and threads of chalcopyrite. Widespread mineralization is indicated by large patches of brown stained rock. Lower down the slope a second zone 800′ wide and a mile long traverses the middle of the claims. This also shows a carbonate and sulphide ore. Mr. Bell considers this property a possible 'porphyry copper,' in spite of the opinions of various well-known engineers. Mr. M. R. Straight, of New York, is understood to be prospecting the deposit for local people.

Development: includes numerous surface cuts, and crosscut tunnel 1,200′ long, January, 1920. Drifting both ways 500′, in 100′. In this tunnel 10′ samples taken by Mr. Bell, from the 350′ to 650′ points averaged 1% copper and 50 cents in gold and silver. Combined samples from a 40′ section gave nearly 3%. The values occur in chalcopyrite.

IDAHO EXPLORATION CO. **IDAHO**

Address: Hailey, Idaho.

Property: a group of patented claims in Kelly Gulch, W. of Hailey, Blaine county. A rich strike made in 1915, said to have disclosed an orebody several feet wide, assaying 110 oz. silver and 70% lead per ton. Under development until interrupted by the war.

IDAHO GIANT MINING CO. **IDAHO**

Absorbed by Idaho Carbonate Hill Mining Co., which see.

IDAHO GOLD COIN CO. **IDAHO**

Controlled by the Salger Seed Co., La Crosse, Wis. at last accounts. S. W. Ford, supt., Landore, Idaho.

Property: in the Black Lake section of the Seven Devils district, Adams county, carries gold ore assaying from $12 to $16 per ton. Company expended $250,000 in 12 years development work and built a 50-ton cyanide plant at the mine. No recent news.

IDAHO GOLD & RUBY MINING CO. **IDAHO**

Address: Lenia, Boundary county, Idaho.

Officers: J. M. Schnatterly, pres.; S. A. Deardorf, v. p.; M. L. McCormick, sec.-treas., 2628 Dalton St., Spokane, Wash.; with A. B. Babb, director.

Cap., $4,000,000; $1 par.

Property: 2,500 acres of placer ground and quartz claims near Lenia, on which company's engineer estimated 300,000,000 cu. yd. of gravel available.

Equipment: company spent $12,000 in 1917 on a plant capable of hydraulicking 25,000 cu. yd. of gravel daily. Work in 1918 was confined to digging a large ditch by steam-shovel, erecting a pipe-line, flume, sluice-boxes and three 9-in. giants for hydraulicking. In the summer of 1919, 35 men were at work and property was about ready for sluicing.

IDAHO AND LOS ANGELES M. & M. CO. **IDAHO**

Address: A. J. Dunn, Wallace, Idaho.

Cap., $1,000,000; $1 par; assessable; last assessment levied Oct. 15, 1919.

Property: 14 claims, 7 patented, in Beaver and Placer Center mining districts, Shoshone county, said to show a well defined vein containing lead-silver-zinc and copper ore. Developed by 250′ tunnel with various crosscuts. and drifts.

IDAHO MINERAL MINING CO. **IDAHO**

Address: Box 326, Spokane, Wash.

Officers: D. W. Cassidy, pres.-treas.; C. E. Adams, v. p.; B. B. Adams, sec.; with C. H. Pugh, M. C. Guilbert, and O. E. Cushing, directors.

Inc. Oct., 1909, in Washington. **Cap.,** $150,000; 10c par; 1,350,000 issued. Annual meeting 1st Monday in October.

Property: 4 claims, 80 acres, on east side of Lake Pend d'Oreille, Bonner county. Group contains a fissure vein in quartzite, with silver-lead ore having some copper and gold.

Development: by 350 and 600′ tunnels, and a total of 2,300′ of workings with a maximum back of 350′. A long crosscut tunnel being driven in 1919 will give a back of 550′.

One car of sorted ore shipped in 1918 netted $48.60 per ton. Total output to date is 2 carloads. Is regarded as a good prospect.

IDAHO MINES SYNDICATE — IDAHO

Address: 120 Broadway, New York.

Controls the Unity Gold Mines Co., which see.

IDAHO-MONTANA AMALGAMATED MINING CO. — IDAHO

Letters sent to Bonner's Ferry returned unclaimed.

Owns the Idaho-Montana mine, near Kalka station on the Great Northern R. R., 7 miles E. of Bonner's Ferry, Bonner county.

Developed by a 400′ incline shaft which discloses a 2 to 4′ vein in diorite with ore containing lead and silver values associated with iron sulphide, expected to develop copper with depth. Has 50-ton concentrator. Considered promising.

IDAHO-NEVADA EXPLORATION CO., LTD. — IDAHO

Address: Wallace, Idaho.

Officers: M. J. Mahoney, pres.; Jos. Peila, v. p.-gen. mgr.; E. R. Turk, sec.-treas., with A. B. Livingston and August Holst, directors. W. B. Lively, mgr.; S. L. Shonts, cons. engr. at last report.

Inc. 1914, in Idaho. **Cap.,** 1,500,000 shares; shares given to those agreeing to pay an assessment of 1 mill per share every 2 months.

Property: 3 lode claims, the Castle Rock, Smart Alec and Arlington, and a mill site, formerly owned by the Castle Rock Mining Co., about 3 miles S. E. of Wallace on Placer Creek. Ore occurs as chalcopyrite in a 4′ vein in quartzite.

Developed to depth of 250′, by a crosscut driven to intercept the main vein.

Equipment: includes compressor and hoist. A carload schipment to Tacoma smelter in 1915 said to have assayed .04 oz. gold, 10.89% copper, 10.5% silica, 35.7% iron. Surface equipment and buildings destroyed by snowslide, January, 1916; since re-built.

In June, 1919, mine was sold at forced sale for $60,000, to pay for mortgage and interest amounting to $73,916. The original owners bid in the property.

IDAHO NORTHERN MINERAL CO. — IDAHO

Mine office: Murray, Idaho.

Officers: F. Swanson, pres.; Vina Burton, sec.-treas., with A. Engquist and J. A. Sangren, directors.

Inc. in Washington. **Cap.,** $1,500,000; shares $1 par.

Property: 18 unpatented claims, in the Summit mining district, 5 miles from Murray, shows copper, lead, silver and gold ore in 2 well defined veins. Developed to depth of 400′ by 1,500′ tunnel. Property still in development stage.

IDAHO-SEATTLE MINING CO. — IDAHO

Office: 1604 Hoge Bldg., Seattle, Wash. **Mine office:** Tendoy, Idaho.

Officers: L. E. Eyman, mgr.; F. R. Van Tuyl, F. A. Linforth, and L. R. Margetts, directors.

Inc. Oct. 13, 1915, in Montana. **Cap.,** $100,000; $1 par. Annual meeting 2nd Monday in January. Gross earnings in 1916 were $20,000 from dump and mine, and $7,000 in 1917.

Property: 3 claims, 2 patented, 60 acres, known as the Copper Queen mine, in Agency creek 8 miles from Tendoy, Lemhi county. Claims show bornite, chalcopyrite, copper glance and quartz in fissure veins dipping at from 45 to 70°. Ore occurs in shoots 20″ to 16′ thick, reported to average 10% copper, ½ oz. gold, 1 oz. silver per ton. One shoot is 500′ long. Developed by 1,600′ of workings to depth of 300′. Ore is mined by overhead stoping.

Equipment: includes a 20-ton concentrator whose output assays 30 to 40% copper, 1 to 2½ oz. gold and 8 oz. silver.

IDAHO STANDARD MINES CO. **IDAHO**

Address: E. H. McAuly, mgr., Warren, Idaho.

Property: 5 claims in Warren district, Idaho county, showing veins of gold-bearing ore developed by 2,000′ tunnel work, etc.

Equipment: includes a mill with crusher, Huntington mill, vanners, boiler and engine.

Production: about $4,000 monthly for past two years.

IDAHO TUNGSTEN CO. **IDAHO**

Had a 7-year lease on the Ima Cons. M. & M. Co. (which see). No recent returns.

IDORA MINING CO., LTD. **IDAHO**

Absorbed 1918 by Sunshine Consolidated Mining Co., which see. Described in Vol. XIII.

IMA CONSOLIDATED MINING & MILLING CO. **IDAHO**

Address: Ima, via Landore, Adams county, Idaho, but letters returned. Probably idle.

Inc. 1900, in Idaho.

Property: 21 patented claims near Ima, on Patterson creek, 31 miles S. W. of Landore, Ida. Tungsten was discovered on this property in 1903, but was not mined until 1911.

Ore: mainly hubnerite with some wolframite, occurs in white quartz fissure veins, 1-10′ thick in a formation of pre-Cambrian sedimentaries, closely resembling silicious schist. The quartz gangue shows lead, zinc and iron sulphides.

Development: aggregates about 2,500′ of tunnels and drifts.

Equipment: includes a 50-ton concentrator with flotation unit. Property was worked under a 1-year's lease by the Idaho Tungsten Mining Company and shipped about 12 tons of 60% tungsten concentrates. Under lease to L. A. Jeffs and E. W. Johnson in 1916.

INDEPENDENCE MINING CO. **IDAHO**

Property: in Wood River district acquired by Federal M. & S. Co., for $300,000.

INTERNATIONAL MINING & METALS CO. **IDAHO**

Office: 310 Hyde Bldg., Spokane, Wash.

Property: embraces the former holdings of the Silver Tip Mining Co., 140 acres in the east Coeur d'Alene region, on the Montana side of the divide, 2 miles from the Snowstorm mine. This prospect had 800′ of tunnels at last accounts.

IRON MASK MINING CO. **IDAHO**

Officers: T. B. Huey, pres.; Leon Demers, v. p.; P. Martin, sec.-treas.; with J. J. Bouchard, and P. J. Bovingertner, directors.

Inc. May, 1908. **Cap.,** $1,000,000; shares $1 par; $500,000 outstanding. Assessment No. 3 of 2 mills per share, levied June, 1913.

Property: 6 claims, well timbered and watered, 3 miles from rail, in St. Joe district, said to show a 10′ vein of concentrating ore, with an 18″ vein of smelting ore.

Development: by 1,400′ tunnel with backs of about 700′, and 2,400′ of drifting on the vein in the various tunnels. The workings show silver and lead ore of good average grade, with a small percentage of copper.

Equipment: includes gasoline power and necessary mine buildings. Apparently idle.

I. X. L. GOLD MINING CO., LTD. **IDAHO**

Address: H. W. Dorman, Caldwell, Canyon county, Idaho.

Inc. in Idaho. **Cap.,** $200,000; $1 par; all issued.

Officers: Douglas Fleming, pres.; L. S. Diller, sec.; W. H. Kalback, treas.; H. W. Dorman, mgr.

Property: 120 claims in the Westview district, near Pearl. Deposit is a 4′ contact vein between granite and porphyry, carrying sulphides of lead and silver with some gold.

Development: by 3,000′ tunnel giving a back of 550′. Idle for several years.

JACK WAITE EXTENSION MINING CO. **IDAHO**

Address: J. T. Ellarson, sec., Murray, Idaho.

Officers: Chas. McElroy, pres.; M. Schuelman, v. p.; J. T. Ellarson, sec.; Theo. Bedard, mgr. and director. John T. Pollock, supt.

Inc. in Idaho. **Cap.,** $1,000,000; $1 par; 823,000 issued. Annual meeting first Monday in July.

Property: 53 claims on Big Beaver Creek, adjoining the Jack Waite, on the E., 9 miles from Whitepine, on the N. P. R. R. 3 claims in Idaho, balance on Montana side of the divide, in Sanders county, reported to carry the extension of the Jack Waite veins.

Geology: fissure vein 6-12′ wide cuts slate and granite.

Development: by crosscut tunnel on Idaho side, which will cut 2 veins, one at 650′, a second at 1,000′ from portal, claimed to be 6′ wide and to carry gold-silver values.

Equipment: includes a 12-h. p. gasoline engine and compressor.

JACK WAITE MINING CO., LTD. **IDAHO**

Address: Union, Shoshone county, Idaho.

Officers: E. Winsby, pres.; Robert Shuffuls, v. p.; C. E. Chamberlain, sec.-treas.; C. I. Grimsmoe, supt.

Inc. Nov. 26, 1909, in Idaho. **Cap.,** $1,500,000; $1 par; assessable; 1c assessments. Stock listed on Spokane Stock Exchange.

Property: 3 patented claims on Tributary creek, 10 miles from Waite; said to show a vein in slate dipping 60° S. W. and pitching N 70° W. Size of orebody is given as 300′ by 10′ and average of ore from 8 to 15% lead.

Development: by 2 tunnels, 1,400′ and 2,900′ long, respectively. The greatest depth of workings, which total 5,000′, is 1,300′.

Production: in 1917 was $76.465; ore was also shipped during 1918.

KENT PLACER GOLD MINING CO. **IDAHO**

Address: S. W. Kent, Montpelier, Idaho.

Officers: S. W. Kent, pres.; Chas. Barber, v. p.; H. M. Moore, sec.-treas.

Inc. in Idaho. **Cap.,** $500,000; shares 10c par; 4,000,000 issued.

Property: 640 acres gold placer ground on south fork of Snake river, near Alpine, Bonnerville county, 80 miles from Montpelier, nearest railway point. It is said that the gravel averages $5.60 per cu. yd. but information from uninterested sources indicates a value of 90c a yard. Practtically idle.

KING DAVID CO. **IDAHO**

Address: 446 Peyton Bldg., Spokane, Wash. **Mine office:** Neva, Idaho.

Officers: A. R. Immisch, pres.; F. C. Dolke, v. p.; P. A. Hughes, sec.; L. A. Smith, treas., with J. A. Brown and T. W. K. Whitlam, directors.

Inc. Aug. 27, 1915, in Washington. **Cap.,** $1,500,000; $1 par; 1,150,000 issued.

Property: 6 unpatented claims in Ruby Creek district, Clearwater county, Idaho.

Geology: contact veins in trachyte and metamorphic granite with vertical streaks, 1 to 4″, carrying 45 to 63% zinc, with some lead and silver.

Development: 165′ shaft with 135′ drift on vein, and several crosscuts.
Equipment: includes steam hoist, compressor, pump, etc. A prospect.

KIRKHAM GROUP **IDAHO**

Address: H. L. Kirkham, owner, White Bird, Idaho county, Idaho.
Property: 6 claims, 61 acres, in Camp Howard district, Idaho county, containing a contact vein in granite and diorite. Ore contains copper sulphides carrying gold, silver values and is said to assay $25 per ton.
Development: by 60′ tunnel.

KUSA SPELTER CO. **IDAHO**

Address: N. W. Emmens, Hailey, Blaine county, Idaho.
Property: 6 claims in Lake Creek district, worked by company during 1917 and 1918, with shipments of 200 tons of 36% zinc ore, to company's smelter in Oklahoma.

LAKEVIEW METALS CO. **IDAHO**

Address: R. Mabry, pres., Hutton Bldg., Spokane, Wash. T. C. Cunningham, supt.
Cap., $100,000; 10c par; assessable.
Property: 2 patented claims, the Conjecture mine, 4½ miles E. of Lakeview, Bonner county, Idaho.
Development: by 2,000′ tunnel and 230′ shaft, said to have blocked out 40,000 tons of ore.
A 100-ton concentrating plant was to be finished during 1919. Hydroelective power is also to be developed and transmitted 3 miles to the mine.

LAKINA COPPER CO. **IDAHO-WASHINGTON**

Officers: E. A. Patrick, pres.-mgr.; T. E. Coleman, v. p.; Luther Haynes, sec.-treas.; with E. E. Younge, Charles Zeige, V. C. Hill, and J. S. Ross, directors.
Cap., $3,000,000; shares $1 par; 2,175,000 outstanding.
Property: 2 claims, 40 acres, in Deadwood mining district, 3 miles N. E. of Lowman, Boise county, Idaho; and 4 claims, about 25 miles N. of Twisp, Okanogan county, Wash. The Idaho property has free-milling ore, 30′ wide, traversing granite-porphyry and giving assays of from $48 to $76 per ton. Both properties inactive, but work was to be started late in 1919.
Deadwood property reported held under lease and bond. Company also owns 750,000 shares in Lakina Kennecott Mining Co.

LATAH COPPER MINING CO., LTD. **IDAHO**

Potlatch, Latah county, Idaho. Idle since 1907. See Vol. XI, Copper Handbook.

LATEST OUT MINING & SMELTING CO. **IDAHO**

Address: Gilmore, Lemhi county, Idaho.
Officers: Ralph Nichols, pres.; D. L. Nichols, v. p.-sec.-mgr.; F. A. Nichols, treas., with A. C. Cherry and F. B. Watson, directors.
Inc. June 1, 1910, in Idaho. **Cap.,** $500,000; $1 par.
Revenue from ore sales in 1918 was $163,293, and operating expenses were $151,331. **Dividends:** $10,000 paid in 1918.
Property: the Latest Out mine, 1 and a fraction patented claims, at Gilmore. Mine is a lead-silver-gold producer. (See full description by Nichols in Trans. Am. Inst. M. E., Vol. XLVI, pp. 937-9, 'Lead-Silver Mines of Gilmore').
Geology: fissure veins that cut limestone beds at right angles, contain ore shoots of limonite and hematite replaced by lead ore. Sulphides appear to decrease with depth. Ore reported to average 25% lead, 25% silica, 15% iron, 0.5% sulphur, 10 oz. silver and 0.03 oz. gold per ton. Ore-shoots are upwards of 1′ wide, and have a southerly rake.
Development: by 900′ shaft, and total of 16,000′ of workings. Reserves: 20,000 tons blocked out with an equal quantity of possible ore. In December, 1919, a good orebody was being mined on the 600′ level.
Equipment: includes a 40-h. p. gasoline hoist and 750′ gravity tram.

Production: $163,293 of ore shipped in 1918, and about $1,000,000 to date. Average grade was $22.50 per ton.

Apparently a good mine.

LAWRENCE MINING & MILLING CO., LTD. **IDAHO**

Office: 427 Eagle Bldg., Spokane, Wash. **Mine office:** Clark Fork, Idaho.

Officers: Jos. Reed, pres.-mgr.; W. W. Wood, v. p.; S. Hilliard, sec.-treas., with O. A. Turnbow and A. Loding, directors.

Cap., $75,000; 5c par; 1,426,815 outstanding.

Property: 10 claims, 1½ miles from Clark Fork, Bonner county, said to carry gold-silver-copper-lead ore in fissure veins 2″ to 9′ thick.

Development: 3,000′ of tunnel and drifts and a 160′ incline shaft.

Equipment: 60-ton concentrator, pump, and compressor. Concentrates assay 75% lead and 17 oz. silver per ton. A carload in December, 1919, was settled for $2,526. Total net receipts were $55,000 to that date.

LEAD KING MINING CO. **IDAHO**

Merged August, 1917, into Eclipse Mining Co., which see.

LEESBURG GOLD DUST MINING CO. **IDAHO**

Office: 420 Constitution Bldg., Salt Lake City, Utah.

Officers: D. H. Wenger, pres.; W. C. Burton, v. p.; W. S. Burton, sec.-treas.; with E. W. Stifel and T. H. Pollick, directors.

Cap., $1,500,000; $1 par; 1,096,705 issued.

Property: 4 claims, 2 patented, at Leesburg, Lemhi county, Idaho. Deposit is a contact vein between granite and quartzite, containing ore said to average $7.50 per ton in gold and silver.

Development: by 150′ shaft and tunnel, with workings totaling 1,000′.

Equipment: includes steam plant and a 10-stamp mill and cyanide plant. Development only reported done in 1919.

LEESBURG MINING & POWER CO. **IDAHO**

Address: M. H. Phillips, supt., Mackinaw, via Leesburg, Lemhi county, Idaho.

Cap., $1,000,000; $1 par.

Property: 29 claims in Mackinaw district, carrying veins of gold and silver ore.

Development: by 165′ and 200′ shafts with over 2,500′ of workings.

Equipment: hydro-electric plant, hoist, 40-stamp mill, sawmill, etc. Production reported to total $125,000 up to 1915. No recent returns.

LEMHI GOLD MINING CO. **IDAHO**

Formerly operated the property of the Virginia Cons. Mining Co., near Baker, Lemhi county, Idaho, which is now worked by the Mines Developing & Leasing Co., which see.

LIBERTY BELL GROUP **IDAHO**

Address: E. M. Griffith, owner, Grangeville, Idaho county, Idaho.

Property: 3 claims in Buffalo Hump district, which contain 2 veins 20 to 35′ wide. One vein has a shoot showing 5′ of rich gold ore carrying some galena and petzite (a telluride of gold and silver).

Development: by 400′ tunnel, and considerable surface work.

Reported that $7,000 was spent on property during 1918, but litigation resulting from the discovery of such rich ore on the surface, stopped further development.

LITTLE NORTH FORK COPPER M. & M. CO., LTD. **IDAHO**

Address: T. R. Mason, Kellogg, Idaho.

Officers: T. R. Mason, pres.; J. E. Jones, sec.; John Locke, treas., with Archie McDonald, J. Koldenbaugh, and H. S. Savage, directors. Jas. H. Hoskins, supt.

Inc. Sept., 1903, in Idaho. **Cap.,** $1,500,000; shares $1 par, assessable; 1 mill per share called September, 1914.

Property: 10 claims, known as the Handspike mine, on Little Copper

creek, near Little North Fork, 12 miles from rail, in Kootenai county. Claims lie above the Horst-Powell holdings.

Development: by the 2,320′ No 1 upper tunnel, showing ore assaying up to 28.8% copper, 1 oz. silver and $1.20 gold per ton, and the No. 2 lower tunnel of 1,500′ showing a 12 to 18″ paystreak of argentiferous copper ore that averages $8 to $30 per ton. Property claimed to have $200,000 worth of copper ore blocked out.

LOST PACKER MINING CO. **IDAHO**

Office: 564 E. First South St., Salt Lake City, Utah. **Mine and works office:** Ivers, Custer county, Idaho.

Officers: Jas. Ivers, pres.; J. T. Finlen, v. p.; Henry Welsh, sec.-treas., with J. Frank Judge and H. A. McCormick, directors; J. P. Boyle, mgr., at last accounts.

Inc. 1903, in Utah. **Cap.,** $150,000; shares $1 par; changed 1916 to 600,000 shares, 25c par; assessable. Stockholders privileged to purchase new shares at ratio of 3 for each old share held. Dividend of 25c a share, paid October, 1913. Stock listed on Salt Lake City Exchange.

The Packer Co. was incorporated June, 1917, as a holding company to take over 80% or more of the Lost Packer Mng. Co. stock.

Property: 34 claims, 4 patented, in the Loon Creek district, 112 miles west of Mackay, the nearest rail point. The mine and smelter are in the mountains 7,100′ above sea-level, but an auto road runs to the mine. Claims said to show a number of iron outcrops, covering two contacts, two miles apart, one a limestone diorite contact, the other between limestone and quartzite. These outcrops are of favorable character.

Development: by drift tunnels, No 1 having a back of 450′, No. 2 a back of 700′, and No. 9 a back of 870′, latter showing rich ore, and planned to have a back of 2,000′, ultimately. Tunnels show vein to be 2 to 7′ wide, with maximum width of 15 to 18′, carrying ore said to average 9 to 16% copper, and 2-8 oz. gold per ton, with a paystreak of 2″ to 5′ width, proven to average about 2′ for a distance of 500′, and depth of 400′. Mine is developed to 1,000′ level. See U. S. Geological Survey Bull. 530 G.

Company at one time employed 80 men at the mines and 400 horses were required to handle supplies and output.

Equipment: about $225,000 has been expended on surface improvements and equipment, including the smelter, but excluding the 50-ton oil flotation concentrator, built in 1915. The property has water power, with an electric light plant, assay office and necessary mine buildings.

The smelter has a 100-ton water-jacket blast furnace, making matte of about 45% copper, 25 oz. silver and 8 to 10 oz. gold per ton, with slags running only about 0.2% copper. The smelter ran 24¾ days in the summer of 1913, smelting 1,800 tons of ore, and producing 380 tons of matte. Total production to end of 1915 was $800,000 Management estimated 20,000 tons of ore in old stopes expected to net $4.97 per crude ton.

Mine is probably idle, due to remote location and economic conditions.

LOST PACKER MINING & SMELTING CO. **IDAHO**

Inc. 1907 in Wyoming. **Cap.,** $3,000,000; $5 par, as a holding company, to gradually acquire the outstanding stock of the Lost Packer and other mining companies.

LUCKY BOY GOLD MINING CO. **IDAHO**

Office: Empire Bldg., Boise. **Mine office:** Idaho City, Idaho.

Officers: Thos. Brown, pres.; E. W. Barry, v. p.; Fred V. Tinker, mgr., with R. E. Highnote, F. E. Johnesse and John G. Huber, directors; T. E. Rippey, sec.-treas.

Inc. Sept 30, 1914, in Idaho **Cap.,** $500,000; shares $1 par; 320,000 shares outstanding. Annual meeting second Tuesday in January.

Property: 7 claims, 120 acres, in Gambrinus mining district, 6 miles N. E. of Idaho City, Boise county, said to show a shear zone, 3-40′ wide,

of granite porphyry, carrying some quartz streaks and considerable soft talc. The orebody runs E.-W. and dips about 60°. Ore is free gold.

Development: by 300′ shaft and 840′ tunnel to depth of 360′, with 2,100′ of drifts and crosscuts.

Equipment: includes 12″x14″ compressor, electric power, 100 h. p. crude oil engine direct connected to 55 k. w. electric generator, 100-ton Marathon mill and electric hoist.

Ore reserves: estimated Feb., 1916, 130,000 tons of ore. Credited with production of $130,000 under former owners. Present management competent and property considered promising.

LUCKY BOY MINING & CONCENTRATING CO., LTD. IDAHO

Address: Mullan, Shoshone county, Idaho.

Officers: M. D. Needham, pres.-mgr.; F. O. Morrison, v. p.; H. G. Loop, sec.-treas.; with P. J. Scoles, directors.

Inc. Jan., 1907, in Idaho. **Cap.,** $1,000,000; $1 par; assessable, 700,000 issued.

Property: 6 unpatented claims, 90 acres, 3½ miles E. of Mullan, 1 mile up Gentle Annie gulch. Quartz vein cuts through shale, and carries ore said to average $2 gold, 2% lead, 1 oz. silver, and 3% zinc.

Development: by 250′ tunnel. Work was started through the Silver Star company's tunnel, and by March, 1919, the face was in 1,550′, attaining a depth of 500′.

A prospect.

MANDARIN MINES CORPORATION IDAHO

A reorganization, 1914, of the Yellow Jacket & Gold Mining Co. Officers at that time were: C. W. Pope, pres., 25 Broad St., New York,; D. C. Catlin, v. p., 60 Broadway, New York; with C. E. Pope, H. E. Parker, and John B. Hastings, directors.

Inc. 1914, in Nevada. **Cap.,** $1,000,000; par $1.

Property: 4 claims, patented and 3 millsites, on Yellow Jacket creek, in Lemhi county, 45 miles S. W. of Salmon City, was a producer until the ore above a large fault was exhausted. Gold ore occurred in a quartz vein. Said to have produced $600,000 in the past. Mine has been idle for several years.

MASCOT MINING & MILLING CO. IDAHO

Address: Pocatello, Idaho. **Mine office:** Hailey, Idaho.

Officers: Charles Peter, pres. and mgr.; J. M. Stevens, sec.-treas.; A. J. Weber, asst. treas.; with Ferd. Walther, J. W. Lorenzen, A. Walton, Otto Schulze, A. H. Freber, and P. Gardner, directors. H. E. Johnson, supt.

Inc. March 4, 1916, in Idaho. **Cap.,** $1.000,000; $1 par; 800,000 issued. Annual meeting, first Monday after first Tuesday in October. Operating expenses in 1918 were $52,000.

Property: 18 claims, 4 patented, at Peter, near Hailey, in Warm Springs Creek mining district, Blaine county, said to show gold, silver and lead sulphide ore in a vein in limestone-shale formation. Examined by E. R. Zalinski, and described by Higgins in 'Salt Lake Mining Review' issues of September 15, 1916; November 15, 1917; and October 30, 1918.

Development: by tunnels and 4.000′ of workings, giving depth of 800′. Main workings are on the Silver Fortune claim. A double-track 6x8 ft. tunnel, being driven, 1919, and was 260′ long in July.

Equipment: air-compressor, oil engine, and complete quarters. A hydro-electric plant is planned, also a 200-ton mill.

Company is well financed and is developing its property thoroughly.

McKINLEY GOLD MINES CO. IDAHO

Letters returned March, 1918 from former address, Kansas City, Mo.

Inc. in Arizona. **Cap.,** $1,000,000; $1 par. Has spent $75,000 without return.

Property: 700 acres on Jupiter mountain, Boise Basin, 6 miles from Idaho City, Boise county, shows a big vein carrying erratic metal content.

Development: a crosscut tunnel which has not yet reached the vein. Idle for lack of funds.

MELCHER MINING & MILLING CO. **IDAHO**

Office: 409 Hooper Blk., Salt Lake City, Utah. **Mine office:** Albion, Cassia county, Idaho.

Officers: Samuel McIntyre, Sr., pres., gen. mgr. and treas.; R. M. Wilkinson, sec. and purch. agt.; P. McIntyre, supt.

Inc. in Utah. **Cap.,** $1,000,000; shares $1 par.

Property: 37 claims, including former holdings of the Cumora Mining Co., bought 1912, in the Stokes district, 38 miles from rail and 12 miles from Albion. Country rock is schist, granite, and quartzite, orebodies occurring in fissure veins in both schist and granite. The vein developed runs N. 10° E. and dips 68° west.

Development: by two shafts and 4 tunnels, one 3,290′ long. Shows a 3′ quartz vein carrying chalcopyite and galena and lead carbonates, said to average 5% copper, 4% lead, 5 oz. silver and $5 gold per ton. A large quantity of ore is said to be available.

Equipment: includes 200 h. p. steam and water power plant, 5-drill air compressor and 100-ton mill and flotation plant.

In June, 1919, the mill was operating. Company is said to have expended $200,000 to date.

MERGER MINING CO., LTD. **IDAHO**

Address: J. C. Northrup, mgr., Palouse, Wash. Mine under lease to Collingwood Mining Co., until 1922.

Officers: J. C. Northrup, pres.-mgr.; G. A. Weldon, v. p.-treas.; C. E. Frederick, sec., with E. R. Northrup and C. L. Cleveland, directors.

Inc. Oct. 15, 1913, in Washington. **Cap.,** $3,750,000; $1 par; assessable for annual labor only. Annual meeting April 16.

Property: the Mizpah mine, 20 claims, 318 acres, well watered and timbered, on Copper mountain, near the Palouse river, in the Hoodoo district, Latah county, almost 40 miles from Palouse. A 20-mile wagon-road runs to Harvard, 10 miles from the Puget Sound railway.

Geology: the property is covered by quartzite and schist, with fissure veins on the quartzite-schist contact. The veins run N. E. and dip N. W. The developed orebody is 10 to 40′ wide, and contains 3% chalcopyrite and 22% copper glance.

Development: includes 5 tunnels, with about 3,000′ of workings reaching depth of 250′.

Equipment: includes 60-h. p. gasoline power, with a 3-drill air-compressor. There are 16 buildings. A 50-ton mill is to be erected. Milling ore averages 4½% copper.

Production: 2,000 tons of milling grade has been mined, and 170 tons of high-grade ore shipped.

METTA MINING CO. **IDAHO**

Address: A. E. Christensen, supt., Shelley, Bingham county, Idaho.

Officers: Soren Yorgeson, pres.; F. E. Roberts, v. p.; J. I. Hubble, treas., with James Christensen, H. L. Malcom, and A. Whitton, directors.

Inc. in Idaho. **Cap.,** $300,000; $1 par; increased to $1,000,000; assessable; 350,000 issued. Operating expenses in 1918 were $2,500. Annual meeting first Monday in February.

Property: 4 unpatented claims, 82 acres, in Little Lost River and Birch Creek mountains, Hamilton district. Examined by Robert N. Bell, of Boise and A. G. Burritt, of Salt Lake City.

Geology: deposit is a fissure in limestone. Ore shoot is from 8 in. to 4 ft. wide, and ores carry galena and iron carbonate, assaying 15% lead, 12 oz. silver, with some gold and copper.

Development: 4 shallow shafts and two short tunnels, workings aggregating 742′ in March, 1919. A new shaft is to be sunk 600′.

Equipment: steam power, hoist, compressor, etc.

Production: 5 carloads of ore averaging 35% lead and 13 oz. silver per ton.

MILITARY MINING & MILLING CO., LTD. **IDAHO**

Office: Clyde-Taylor Bldg., Wallace, Wash. Walter H. Hanson, sec.

MINERAL ZONE MINING CO. **IDAHO**

Address: G. L. L. Baskett, supt., Elk City, Idaho.

Property: known as the Parr group, includes the Mineral Zone gold mine near Elk City,

Development: is by 2,000′ of tunnels, etc. There is a 3-stamp mill which was being worked early in 1918.

No recent returns secured.

MINES DEVELOPING & LEASING CO. **IDAHO**

Address: W. A. Byers, 207 Atlas Bldg., Salt Lake City, Utah.

Property: a lease on the holdings of the Lemhi Gold Mining and the Virginia Consolidated Gold Mining Co. 7 miles from Baker and 22 from Salmon, Lemhi county, Idaho, 1 mile south of the Montana-Idaho boundary.

Development: by tunnels and shaft, opening copper-silver gold ore. A mill is to be erected to serve both properties.

MINNIE MOORE MINES CO. **IDAHO**

Officers: I. E. Rockwell, pres., Bellevue, Idaho.

Cap., $500,000; shares $1 par.

Property: at Bellevue, in the Mineral Hill district, Blaine county, was bonded to Chas. M. Schwab interests, but relinquished by them in 1906 when ore was found to be cut off by complex faulting.

In June, 1912, all the property of the Idaho Cons. Mines Co. was bought at receiver's sale and in 1914 the Mill Site and Onyx lode claims were bought for $5,000. Some lead and zinc concentrates have been shipped.

Idle, "awaiting intensive prospecting," when funds permit.

MIZPAH COPPER MINING CO., LTD. **IDAHO**

Property sold to Merger Mng. Co., which see.

MONITOR CONSOLIDATED COPPER MINING CO. **IDAHO**

Stockholders sold property to Montana-Idaho Copper Co., 1914, for $102,000, payable in shares of new company at par, stock exchanged April 17, 1917, and company disincorporated. See Mont.-Idaho C. Co.

MONTANA-IDAHO COPPER CO. **IDAHO**

Address: Paulsen Bldg., Spokane, Wash. **Mine office,** Delage, Idaho.

Officers: H. F. DeBower, New York, pres.; J. L. Dirks, Spokane, v. p.; W. J. Kirby, sec.-treas.; Otis Hill, gen. mgr., and G. B. May, directors.

Inc. 1914 to take over holdings of Monitor Cons. C. M. Co. **Cap,** 6,000 shares; $100 par.

Property: 44 claims, 10 patented, ¼ to 7½ miles from Adair, on main line of C. M. & St. P. Ry. First copper location in the eastern Coeur d'Alene. A fissure vein of 10 to 30′ width, with N. E. strike and nearly vertical dip, has a paystreak carrying massive chalcopyrite ore, balance of vein carrying disseminated chalcopyrite, mainly of concentrating grade. Occasional native copper is found.

Development: in 1919 the main tunnel was 4,265′ long. At the 3,865′ point a drift driven 1,050′ on a vein, had a back of 1,300′. About $70,000 has been spent on exploration.

Equipment: hydro-electric power plant, compressor, drills, etc.

MONTE CRISTO GOLD MINES CO. **IDAHO**

Address: C. E. Eddy, Bonanza, Custer county, Idaho.

Property: a gold mine 4 miles from the Lost Packer copper mine, which was to "electrify the mining world and make a great new boom for mining in Idaho" in 1918. Examined by Paul Valtinke, who said that "the new quality of ore coming in at 150′ depth would commonly be called a telluride, but is in fact a selenide, resulting from super-heated action and

volcanic fumes, which deposited the rich gold and silver values and gave the ore a peculiar blue-greyish cast." This is extremely interesting if true.

MOUNTAIN GIRL MINING CO. **IDAHO**

Address: B. S. Rupp, sec., Salt Lake City, Utah.

Inc. Nov., 1919, in Idaho. **Cap.,** $250,000.

Property: claims in Stanley basin, Custer county. Work was started in November, and a car of rich ore loaded for the smelter.

MOYIE GOLD-COPPER M. & M. CO., LTD. **IDAHO**

Address: G. E. Crocker, Bonners Ferry, Idaho.

Inc. Sept. 11, 1911, in Idaho. **Cap.,** $1,250,000; $1 par; assessable; 750,000 issued. Annual meeting first Monday in September.

Officers: A. J. Kent. pres.; J. W. Reid, v. p.; G. E. Crocker, sec.; M. P. DeWolf, treas., with H. L. Medbury, directors.

Property: 12 unpatented claims in Moyie Yakt district, 17 miles from rail; also 5 claims in Moyie Kootenai district, 3 miles from rail, all in Boundary county.

Geology: at the first or Damon group, a gold-bearing quartz vein cuts granite and diorite, the paystreak being 6″ to 6½′ wide. The second or Queen group has a contact vein in quartzite, that carries gold, silver, lead, and copper, with a little zinc; another vein contains 3″ seams of ore assaying 50 oz. silver, 65% lead, and $2 gold per ton.

Development: at the Damon group comprises a 35′ shaft and 360′ tunnel. On the Queen group only surface prospecting has been done as yet. Properties appear to be worth development.

NATIONAL COPPER MINES CO. **IDAHO**

Office: 926 Chamber of Commerce, Portland, Oregon. Mine at Cuprum, Idaho.

Officers: Wm. Trevor, pres. and mine supt.; Dr. R. J. Marsh, v. p.; Edward H. Hayes, sec.; W. F. Coffey, treas., with Jas. Wolfs and Fred Hagstrom, and C. H. Skewes, directors.

Inc. in Oregon. **Cap.,** $3,000,000; $1 par; non-assessable.

Property: 33 claims, patented, in Cuprum Basin, Seven Devils district, Adams county, Idaho; also the Gold Barr mine and Coad placer mine, 2 patented claims, in southern Oregon. The Idaho claims are near Cuprum, a few miles from Homestead on the Northwest (Snake River) R. R.

Ore: contains gold, silver, and lead as well as 5 to 17% copper, and occurs in contact deposits.

Development: by over 3,500′ of tunnels, shafts, and open-cuts. In 1916, 300 tons of ore were mined. New orebodies were opened 1917, and shipments began, but so far as known none since. This company must not be mistaken for the National Copper Co. operating in the Coeur d'Alene.

NATIONAL MINING & DEVELOPMENT CO. **IDAHO**

Address: A. C. Gallupe, pres., Placerville, Idaho.

Inc. Sept. 23, 1911. **Cap.,** $1,000,000; $1 par; divided into 600,000 common and 400,000 preferred shares.

Property: the Mountain Chief mine at Placerville, Boise county, shows gold-silver ore in a fissure vein, 1-3′ wide. Ore averages from $20-$25 per ton. Developed by 5 tunnels.

Geology described 17th Annual Report of the Mineral Industry of Idaho, 1915.

Equipment: includes 30-ton all-sliming cyanide plant.

Producing since 1912. Property promising.

NELLIE BLOOM MINING CO. **IDAHO**

Address: M. E. Hopkins, supt., Horse Shoe Bend, Boise county, Idaho.

Property: the Nellie Bloom mine, about 2 miles from Horse Shoe Bend, shows a shoot of oxidized gold ore, 3-5′ wide, 500′ long at depth of 300′, said to carry average milling value of $10 per ton.

Equipment: includes a 10-stamp mill and electric power. Management estimated six months' supply of free milling ore blocked out at last report.

NICKEL PLATE MINING CO. **IDAHO**

Office: 616 Hutton Bldg., Spokane, Wash.

Officers: L. Oriard, pres.; J. R. Fordyce, v. p.; S. A. Wells, sec.-mgr.; Z. A. Moore, treas.; with D. Leitch and C. George, trustees.

Inc. in Washington. **Cap.,** $2,000,000; $1 par. Annual meting first Monday in June.

Property: 2 claims on Nickel Plate Mountain, between Reeder and Granite creeks in Bonner county. Country rocks include granite, syenite, and gneiss. Cut by veins reported to have shown cobalt, platinum and palladium values together with some gold and copper. About $30,000 was spent on equipment up to 1918, and about 1,000′ of work done, apparently the multiplicity of metals prevents profitable treatment of the ore.

NORTHWESTERN DEVELOPMENT CO. **IDAHO**

Address: C. Rock, supt., Salmon, Idaho.

Property: the Ranger copper mine, 12 miles E. of Salmon, in Lemhi county. The mine was worked for gold in the eighties, but the copper content prevented gold recovery, 60% being lost. About $260,000 was spent on the mine at that time. In 1917 the mine was unwatered after 33 years idleness, and new work disclosed an ore shoot 320′ long, 4′ wide, carrying values of about $40 per ton in copper and $50 to $75 per ton in gold. About 100′ out of 150′ in depth was stoped. In 1918, an 800′ tunnel was started to cut the vein at depth of 650′. Dumps said to contain 10,000 tons of $10 ore. Hydro-electric power can be developed nearby.

NORTHWESTERN MINING CO. **IDAHO**

Out of business.

OLIVIA GROUP **IDAHO**

Address: Hazlitt & Trader, owners, Dixie, Idaho county, Idaho.

Property: 11 unpatented claims, 200 acres, in Dixie mining district, shows $9.50 gold-silver ore in quartz fissure veins, averaging 2′ in width, running N. W., with dip 60° N. E. The country rock is granite and gneiss.

Development: by 150′ tunnel, and total of 250′ of workings. Another tunnel has been started at water level.

Equipment: includes a 10-ton Huntington mill. A prospect.

OROGRANDE GOLD MINING CO. **IDAHO**

Address: Judge Geo. Turner, Spokane, Wash. William Hogan, supt., and H. E. Hewitt, mill supt.

Cap., $1,500,000; $1 par; non-assessable.

Property: on the Crooked River, 64 miles S. E. of Stites, nearest rail point, Idaho county. Ore carries $2.30 to $3.60 per ton gold, and is developed by 1,000′ of tunnels and lateral workings. Mining is done by the glory-hole method.

Equipment: includes a 300-ton all-sliming cyanide mill. In Aug., 1918, trial runs showed that 1,700 tons ran $2; 2,697 tons gave a recovery of $2.03; and 2,939 tons went $1.93. By selective mining a $3 to $4 average might be secured, of which $1 would be profit.

OVERLOOK MINING & DEVELOPMENT CO. **IDAHO**

Address: Walter Upington, sec., Walla Walla, Wash.

Cap., $1,000,000; shares $1 par; non-assessable.

Property: 16 claims in Black Warrior district, Lemhi county, said to contain $10 gold ore.

Development: by 1,600′ of tunnels and over 1,500′ of other workings.

Equipment: 20 and 3-stamp mills, and complete outfit, in which some ore has been treated, though returns are unknown.

PACKER CO., THE **IDAHO**

Office: at last accounts, Mackintosh Block, Salt Lake City, Utah.

Officers: Chas. Read, pres.; E. G. Rowe, v. p., with W. A. Black, T. E. Guhin and A. L. Miller, directors. J. H. Woodmansee, sec.-treas. Registrar & Transfer Co., N. Y., registrar and transfer office.

Inc. June 12, 1917, in Maine. **Cap.,** $600,000; par $1; $500,000 issued.

Organized as holding company to take over 80% or more of Lost Packer Mining Co. stock (which see).

PARK COPPER & GOLD MINING CO., LTD. **IDAHO**

Office: 616 Cedar St., Wallace, Idaho. **Mine office:** Mullan, Shoshone county, Idaho.

Officers: O. W. Lewis, pres.-mgr.; Nellie J. Stockbridge, sec.-treas.

Cap., $150,000; shares 10c par.

Property: 7 claims, on the southern side of Stevens Peak, 5 miles from a railway. The property is said to have a fissure vein in quartzite, of about 60′ in average width, capped by a 40′ gossan of mixed hematite and siderite, carrying kidneys of high-grade copper carbonates and chalcopyrite, with occasional native copper.

Development: by two 25′ shafts, and 3 tunnels, the two upper tunnels showing ore, while No. 3, the lower tunnel, of 1,680′ length, with a back of about 1,000′, shows no ore. The mine has about one-half mile of workings.

Idle since 1917, but management expected to resume operations in 1920.

PITTSBURGH-IDAHO CO., LTD. **IDAHO**

Office: 23 Fourth Ave., Pittsburgh, Pa. **Mine office:** Gilmore, Idaho.

Officers: A. S. Ross, pres.; Irvan Neckermann and Robt. B. Little, v. p.'s; W. A. McCutcheon, sec.-treas.; with G. W. Provost, J. W. Brown, and J. S. Alexander, directors. J. E. Walker, supt.

Inc. in Idaho. **Cap.,** $1,000,000; $1 par; 813,227 issued. Bonds, $150,000, with $127,000 outstanding. Commonwealth Trust Co., Pittsburgh, registrar; company makes its own stock transfers. Annual meeting, first Monday in July. Stock listed on Salt Lake City Exchange and New York Curb.

Financial Statement years ending December 31:

Year	Revenue	Operating charges	Profit or loss	Dividends	Surplus
1917.....	$199,060	$247,208	—$48,145	$65,523	$68,738
1916.....	.....	165,468	+159,934	44,928	182,409

Dividends: total $375,000.

Property: 25 claims, 5 patented, about 500 acres, in the Texas district, near Gilmore, Lemhi county.

Geology: claims show limestone cut by fissure veins 3 to 30′ wide and traceable for 200 to 700′. Veins strike N.-S. and dip about 45°. Ores are a mixture of lead carbonates and cube galena, averaging 28% lead, 14 oz. silver and 0.05 oz. gold and 15% iron. Ore at the bottom level is still partly oxidized.

Company is also developing the Brown group on which high-grade ore has been discovered.

Development: by 18,000′ of workings including a 45° shaft to depth of 850′, and a 6,000′ transportation tunnel connecting with the 400′ level. A large flow of water on the bottom level retards work. Ore reserves are estimated at 50,000 tons. The 7th level had cut 5 orebodies by December, 1919.

Equipment: electric power is produced by a 250-h. p. Diesel engine direct connected to a 135-k. w. generator, hoist, compressor, pump, tramway, and other complete plant.

Production: 94,494 tons ore has been sent to the smelters since 1910, yielding $2,848,632. Ore mined in 1918 averaged 30% lead, 15 oz. silver, and 0.05 oz. gold.

This company has been in a transition stage, doing much development and erecting new machinery, but should soon resume dividends, especially with silver at over $1 per ounce.

PITTSBURGH LEAD MINING CO. **IDAHO**

O. B. Wallace, mgr. **Directors:** Henry L. Collins, G. B. Oberall, of Pittsburgh; W. M. Rumley and Christopher Murphy, of Chicago. Merged with California Cons. Mng. Co. and Panhandle M. & M. Co., July, 1916.

Cap., $1,000,000; shares $1 par; all issued.

Properties: are in Nine Mile creek section, or Placer Center district, Shoshone county.

The **Pittsburgh property** was formerly a shipper but idle several years, comprises a small group only. **The Consolidated** consists of the Black Cloud group, 4 patented claims, idle since 1901, but owns a mill 2 miles above Wallace, leased and operated until recently by the Marsh Co.

The Panhandle group: consists of 2 patented claims on Nine Mile Creek.

Nothing is known of operations since 1917.

POCATELLO GOLD & COPPER MINING CO. **IDAHO**

Address: Pocatello, Idaho. H. W. Lockhart, pres.

Inc. Dec. 1, 1902, in Idaho. **Cap.,** $1,000,000; shares 50c par.

Property: 7 claims, 140 acres, in the Fort Hall district, 12 miles east of Pocatello, Bannock county, shows a vein of about 3′ average width, reported to give assays of 30% copper, 13.8 oz. silver and $1 gold per ton, from bornite and chalcopyrite ore. Ore is of milling grade but contains a small streak of rich ore, from which shipments to the White Knob smelter gave returns of 17 to 30% copper and 15 to 18 oz. silver per ton.

Development: by tunnels, with about 1,000′ of workings. Presumably idle.

PONDERAY MINING & SMELTING CO. **IDAHO**

Offices: 922 Old National Bank Bldg., Spokane, Wash., and Sandpoint, Bonner county, Idaho.

Officers: Geo. S. Brooke, pres.; Leo Greenough, sec.-treas.

Cap., $500,000; $100 par; all issued.

Property: 4 patented gold-silver-lead claims near Lakeview, in Bonner county, and 4 lime-copper claims near Bayview, Kootenai county.

POPE-SHENON COPPER CO. **IDAHO**

Address: Salmon, Lemhi county, Idaho.

Officers: R. H. Winder, pres.; Thomas Austin, v. p.; C. R. Bradford, sec.-treas.; A. Boulais, supt.; R. H. Bradford, metallurgist.

Six assessments have been levied, the latest on February 21, 1919.

Property: near Salmon, developed by tunnels, the upper and lower being 900′ apart. In October, 1918, 12.86% copper ore was sent to Utah smelters, and in May, 1919, 10 to 15% ore was being extracted. In September the weekly output was 2 carloads. A leaching plant is being erected. The Bradford volatilization process is to be used also.

PRINCEMONT MINING CO. **IDAHO**

Address: Marble Creek, Idaho. J. D. Olley, supt., at Noxon, Mont.

Officers: S. B. Holbert, pres., Pittsburgh, Pa., with N. B. Trist, C. F. Briggs, W. J. Williams, A. G. Holmes, E. F. Holbert, and W. H. Batting, directors.

Inc., 1916, in Idaho. **Cap.,** $2,000,000; shares $1 par; non-assessable; 1,650,000 issued. Annual meeting second Monday in September.

Property: 43 claims, 875 acres, as follows: Copper Prince of 13 claims on C. M. & St. P. R. R., Ida., also the Idaho-Virginia group of 24 claims, near St. Joe, Ida.; and the Pilgrim group of 6 claims near Noxon, Sanders county, Mont. These properties contain copper and gold ores, others lead and silver ore, and others only copper.

The copper Prince and Idaho-Virginia properties are fully equipped; the former developed by 600′ tunnel and 125′ shaft and the latter by 162′ shaft. The Pilgrim is opened by tunnels.

RABBIT FOOT MINING CO. **IDAHO**

Address: R. E. L. Ramey, Farney, Lemhi county, Idaho.

Property: 15 quartz and 16 placer claims near Farney, gold-silver ore being opened by 2,000′ of tunnels. A 10-stamp mill and cyanide plant has been operated.

RAMSHORN MINING & SMELTING CO. **IDAHO**

Address: Salisbury Bros., Felt Bldg., Salt Lake City, Utah.

Property: at Bay Horse, Custer county, Idaho. Was reported by State Inspector of Mines in 1912, to the best developed deposit of silicious silver ore in Idaho.

Geology: claims show well-defined fissure veins in black altered slate of igneous material. Vein worked varies from a few inches to several feet in width and carries quartz and spathic iron, with oreshoots containing streaks and spots of tetrahedrite carrying high value in copper and silver.

Development: by tunnels, said to block out over 20,000 tons of high-grade silver ore.

Equipment: hydro-electric plant, motor-trucks, and tramway; a mill is to be erected.

Production: several carloads of ore were sent to a Utah smelter during 1918, and regular shipments were being made in 1919.

RANKIN CREEK PLACER MINES CO. **IDAHO**

Address: A. S. Thatcher, pres., 1455 Michigan Ave., Salt Lake City, Utah. T. B. Meldrum, sec.-treas.

Inc. 1917, in Utah. **Cap.,** $25,000; shares 25c par; 60,000 in treasury.

Property: 80 acres in Yankee Fork district, Custer county, reported to carry free gold. About 1,000′ of placer ground previously worked averaged $3 per cu. yd. There is an old mill on the ground. Active development was to start in 1917, but details were lacking.

RED BIRD MINING & SMELTING CO. **IDAHO**

Property acquired by Clayton Mining & Smelting Co., which see.

RED HORSE MINING CO., LTD. **IDAHO**

Address: Harrison, Kootenai county, Idaho.

Officers: M. W. Frost, pres.; E. R. Goodwin, v. p.; M. A. Kigar, sec.-treas.; with D. R. Frost, Otto Borchardt, S. Jones, R. A. Jones, John Demay, and Charles Custer, directors.

Inc. 1904, in Idaho. **Cap.,** $1,500,000; $1 par; assessable; 1,000,000 issued.

Property: 16 claims, 320 acres, 5 miles N. E. of Springston, Idaho. A quartz vein in granite carries ore with gold, silver and copper values.

Development: by 1,700′ of workings. During 1918, $2,000 was received from assessments and expended in development work. There have been no shipments, and there is no equipment.

RED LEDGE COPPER MINE **IDAHO**

Address: care R N. Bell, State Mine Inspector, Boise, Idaho. Minnesota people are said to own the mine.

Property: copper, gold and silver claims, 10 miles north of Landore, Adams county, in Deep Creek canyon, and 17 miles from Homestead, Oregon, nearest rail: described in Vol. XII.

RIVERSIDE MINING CO. **IDAHO**

Address. T. R. Mason, pres., Kellogg, Idaho. Owned in Kellogg and Spokane.

Cap., $1,000,000; shares $1 par; assessable.

Property: 5 claims in National Forest Reserve, at headwaters of the North Fork of Coeur d'Alene river, Kootenai county, shows a 7′ vein with 18″ of high-grade silver-lead ore.

Development: 460′ crosscut tunnel reaching depth of 100′.

Equipment: steam power, compressor, hoist, etc.

No recent returns.

SEVEN DEVILS COPPER CO. **IDAHO**

Office: 217 Linden Ave., Ithaca, N. Y. **Mine office:** Landore, Adams county, Idaho.

Officers: Wm. K. MacNamara, pres.; Chas. F. Riddle, v. p.; Chas H. McColloch, sec.; Fred D. Smith, treas. and gen. mgr.; with Chas. Marvin, directors; Geo. A. Jones, supt.

Inc. March 31, 1908, in Arizona. **Cap.,** $2,000,000; $1 par; issued $1,558,993.

Bonds: $250,000 authorized at 6%. Annual meeting, second Tuesday in March.

Property: 15 claims, partly patented, 134 acres, including the Arkansaw, Margaret mines, and bond and lease on the Decorah mine, 16 miles from rail. Lands show contact deposits, between diorite and limestone, having a strike of N. 75° W., and said to be 15 to 50′ in width. These deposits carry oxidized ores, succeeded at a little depth, by sulphides, the chalcopyrite and bornite ores said to average 5% copper, 2 oz. silver and $1 gold per ton.

Development: exclusively by tunnels, there being drift tunnels of 900′ and 150′, and a 483′ crosscut tunnel, with 2,800′ of workings, estimated by the management to show 182,700 tons of ore blocked out for stoping. The Arkansaw mine has produced a little high-grade ore in the past.

Equipment: includes a 125 h. p. electric plant, taking power from the Oxbow station of the Oregon-Idaho Power Co., and there is a sawmill near the mine.

Production: to 1916, 555 tons ore said to have averaged 11.2% copper.

Inability to pay off $20,000 debentures caused closing down of mine and suspension of all operations except leasing, in 1915. Company's Arkansaw mine has since been taken over by the Arkansaw Leasing Corporation. The Seven Devils company is alive legally, being held to take over the various interests when the results of development are completed, giving a better basis for distribution of interests in the corporation.

SILVER CITY MINING CO. **IDAHO**

Address: Silver City, Owyhee county, Idaho.

Property: near Silver City, adjoins the Trade Dollar Consolidated on the east and has a system of parallel fissures containing gold-silver ores. In 1914 the company remodeled the old Blaine mill, purchased from the Trade Dollar Consolidated, located in Long Gulch, ½ mile S. E. of Silver City. Mill has 10 stamps, classifiers, concentration tables, and a 25-ton cyanide plant. Presumably idle.

SILVER LEAF MINING CO. **IDAHO**

Address: J. B. Sullivan, Lakeview, Bonner county, Idaho.

Property: silver-lead prospect near Lakeview, which in 1918 was opened by tunnels, with some ore ready for shipment. The upper level showed 20″ of $125 silver ore, alongside 36″ of $35 lead carbonate ore.

SILVER MOUNTAIN MINING CO. **IDAHO**

Office: 950 Pine St., Potlatch, Idaho. W. E. Horstkotte, sec.

SILVER TIP MINING CO. **IDAHO**

Merged with International Mining & Metals Co., which see.

SINKER TUNNEL MINING CO. **IDAHO**

Address: W. G. Adams, sec., Nampa, Idaho.

Property: the War Eagle group of gold claims in Silver City district, Owyhee county. Idle since 1878, but re-opened in 1916, since when the 6,400′ tunnel has been extended 310′, cutting a rich free gold vein, said to be 9′ wide, including a "granite horse."

SMOKY BULLION GROUP **IDAHO**

Address: E. A. Worswick, Soldier, Camas county, Idaho.

Property: 3 claims, patented, 57 acres, on headwaters of Smoky river near Hailey, Blaine county, contains a big deposit of low-grade concentrating ore opened for 4,200′ on a contact zone between granite and limestone.

Reported to show a shoot of silver-lead ore, with considerable zinc and some iron pyrite. A lower tunnel was driven under the main shoot, which proved to be almost barren. Whether the orebody was faulted or tapered out at comparatively shallow depth is not known. The latter is possible because it has proven to be the case with many Wood River veins.

Development: amounts to 2,000′, mostly by tunnels, one 600′ long, with 375′ back. Property examined by Prof. Knutson and by J. M. Wilfley.

Property has milling plant erected by an Eastern syndicate, which spent

$100,000 on the property and allowed it to be sold for taxes. Regarded as a promising prospect, but practically idle for 15 years up to 1920.

SOUTHERN IDAHO DEVELOPMENT CO. **IDAHO**

D. J. Mahoney, supt., Pocatello, Idaho. U. B. Sollie and Dr. J. C. Arnout, directors.

Property: group near Pocatello, showing a vein of copper ore, from which a carload shipped, 1916, returned 17.7% copper and 4 oz. silver per ton.

Letters returned in June, 1919; company probably defunct.

SOUTH FORK MINING & MILLING CO. **IDAHO**

Office: 401 Chamber of Commerce Bldg., Spokane, Wash.

Officers: W. H. Stowell, pres.-mgr.; H. C. Kreyssler, v. p.; J. W. Higgins, sec.-treas.; with W. D. Scott, directors.

Inc. April 15, 1914, in Washington. **Cap.,** $1,500,000; $1 par; assessable to 5 cents (1 cent a year); 945,946 issued.

Property: 12 claims, 220 acres, in Ten-Mile and Elk City district, Idaho county. Deposit is a quartz vein in granite, carrying $10 gold per ton. Shoots are 430′ long; $8 is recovered by amalgamation and $4 in sulphides.

Development: by 4 tunnels totaling 3,000′, reaching depth of 400′. Workings amount to 4,000′.

Equipment: water and steam power, and 5-stamps with concentrator. Concentrates assay $150 per ton. A new mill and water power are planned.

Production: totals about $200,000.

STECKNER GOLD MINING CO. **IDAHO**

Address: care D. B. Cornell, sec.-treas., Great Barrington, Mass. Henry Tator, pres.; F. H. Cornell, v. p.

Inc. Feb. 17, 1914, in Arizona. **Cap.,** $2,000,000.

Property: the Gold Dollar group, 10 lode and 5 placer claims, near Orogrande, Idaho county, shows fissure veins in granite. The veins are 2 to 4′ thick and carry gold ore, shown by systematic sampling to carry $3 to $13 per ton.

Development: by 3,000′ of work, all tunnels, 1,000′ depth.

No recent information.

SUNSET MINING CO. **IDAHO**

Address: W. F. Van Wagenen, gen. mgr., Leadore, Idaho. E. D. Cox, mine supt.; G. A. Snow, mill supt.; G. W. Wood, mine eng.

Office: S. D. Huffaker, sec., Room 312, Utah Savings & Trust Bldg., Salt Lake City, Utah. Company is controlled by Utah capital.

Property: is 20 miles north of Gilmore, in Lemhi county. Examined by S. M. Soupcuff of Salt Lake City.

Geology: the ore occurs in a contact deposit between blue Carboniferous limestone and an underlying sheet of white silicious quartz-prophyry. The best ore is found under a red fault gouge, which overlies the ore-bearing brecciated limestones and separates them from a capping of Tertiary lake bed gravels that constitute the hanging wall. Deposit has a flat dip. Ore in upper levels consists of grey lead carbonate, but the orebody in the lower tunnel consists of fine-grained steel galena scattered through brecciated limestone, with occasional segregations of clean shipping ore. On the 500′ level the orebody is 10′ to 20′ thick, and 200′ long, all of it of milling grade.

Development: by tunnels and extensive lateral workings, opening a considerable tonnage of ore.

Equipment: includes a new 60-ton concentrating plant, to be enlarged in 1919.

Production: in 1918 irregular shipments of 11% lead and 7-oz. silver ore were made to Utah smelters, while in July, 1919, the mill was producing 7 carloads (300 tons) of concentrate per month.

TRI-METALLIC MINING CO., LTD. **IDAHO**

Address: Pardee, Idaho county, Idaho.

Officers: H. F. Bethmann, pres.; A. C. Jack, v. p.; F. M. Bethmann,

sec.; E. F. Bethmann, treas.; William Jack, mgr.; Miles Johnson, cons attorney.

Inc. in Idaho. **Cap.**, $250,000; $1 par

Property: 7 claims and a millsite, all patented, ½ mile N. W. of Pardee, in the Lolo mining district, near the N. P. R. R. Claims show a quartz vein in granite, the ore carrying copper carbonates and sulphides. Examined by Samuel Aughey.

Development: by 700′ of shafts and tunnels. A 2-drill compressor is available. No recent progress has been reported.

TUNGSTEN HILL MINING CO. **IDAHO**

Address: C. D. Muxen, sec., Spokane, Wash.

Cap., $50,000; shares 5c par; assessable.

Property: 7 claims in the Moyie-Yahkt district, Boundary county. Ore carries scheelite, gold, silver, and lead.

Equipment: includes gas engine and compressor; a concentrating plant was planned at last accounts.

UNA MINING CO. **IDAHO**

Address: Ralston McCraig, sec., Spokane, Wash.

Inc. 1914. **Cap.**, $1,250,000; shares $1 par; 650,000 issued; assessable.

Property: 3 claims, 4 miles west of Orogrande, shows a vein 10′ wide, carrying pay streaks of a few inches to 5′ thick. In the 40′ shaft the ore is said to average $7 per ton in gold with some silver.

Development: by 1,100′ tunnel which cut the vein, Sept., 1919.

UNITED LEAD CO. **IDAHO**

Name changed to Silverado Mining Co., which see.

UNITED METALS & POWER CORPORATION **IDAHO**

Address: Arrott Bldg., Pittsburgh, Pa.

Inc. April, 1918, in Delaware. **Cap.**, $5,000,000; $5 par; 67,037 issued.

Officers: Walter Gray, pres.; W. P. Fowler, v. p.; A. L. Schweibinz, sec.; C. C. Wesley, treas.; with M. E. Frazee, and A. S. Moore, directors.

Property: 14 claims, 289 acres, in Sea Foam district, Custer county. Nearest rail is at Ketchum, 105 miles distant. Company is said to have re-built 22 miles of old road, constructed 3 miles of new road and 9 bridges. The State is expending $50,000 on a road from Galena Summit, which is between the mine and the shipping point. Four veins cross the property, the Montana being the principal one. Ore carries silver, lead, and gold. Ore beng mined, sorted, and shipped averages $75 per ton.

Development: by a number of short tunnels.

Equipment: water-power, compressor, drills, 10 Holt tractors and trailers to be ready by May, 1920; employs 25 men.

UNITED MINES CO. **IDAHO**

Office: 501 C. of C. Bldg., Spokane, Wash. **Mine office:** J. L. Magney, Fairfield, Idaho.

Officers: T. S. Griffith, pres.; E. J. Peterson, v. p.; L. J. Raef, sec.; Chas. Uhden, treas., with V. A. Johnson, E. A. Worswick, Jack Wallace, and J. C. Lawrence, directors.

Inc. May 17, 1916, in Washington. **Cap.**, $250,000; 25c par; 659,670 issued.

Property: 13 claims, 10 miles N. E. of Fairfield, Blaine county, said to show a fissure vein in granite, dipping 45° with N.-S. course. Shoots are 3 to 7′ wide, 260′ long and 150′ deep. Ore is mostly sulphide, carrying pyrite, galena and chalcopyrite. Value in gold, silver, and copper is $20 per ton.

Development: by 511′ tunnel, opening to 157′ depth with total of 1,800′ of workings. Ore reserves estimated at 30,000 tons, 13,000 tons blocked out.

Equipment: 10-stamp mill, 2 concentrators, flotation plant, assay office, sawmill, etc. No details available regarding production.

UNITY GOLD MINES CO. IDAHO

Offices: Warren, Idaho county, Idaho, and 120 Broadway, New York.

Officers: James H. Hawley, pres.; Lorren M. Hart, v. p.; George C. Luebbers, treas.; Eduard C. Christensen, sec.; Jay A. Czizek, managing director, also directors.

Inc. April, 1916, in Delaware. **Cap.,** $2,500,000; $5 par; 350,000 outstanding. Listed on New York Curb. Security Transfer & Registrar Co., New York, transfer agt. and registrar. Company has no debts, and has funds to bring property to production stage.

Property: 200 acres, patented, including the Little Giant and Charity mines, and 2 tunnel sides, each 3,000′ long and 1,500′ wide, crossing vein system at right angles; all at town of Warren, Idaho, 40 miles from Lakeport on O. S. L. Ry.

Geology: the prevailing rock is granite, cut by typical quartz veins, and traversed by later dikes of porphyry. Veins are step faulted by these dikes and by fault fissures. Veins carry shoots of free milling quartz; that of old workings of Little Giant mine being 800′ long, 3′ thick, and averaging $85 per ton for 5,500 tons milled. The ore shoot of Old Charity mine workings is 1,000′ long, and averaged $30 per ton. These shoots are faulted and were lost in old mine workings, but the deep crosscut drainage tunnel proves the shoot to persist in size and value down to that level 450′ below old stopes. One vein cut in the tunnel carries high-grade tungsten ore.

Development: a 2,750′ new drainage and transportation tunnel of 8′x8′ cross section has been driven beneath the old mine workings at a depth of 300′ to 800′ below the vein outcrop. This has opened up five veins each with stoping back of 300 to 500 ft. and crosscuts, raises and drifts expose the veins, and open up stoping ores. This tunnel will be extended 2,500′ farther to crosscut five other known production veins.

Production: in former years said to total $1,200,000 from 150′ backs stoped in the two mines; including 5,500 tons of $85 ore mined and milled from Little Giant workings.

A scheelite vein was cut at 1,850′ in main tunnel at a depth of 450′. A drift on it for 120′ shows vein to be 3′ wide. Ore was stripped for 40′. Product tested by Ledoux & Co., New York, shows 60% concentrate from crude ore. Analysis showed 75.8% tungstic acid; phosphorus, 0.005%; arsenic, 0.18%; copper, 0.05%. Recovery was 94.7%.

Equipment: hydro-electric power developed from water carried in ditch 4½ miles, gives 238′ head for driving compressors, stamp-mills, and tramming ore and waste through tunnel.

Gold ores are free milling, and first mill unit was erected at mouth of tunnel. It includes Blake and gyratory crushers with capacity of 500 tons; 10 stamps, 2 tables, capacity 50 tons in 24 hours. A second unit is to be erected at the Charity mine workings.

UTAH BELLEVUE MINES CO. IDAHO

Address: Joe Saxman, pres., Bellevue, Idaho.

Cap., 500,000 shares; in treasury, 165,000. No bonded indebtedness.

Property: 3 claims in Wood River district, Blaine county, said to show silver, lead, zinc ore. Reported developing and shipping. Two feet of high-grade ore was opened late in 1919.

VIRGINIA CONSOLIDATED GOLD MINING CO. IDAHO

Property being operated by Mines Developing & Leasing Co., which see.

WAVA MINING & MILLING CO. IDAHO

Address: J. D. Hedrick, Hailey, Idaho.

Inc. Sept., 1919, in Idaho. **Cap.,** $50,000; in 35,000 common and 15,000 preferred shares of $1 par.

Officers: C. E. Gordon, pres.; Jack Edwards, v. p.; J. D. Hedrick, sec.; C. S. Shepherd, treas.

No information is given out as to property or operations.

WEILER MINE **IDAHO**

Address: H. W. Weiler, Mackay, Idaho.

Property: 6 claims in Antelope district, Butte county, Idaho. Ore occurs in fissure and contact veins in porphyry and limestone, the veins varying up to 4′ wide. Ore reported to assay 20% lead, 25 oz. silver, and up to $1 gold per ton.

Development: 200′ shaft and 5,000′ workings. Reserves are estimated at 2,500 tons.

Equipment: 6-h. p. gasoline hoist.

WEIMER COPPER CO. **IDAHO**

Address: Dubois, Fremont county, Idaho.

Property: 18 claims, 360 acres, on Birch Creek, in Skull canyon district, shows a crushed zone 100 to 200′ thick between quartzite and limestone, which carries high-grade ore in pockets and in cross fissures, of 3″ to 2′ width, running at right angles to the main contact deposit.

Development: by an open-cut and 2 tunnels of 300′ each. Idle for several years. Said to be controlled by Jesse Knight interests.

WEST COAST MINES CO. **IDAHO**

Address: H. J. Hibschman, Spokane, Wash.

Cap., $500,000; shares $1 par; non-assessable.

Property: 13 claims, the Pearl mine near Boise, Ada county, showing a vein of gold-silver ore, developed by 200′ shaft and several hundred feet of lateral workings. Idle since 1917 for want of capital.

WILBERT MINING CO., LTD. **IDAHO**

Office: 222 Kearns Bldg., Salt Lake City, Utah.

Officers: A. S. Ross, pres. and gen. mgr.; J. A. Foley, sec.-treas.; D. J. Lennion, supt.

Inc. 1907, in Utah. **Cap.,** $1,000,000; shares $1 par; assessable; increased to $2,000,000 in February, 1918. Annual meeting in May. Stock transferred at company's office. Listed on Salt Lake Stock Exchange and New York Curb. U. S. Corporation Co., New York, transfer office. Assessment No. 5 of 1 cent per share was levied June, 1919.

Dividends: $10,000, Nov. 15, 1915; $40,000 in 1916; and $40,000 in 1917, and $30,000 in 1918.

Financial Statement, years ending May 1:

Year	Revenue	Expenses	Dividends	Cash Balance
1918.....	$165,961	$135,961	$30,000	$925
1917.....	181,389	128,475	40,000	12,914
1916.....	.....	.....	40,000	42,467

Property: 16 patented claims, plus those of the Wilbert Annex, in the Dome mining district, 40 miles from Arco, Butte county.

Geology: the claims show Cambrian quartzite cut by a fissure vein that contains lead and silver ore, mostly of concentrating grade. The top of the vein has been folded into a nearly horizontal bed, worked by quarrying. The main ore-shoot has been followed to a depth of 800′ and is stoped out from No. 5 level to the surface.

Development: by 800′ incline shaft and extensive lateral workings. Recent work has been concentrated on the 500′ level.

Equipment: most of the surface plant, including a 100-ton mill, was burned in August, 1918. It will probably be rebuilt.

Production: for year ending May 1, 1916, was 15,204 tons crude ore, assaying 25% lead and 3.86 oz. silver, which yielded by sorting and concentration, 5,787 tons, assaying 52% lead and 8 oz. silver. Costs were $3.56 per ton.

In 1916-'17, the mill treated 6,981 tons of 18.7% lead and 4.9 oz. silver ore, yielding 1,758 tons of concentrate, assaying 54.2% lead and 15.3 oz. silver. Extraction was 72.9% and 78.6%, respectively. Milling costs were $1.89 per ton.

WILBERT ANNEX MINING CO. **IDAHO**

Bought out, 1919, by Wilbert Mining Co., which see.

WISE BOY GROUP **IDAHO**

Address: E. W. Oliver, Grangeville, Idaho.

Property: 5 claims, 3 patented, in northern part of Buffalo Hump district, Idaho county, 50 miles by road from Grangeville. Surface exposures are said to be promising.

Development: a 500′ crosscut tunnel and a 200′ shaft. A drift on the vein for 700′ north and 200′ south from bottom of shaft exposes an average thickness of 7′ of ore estimated to run $20 gold per ton. Owing to litigation, mine was closed for 15 years, so that timbering, 10-stamp mill, boiler, engine building, etc., require considerable overhauling. Dumps are said to contain $25,000 of free-milling ore.

YELLOW JACKET GOLD MINING CO. **IDAHO**

Reorganized, 1914, as Mandarin Mines Corp., q. v.

YELLOW PINE QUICKSILVER MINING CO. **IDAHO**

Office: 822 Main St., Boise, Idaho.

Officers: J. E. Fox, pres.; J. A. Marks, v. p.; G. G. Adams, sec.; Wm. McIntyre, treas., with O. R. Call, directors.

Inc. May 24, 1918, in Idaho. **Cap.,** $1,000,000; $1 par; assessable. Annual meeting, May 24.

Property: 4 claims being patented in Yellow Pine district of Valley county. Examined by W. H. Hill. Surface indications are very promising, as shown in a description of the region in the annual report of the Idaho State Inspector, for 1918. The deposit is in quartzite and limestone, and carries from 2 to 10% mercury.

Development: by 100′ tunnel, to be extended 300′. About $8,000 was spent during 1918. A 25 or 50-ton furnace was contemplated in 1919. An adjoining mine produced 2,175 lb. (70 flasks) of quicksilver in 1918, using small retorts.

COEUR D'ALENE REGION

Embraces region along the Coeur d'Alene river for 10 miles west of the Montana line, including Mullan, Burke, Wallace, Pine Creek, Murray, and various other so-called mining districts.

ADVANCE MINING CO. **IDAHO**

Office: 824 Vine St., Missoula, Mont. **Mine office:** Mullan, Shoshone county, Idaho.

Officers: Herbert Crego, pres.; F. D. Fox, v. p.; Henry Hubert, sec.-treas.; preceding officers, and F. H. Murphy, directors; Joe Peila, mgr.

Inc. 1903. **Cap.,** $1,000,000; shares $1 par; assessable. Last assessment, 5 mills per share, levied May 8, 1916.

Property: 5 unpatented claims, 4 miles from Mullan, on Snowstorm hill, lying between the Snowstorm on the east and the Butte & Coeur d'Alene on the west, and 107 acres of timber land.

Development: by 1,550′ tunnel with 2 crosscuts showing streaks of chalcopyrite ore. No recent information.

AETNA M. & M. CO. **IDAHO**

Address: Wallace, Idaho.

Officers: Jas. Murphy, pres.; O. W. Lewis, sec.-treas., with Dr. C. S. Stone, Dr. F. Leo Quigley and C. W. Gilstrap, directors.

Cap., $150,000; shares 10c par; assessable.

Property: 4 claims, unpatented, 1 mile S. E. of Burke, Shoshone county, developed by 300′ tunnel. Idle since 1915.

AJAX MINING CO. **IDAHO**

Office: Burke, Idaho.

Officers: F. E. Starkey, pres.; H. W. Woodward, v. p.; J. A. Havighorst, sec.-treas., with F. Moriarity, G. E. Sprague, Gus Benson, and Alva C. Bixby (mgr.), directors.

Cap., $1,600,000; $1 par; all issued; assessable; 8 assessments of 5 mills each called to August 1, 1917. Annual meeting, first Tuesday after first Monday in September.

Property: 13 patented claims, 184 acres in Gorge gulch, near Burke, Coeur d'Alene district, adjoining the Hercules on the E., and said to carry the extension of the Hercules vein system for 1¼ miles in length.

Ore contains silver and lead values.

Development: by several tunnels. No. 2 is tunnel over 3,000′ in length, cutting the shoot opened in upper workings and exposing 1 to 8′ of milling ore, with a 400′ drift on a 6 to 8″ high grade streak. A 250′ shaft was sunk near the point where the vein was reached by the tunnel 650′ from the Hercules boundary. Shaft fully equipped with air-hoist, compressor, and electric motors. A large outcrop at east end of property was opened by 1,000′ of work in 2 tunnels, and arrangements made to use the 3,500′ Oom Paul Cons. Mining Co.'s tunnel, to explore Ajax ground. Early in 1918 the heading was 7,000′ in and a 2′ vein was cut at a vertical depth of 1,200′. Owing to high mining costs, mine was closed down during much of 1918, but was worked again in 1919.

Extensive development of promising ground has not yet discovered commercial orebodies.

ALAMEDA MINING CO. **IDAHO**

Address: Wallace, Idaho.

Officers: F. J. Finucane, pres., 323 8th St., Spokane, Wash.; Frederick Burbridge, v. p.; Chas. McKinnis, mgr.; J. A. Wayne, sec.-treas.; above, with Chas. Hussey, directors. R. R. Catching, supt.

Originally inc. 1900 as the Alameda M. & M. Co., Ltd. Reorganized 1910 as Alameda Mng. Co. **Cap.,** $1,500 000; $1 par; assessable; 14 assessments levied since 1900. Control of 800,000 shares purchased April, 1916, at 15c a share, by syndicate consisting of above named officers. Stock listed on Spokane and Butte Exchanges.

Property: 6 claims adjoining Success mine on the E., in Nine-mile section, Coeur d'Alene district, Shoshone county. Little work has been done on the property during the 5 years up to 1918, owing to litigation with the Success company. Operations of the latter company having shown that orebodies opened on the 400, 450, and 700′ levels of the Success mine extend into Alameda ground. The faces on the 400′ and 450′ levels are said to average 31.7 oz. silver per ton, 31.5% lead, 21.1% zinc; and on the 700′ level, 7.5% lead, 7 oz. silver, and 25.7% zinc.

The first suit was won by the Alameda Co., which was awarded $56,070 damages. The Success Co. won on appeal, the court permitting company to follow the granite vein downward between vertical planes along the end-lines of the Granite claim beneath surface of the Cardiff, or any other claims under which this vein extended within the vertical lines named. The Alameda Co. appealed the case, but lost.

Development: by several tunnels, one being 2,500′ long. Some lead-zinc ore was found, on same level as the Success main tunnel, 500′ below the upper workings on this ore-shoot.

ALBANY LEAD MINING CO. **IDAHO**

Address: Wallace, Idaho.

Officers: John Dunphy, pres.; C. W. Betts, sec.

Property: 11 unpatented claims S. E. of Burke, Coeur d'Alene region. No recent information.

ALCIDES MINING CO. **IDAHO**

Office: Hyde Bldg., Spokane, Wash.

Officers: Grant Miles, pres.; Ed. Ehrenberg, v. p. and mgr.; M. W. Neary, sec.; Oscar Cain, treas., with Fred Russell, directors.

Cap., $1,000,000; $1 par. Operating expenses in 1917 were $25,000.

Property: the Mark Cooney group, 100 acres, near Burke, Coeur d'Alene region.

Development: carried on through the 3,000′ tunnel of Gertie Mining Co. Ore carries lead and silver. Mine was closed down February, 1918. No recent news.

ALHAMBRA MINING CO., LTD. **IDAHO**

Address: W. A. Corey, sec., Spokane, Wash.

Cap., $1,000,000; $1 par; assessable.

Property: 22 patented claims, in Yreka district, Coeur d'Alene, said to show silver-lead ores.

Equipment: included compressor and 50-ton flotation plant erected late in 1917; financed by men identified with the Bunker Hill & Sullivan property.

A report in December, 1919, showed that total receipts had been $168,326, of which $165,000 was from assessments. Expenses were $146,096 for development and $16,055 for general charges.

ALICE MINING CO. **IDAHO**

Address: Wallace, Shoshone county, Idaho.

Officers: Walter Mackay, pres.; J. H. Foss, v. p.; J. F. McCarthy, sec.-treas.-mgr., with C. E. Bender and G. W. Ruggles, directors.

Cap., $1,000,000; $1 par; assessable.

Property: 23 patented claims, known as the Alice mine, situated between Wallace and Mullan.

Development: by 685′ shaft and 9,570′ of workings, from which 3,420 tons of silver-lead ore were shipped.

Equipment: includes a compressor and 125-ton concentrator. Electric power is used. Idle in 1919.

ALMA RAY MINING CO. **IDAHO**

Address: Kellogg, Idaho.

Officers: W. W. Papesh, pres.; Peter Engle, v. p.; C. Weigand, sec.-treas., with R. A. Brockman and C. B. Forbes, directors.

Cap., $375,000; shares 25c par; assessable.

Property: 14 claims near Kellogg, between the Lombardy and Teddy groups.

Development: by several tunnels, in one of which copper-silver ore was cut. No recent returns.

AMARGO MINING CO. **IDAHO**

Address: C. A. Maynard or John Sherrard, Mullan, Idaho.

Property: 6 unpatented claims at head of south fork of Coeur d'Alene river. A short tunnel has opened silver ore.

AMAZON-DIXIE MINING CO. **IDAHO**

Office: Wallace, Idaho. **Mine office:** Sildix (not a P. O.), Mont.

Officers: Wesley Everett, pres.-mgr.; A. W. Ellenberger, v. p.; Herman J. Rossi, sec.-treas.; W. W. Woods, and Hugh Toole, directors; F. W. Calloway, engr.

Inc. 1909, in Montana. **Cap.**, $750,000; shares 50c par; assessable; 1,228,000 outstanding. An assessment of 2c was payable on May 30, 1919, and another of 3 mills on December 12.

A trial balance of April 29, 1919, showed that $228,187 had been spent, including $140,183 for development, and over $41,000 for equipment. This money was received from sales of shares and assessments.

Property: 8 claims and 4 millsites, 64 acres, well timbered, at Sildix, Mont., near Lookout, just across the Montana line, adjoining the Leslie Copper Mining Co. Property shows a fissure vein in quartzite exposed by surface trenching for 2,000′, carrying galena, chalcopyrite and lead carbonates, associated with pyrite, with values mainly in galena.

Development: by 2 tunnels, 9,550′ long, the lower or main working tunnel with mouth near the Northern Pacific Railway, to be extended 1,000′. Tunnels are connected by a 400′ raise. In April, 1919, a double compartment shaft was 1,100′ deep, with a station, skip-pockets and levels at that depth. Crosscuts to north and south opened two veins, the southern one showing a body of gold-silver-lead-copper concentrating ore along a 60′ drift. This shaft is to be sunk 500′ deeper.

Equipment: includes a water-power plant developing 110 h. p., a 10-drill compressor, 8x10″ hoist, pumps, 20,000′ sawmill. (150,000′ of sawn lumber on hand). Machine-shop, smithy, carpenter shop, and other necessary mine buildings. Property is served by the Northern Pacific Railway, 160′ from the mine. Electric power to be put in. Reported September, 1919, that A. W. Ellenberger

and others of Cleveland, Ohio, had agreed to provide $150,000 for installation of electric power, and sinking shaft 500′ deeper and for development at that depth.

AMAZON-MANHATTAN MINE **IDAHO**

Address: Eugene R. Day, Burke, Idaho.

Property: 6 claims N. W. of Consolidated Interstate-Callahan, Beaver Creek district, Coeur d'Alene region. Its history, which is one of continuous litigation over ownership, dates from 1912. The former owners eventually gave an option to purchase for $160,000, to J. H. Wourms of Wallace, who conveyed property to Con. Interstate-Callahan. Patrick Burke of Wallace, who had been given an option in 1912 and failed to make his first payment of $16,000, refused to deliver the property, whereupon the District Court ordered vacation of the premises. An appeal to Supreme Court sent the case back to the lower court, it being alleged that Wourms had represented both Burke and the Cons. Interstate. This contention was upheld, and eventually Cons. Interstate-Callahan was ordered to restore the Amazon-Manhattan to Burke, upon return to that company of $159,825, the full amount paid for it. This was, it is said, supplied by Eugene R. Day and the others, now in control.

Development: in the report for 1917, Cons. Interstate-Callahan stated that it had expended considerable money in exploration. When purchased, it was considered a good prospect, but little ore was found, and none was shipped.

Development is by tunnels. The lowest, or No. 3, 2,000′ long, attaining a depth of 900′. It is now stated that reserves are worth $2,000,000. Early in 1918, a ½-mile tramway was constructed to the Ray-Jefferson company's 400-ton mill, from which 60 carloads of concentrates from Amazon-Manhattan ore were shipped in 1918.

AMBERGRIS MINES CO. **IDAHO**

Address: Wallace, Idaho.

Officers: Eugene R. Day, pres.; Harry L. Day, v. p.; W. B. Heitfelt, sec., with August Paulsen, W. Clayton Miller and Al. Page, directors.

Inc. June, 1916, in Idaho. **Cap.,** $1,000,000; $1 par; assessable; last assessment, 2c per share, called August, 1917. Company is a reorganization of the Ambergris Mining Co., organized under laws of Washington with $3,000,000 capitalization. Stock was exchangeable at the rate of 3 shares of old for 1 share in the new company. Controlled by the Day family.

Property: 3 claims, patented, adjoining the Hercules at Burke, Coeur d'Alene region, developed by 200′ shaft, said to show 2-3′ of silver-lead ore. As a result of former litigation, company has the right to use the Hercules tunnels and the aerial tram for shipments to rail. Developing through the No. 4 Hercules tunnel to cut the Ambergris vein. In May, 1918, and again in March, 1919, it was reported that ore was being opened up, but company is not yet a big producer.

AMERICAN COMMANDER M. & M. CO., LTD. **IDAHO**

Address: Mullan, Shoshone county, Idaho.

Officers: D. F. Clark, pres.; J. H. Burns, sec.-treas.

Cap., $1,500,000; $1 par; assessable; 2 assessments of 3 mills per share levied, 1918.

Property: 2 patented claims, 32½ acres, situated 3,000′ north of Mullan, Idaho, and between the Gold Hunter mine and the Federal M. & S. Co's. Morning mine. Considered well located for exploration through adjoining properties.

Development: by open-cuts, shafts, and tunnels. Surface cuts expose lead-silver bearing ore.

Mine is in exploration stage.

AMY-MATCHLESS M. & M. CO. **IDAHO**

Reorganized in September, 1919, as Amy Mining & Development Co., which see.

AMY MINING & DEVELOPMENT CO. **IDAHO**

A reorganization of the Amy-Matchless M. & M. Co.

Address: James A. Wayne, Wallace, Idaho, and Mankato, Minn.

Officers: W. A. Beach, pres.; Geo. Wideman, v. p.; E. L. Hawes, sec.; T. C. Nichelson, treas, all of Mankato, Minn.

Inc. September, 1919, in Idaho. **Cap.**, $1,500,000; $1 par; assessable.

Property: 19 claims on Pine creek, 3 miles from rail, developed by 4,000′ tunnel and 200′ shaft, showing lead-zinc ore.

The reorganization ended dissension of old company and provided money for a resumption of work.

ANCHOR MINING CO. **IDAHO**

Address: Evan Evans, pres., Burke, Idaho.

Cap., $1,500,000; $1 par.

Property: lead-silver bearing claims near Murray, Lalande district, Coeur d'Alene. Developed by tunnels. An ore-shoot 200′ long was opened early in 1919.

ANTIMONY-SILVER MINING CO. **IDAHO**

Address: Wallace, Idaho. H. J. Rossi, Theo. Brown and John Finnel, directors.

Inc. April, 1915. **Cap.**, $100,000; shares 10c par.

Property: on Pine creek, said to show silver-antimony ore in a vein 10 to 36″ wide, exposed by tunnels and a shallow shaft.

No recent information.

ARCTIC MINING & MILLING CO., LTD **IDAHO**

Address: W. H. Keating, treas., Wallace, Idaho.

Cap., $1,500,000; $1 par; assessable.

Property: 5 claims on Placer creek, 6 miles S. of Wallace. Tunnels have opened lead-silver ore.

ARGENTA MINING CO., LTD. **IDAHO**

Address: Mullan, Idaho.

Officers: E. Lindsley, pres. and mgr., Missoula, Mont. D. C. Smith, v. p.; C. D. Brock, sec.-treas., with A. L. Duncan and W. C. Richardson, directors.

Inc. Dec., 1906, in Idaho. **Cap.**, $1,092,000; $1 par; assessable; all outstanding. Annual meeting, second Monday in January.

Property: 5 claims, 3 patented, 75 acres, in Hunter district, Shoshone county, claimed to show quartz fissure vein, 12′ wide, carrying carbonate and oxide ore at surface and sulphide ore at depth; the surface ores consisting of iron oxide, quartz and barite, average 2% lead and 1 oz. silver. Development by 875′ tunnel to depth of 400′.

Management was crosscutting for the vein, August, 1917, and a year later lessees were extracting ore.

ARLINGTON MINING CO. **IDAHO**

Address: Burke, Idaho.

Officers: C. T. Fisher, pres.; M. J. Mahoney, sec.-treas, with W. Fisher, Joseph Ruby and Otto Freeman, directors.

Cap., $1,500,000; $1 par; assessable.

Property: 20 claims near Mountain House, Coeur d'Alene. Ore carries lead, silver and copper.

Development: by 2,000′ of tunnels. Equipped with compressor, etc., driven by water power.

ATLANTIC MINING CO. **IDAHO**

Address: Herman J. Rossi, pres., Wallace, Idaho.

Cap., $1,000,000; $1 par.

Property: 7 claims in Beaver section of Coeur d'Alene. No information obtainable.

BANNER-IDAHO MINING CO. **IDAHO**

Address: C. J. Smith, sec., Spokane, Wash.

Cap., $1,500,000; $1 par; assessable after all issued.

Property: 5 patented claims in Hunter section of Coeur d'Alene region. Ore carries lead and silver and is opened by 1,500′ of tunnels, etc.

No information obtainable.

BASIN MINING CO. **IDAHO**

Address: Wallace, Idaho.

Officers: E. R. Day, pres.; J. J. Murphy, v. p.; P. Maggy, sec.-treas., with H. J. Rossi and J. J. Day, directors.

Inc. July, 1915. **Cap.,** $75,000; shares 5c par. Company is a reorganization of the old Basin Mining Co., involved in litigation since 1907. Control purchased May, 1916, by the Hercules Mining Co., which bought 700,000 shares of issued and 500,000 shares treasury stock, and held 840,854 shares, at last accounts.

Property: 5 patented claims in the Burke section, south of and adjoining the Hercules mine, between the Laclede on the west and the Stanley group. It is valuable to the Hercules Co. for tunnelling from the Hummingbird and Stanley into the Hercules mine. No information obtainable.

BEAR CREEK MINING CO. IDAHO

Address: Wallace, Idaho.

Officers: P. Burke, pres.; R. E. Dunlap, v. p.; J. F. Morton, sec.-treas..

Inc. Aug., 1916. **Cap.,** $250,000; shares 25c par. Annual meeting third Tuesday in August. Company bought the holdings of the Oro Fino Co. at receivers sale, June, 1916, and is a reorganization of that company.

Property: 11 lead-silver claims, about 7 miles from Murray, in the Summit district, 3 miles from the railroad.

Development: about $60,000 was spent by the Oro Fino Co., in driving two tunnels, some raises, etc. A new tunnel 400′ lower, was driven in 1917.

Equipment: includes a mill and flotation plant, in operation during 1918 and 1919. Lead concentrate assays up to 70% and zinc concentrate 46% metal.

BELLE OF THE WEST MINING CO. IDAHO

Address: G. R. Trask, pres., Wallace, Idaho.

Cap., $75,000; shares 5c par; assessable.

Property: 2 claims, adjoining the Success mine, showing lead-silver ore in tunnels and crosscuts.

BELL MINING CO. IDAHO

Address: C. H. Hussey, sec., Spokane, Wash.

Cap., $50,000; 10c par; assessable.

Property: 8 patented claims in Lalande section of Coeur d'Alene, carrying lead-silver ore, developed by over 7,000′ of tunnels and other workings.

BELMONT-BANNER MINING CO. IDAHO

Office: 417 Hutton Bldg., Spokane, Wash.

Officers: Conrad Wolfle, pres. and gen. mgr.; E. A. Wolfle, v. p.; M. E. Poole, sec.-treas., with A. J. Davis and Gale Smith, directors.

Cap., $1,000,000; $1 par.

Property: 10 claims, one fractional, near Delta and 12 miles from Wallace, Shoshone county, shows a fissure vein of 3 to 4′ surface width, in quartzite, carrying silver, lead and copper. Mine has a tunnel over 500′ long with a 60′ winze sunk on the orebody.

No recent information available.

BELMONT MINING CO., LTD. IDAHO

Office: Wallace, Shoshone county, Idaho. Mine in Two Mile gulch, Evolution district, 3 miles north of Osborn.

Inc. 1900. **Cap.,** $100,000; 10c par, with 200,000 shares in treasury. Reorganized 1909, 1,000,000 shares at $1 par; assessable; placing 500,000 shares in treasury. Assessment levied August, 1916.

Officers: William Scheave, pres.; D. C. Nicholson, v. p.; Frank P. Hess, sec.-treas., with Ida Scheave, Christ Anderson, Dr. T. C. Witherspoon and John Nickels, directors.

Property: 9 claims, showing several contact veins in Burke and Revett quartzite. Ore is said to assay 2.5% lead, 2 oz. silver, 15% manganese with only a trace of copper.

Development: by 2,600′ of tunnels. No recent returns.

BENTON MINING CO. IDAHO

Address: Burke, Shoshone county, Idaho.

Officers: John Callahan, pres.-mgr.; F. P. Candee, sec.-treas.; E. G. Gnaedinger, cons. engr., with Fred Richardson and N. E. Nuzum, directors.

Cap., $1,250,000; $1 par issued 1,165,000 shares; assessable; 3 assessments totaling 10½ mills have been levied; last one in 1915 was 3 mills. Listed on Spokane Exchange. Annual meeting in April at Wallace.

Property: 6 claims on east side of Gorge gulch, adjoining the Stanley and Moonlight, near Burke, supposed to have a continuation of the Stanley vein system. **Ore:** a silver-lead-copper-antimony, occurring in fissure veins said to assay 60% lead, up to 12% copper and 65% antimony. Lead vein dipped out of winze at 60′ depth and at 200′ the McNeil fault was passed through. Crosscutting at this level exposed lead vein to the S. E., but main orebody is supposed to be deeper.

Development: adits, 200′ winze from main adit level, with over 1,000′ of drifting. No recent returns.

BEST CHANCE MINING CO., LTD. **IDAHO**

Main office: 203 Paulsen Bldg., Spokane, Wash. **Mine office:** Wallace, Shoshone county, Idaho.

Officers: Chas. H. Bell, pres.; W. A. Cox, v. p.; Chas. A. Gram, sec.-treas., with J. A. Scott and Chas. Horr, directors.

Inc. March, 1909, in Idaho. **Cap.**, $1,500,000; $1 par; fully paid and assessable.

Property: 12 claims, unpatented, in the Yreka section, Coeur d'Alene. Fissure veins carrying lead and silver ore said to be 100′ wide in Burke quartzite.

Development: by 2,800′ of workings. Work was in progress in 1917, but little being done at last accounts.

BIG CREEK LEASING CO. **IDAHO**

Address: Kellogg, Idaho.

Officers: D. W. Price, pres.; Thomas Fluke, v. p.; O. A. Larson, sec.-treas., with R. R. Price, W. A. Beaudry and Elmer Brown, directors.

Cap., $50.000; shares $10 par; all issued. Annual meeting July 8. An initial dividend of 50c per share paid September, 1917; total dividends, $1.50. Profit was $11,193 in 1917.

Property: a 7-year lease, to 1920, on the ground below the 500′ level of the Yankee Boy Mining Co. property (which see).

Development: by tunnels, one 2,150′ long, opening silver-copper ore.

Production: 25 cars of ore in 1916, valued at $28,000; 2,468 tons valued at $127,298 in 1917. Shipments were made in 1919, but no recent returns received from company.

BIG CREEK MINING CO. **IDAHO**

Address: 513 Bank St., Wallace, Idaho.

Officers: G. Scott Anderson, pres.-mgr.; W. W. Smith, sec., above with A. H. Featherstone, Irving Anderson, and C. E. McCoy, directors.

Cap., $1,250,000; $1 par. Annual meeting first Tuesday in June.

Property: 6 claims, 1½ miles up Big Creek, near Kellogg, in the Coeur d'Alene district.

Development: by 3,380′ crosscut tunnel, which in 1918 opened 3′ of 40% lead and 40 oz. silver ore for 200′ at depth of 1,200′. Two other tunnels have opened the same shoot, which can be developed 500′ deeper. Silver-copper ore is also mined.

Equipment: includes electric power, air-compressor and drills. A 75-ton mill was decided upon in May, 1919, and was to be finished by January, 1920. W. L. Zeigler designed the plant.

Production: from 1915 to 1917, 17 cars of 1 to 5% copper and 2 to 5% lead ore, yielding $44,010 net; and 18 cars in 1918, yielding $43,510. Shipments made in 1919.

BIG CREEK SILVER MINING CO. **IDAHO**

Address: E. S. Crane, Kellogg, Idaho.

Cap., $100,000; 10c par.

Property: up Big Creek, near Kellogg. No information available.

BIG DIVIDE MINING CO., LTD. **IDAHO**

Address: Wallace, Idaho.

Officers: Alexander Murphy, pres.; F. P. Markwell, v. p.; E. H. Pattison, sec-treas., with C. A. Markwell and J. F. Markwell, directors.

Cap., $1,500,000; $1 par; 1,241,740 issued.

Property: 137 acres, a silver-lead prospect in Lalande district, Shoshone county, between the Success mine and property of Federal M. & S. Co.

BIG FIVE MINING CO. **IDAHO**

Address: W. F. Sargent, sec.-treas., St. Maries, Idaho.

Cap., $2,000,000; $1 par; assessable.

Property: 40 acres in St. Maries section of Coeur d'Alene, carrying gold, copper, and lead, and opened by tunnels.

BIG IT M. & M. CO. **IDAHO**

Address: Beeler, Idaho.

Officers: H. S. Davenport, pres.; Charles Walker, v. p.; C. M. Beeler, sec.-treas., with W. L. Grant and Charles Korcle, directors.

Cap., $150,000; 10c par. Annual meeting June 21, 1919.

Property: in Pine Creek section of Coeur d'Alene, said to carry copper and lead ore.

BITTER ROOT MOUNTAIN MINING CO. **IDAHO**

Address: 939 South Hilliard St., Spokane, Wash.

Officers: F. A. Edgerton, pres.; F. A. Noteware, sec.-treas.

Inc. 1900, in Washington. **Cap.**, $75,000; 5c par; 1,200,000 issued.

Property: 3 patented claims in Hunter district, developed by 1,000′ of tunnels, and shaft, opening a little silver-lead ore.

BLACK BEAR CONSOLIDATED MINING CO., LTD. **IDAHO**

Reorganized as Black Bear Mines Co., which see.

BLACK BEAR MINES CO. **IDAHO**

Formerly Black Bear Cons. M. Co., Ltd. **Office:** Wallace, Idaho.

Officers: Peter Bernier, pres.; L. L. Brainerd, sec.-treas, with H. J. Rossi and A. D. Wallace, directors.

Inc. March, 1917, in Idaho. **Cap.**, $400,000; 20c par; assessable; 1,007,000 issued. Assessment 1c. a share, delinquent August 2, 1919. An option on control of shares was given to the Flynn Group M. Co. in Jan., 1920, at 18c a share, This secures a right-of-way for the Flynn.

Property: 4 patented claims and a millsite, 4½ miles N. W. of Wallace, Shoshone county. Examined by Frank J. Davey.

Geology: claims carry a fissure vein in Burke quartzite, that dips 80° S., and runs N. 75° W.; in upper horizons vein carries 10% lead as carbonate, with 2 oz. silver per ton. Though narrow and poor at surface, the vein has widened to 8′ at 125′ in depth, with the content just given. In places the vein widens to 23′ across narrowing to 4′ in face of drift. At 1,180′ below the surface the vein is lean and shows evidence of extreme pressure, as shown along drifts from a 2,400′ crosscut tunnel. Raises from that level encounter concentrating ore carrying silver, lead, and zinc, a short distance upward.

Development: by tunnels. No. 1 tunnel cuts vein at 500′ depth, exposing carbonate ore continuing down to bottom of 125′ winze. Main or working tunnel, 1,000′ lower, also cuts ore, the shoot being 2′-25′ thick and 300′ long. As shown in raises, the ore averages 6′ wide, and runs 2.2 oz. silver, 7.76% lead, and 16.57% zinc. The face of the workings is but 350′ from the end line of the Flynn property.

Equipment: includes electric motors, compressors, shops, etc. Company had a lease on the Western Union Co's. mill, which was to be remodeled. Mine closed, 1919, owing to incompetence of president, but new directorate promises to resume work.

BLACKHAWK LEASING CO. **IDAHO**

Address: Thomas Fluke, sec., Wallace, Idaho.

Cap., $25,000; 50c par.

Property: the Blackhawk mine, held under 3-year lease from Blackhawk M. & D. Co., which see.

BLACKHAWK MINING & DEVELOPMENT CO., LTD. **IDAHO**

Controlled by Federal Mining & Smelting Co.

Address: D. R. Treat, sec., Wallace, Idaho.
Cap., $150,000; 10 par; assessable.
Property: the Blackhawk lead-zinc in Government gulch, Coeur d'Alene, developed by about 4,000′ of workings. Is under 3-year lease to Blackhawk Leasing Co.

BLACK ROCK MINING CO. **IDAHO**
Address: G. W. Sommer, Old National Bank Bldg., Spokane, Wash.
Cap., $200,000; 10c par.
Property: 12 unpatented lead-silver claims 2 miles N. of Kellogg.

BLUE BELL MINING CO., LTD. **IDAHO**
Address: M. J. Weber, pres., 2732 N. San Francisco Ave., Chicago, Ill.
Cap., $1,000,000; $1 par.
Property: 11 unpatented claims near Wardner, Shoshone county, Idaho.
Development: a 2,500′ tunnel, said to have opened silver-lead ore.

BLUE RIBBON MINING CO. **IDAHO**
Address: James Keeth, 414 Kuhn Bldg., Spokane, Wash.
Officers: F. T. McCormick, pres.; Geo. Goebler, v. p.; James Keeth, sec.
Inc. 1914, in Washington. **Cap.,** $150,000; 10c par.
Property: 140 acres, 5½ miles N. E. of Burke, Shoshone county, carrying lead ore.
Development: by 1,900′ tunnel gaining depth of 350′.

BLUE STAR MINING & MILLING CO., LTD. **IDAHO**
Address: Kingston, Idaho.
Officers: C. M. Powell, pres.; Aug. Gren, v. p.; A. C. Morbeck, sec.-treas.
Inc. 1909, in Idaho. **Cap.,** $1,000,000; $1 par.
Property: 160 acres on Pine creek, Shoshone county, carrying silver and lead.
Development: by 500′ two-compartment shaft, and 3,000′ of workings.
Reported in February, 1918, that H. Isolata and I. Peterson of Butte had secured option for control of shares for $30,000.

BLUE WING MINING CO. **IDAHO**
Address: Herman J. Rossi, Wallace, Idaho.
Cap., $150,000; 10c par.
Property: 3 unpatented claims on Nine Mile, Shoshone county, carrying silver-lead ore.
Assessment work done.

BOBBIE ANDERSON GROUP MINING CO. **IDAHO**
Address: Herman J. Rossi, sec., Wallace, Idaho.
Cap., $1,500,000; $1 par; assessable.
Property: 70 acres near Wardner, Shoshone county. Ore carries silver, copper, and zinc, opened by shallow shaft and short tunnel.

BOSS ZINC MINING CO. **IDAHO**
Address: A. H. Featherstone, sec., Wallace, Idaho.
Cap., $50,000; 5c par; assessable.
Property: 5 claims, 2½ miles N. of Osborne, Shoshone county, carrying silver, copper, and zinc. In a report of July, 1918, the superintendent, H. Lieb, said that 250′ of driving in a tunnel had revealed a 12′ vein, and surface work had been encouraging.

BOULDER CREEK MNG. & MLG. CO., LTD. **IDAHO**
Office: 922 Old Natl. Bank Bldg., Spokane, Wash.
Officers: Leo Greenough, pres. and mgr.; W. D. Greenough, v. p.; W. J. Beaton, sec.-treas.
Cap., $1,500,000; shares $1 par; assessable; 976,230 issued. Annual meeting, first Monday in December.
Property: 1 claim, 20 acres, about 2 miles S. of Mullan, developed by several tunnels, longest 1,200′, said to show ore assaying 10-15% lead with gold, copper and silver. Property considered promising, but has been idle for several years.

BRISTOL MINING CO., LTD. **IDAHO**

Address: W. A. Tuson, pres., Kellogg, Idaho.

Cap., $125,000; 10c par.

Property: 9 claims, near Wardner, Shoshone county, containing silver-lead-zinc ore.

BROWN LEASING CO. **IDAHO**

Absorbed, 1918, by Kellogg United Mines Co., which see.

BUFFALO MINING CO. **IDAHO**

Address: Mr. Conroy, sec., Missoula, Mont.

Cap., $1,500.000; $1 par; assessable.

Property: 28 unpatented gold-silver-lead claims, partly in Shoshone county, Idaho, and partly in Mineral county, Mont. Developed by 2,400' of tunnels.

BUNKER HILL & SULLIVAN M. & C. CO. **IDAHO**

Officers: 1022 Crocker Bldg., San Francisco, Cal., and Kellogg, Idaho.

Officers: F. W. Bradley, pres., San Francisco; J. W. P. McFall, v. p.; Wm. H. Crocker, treas; J. S. Wallace, asst.-treas; Geo. F. Holman, sec.; G. D. Abbott, asst. sec.; Jules Labarthe, executive head of Bunker Hill Smelter; Stanly A. Easton, mgr.; R. S. Handy, supt. of mills. F. M. Smith, smelter agent, at Spokane.

Inc. 1885, in Oregon. **Cap.,** $3,270,000; all issued; shares $10 par. Not listed. Company is practically a close corporation. Transfer agent and registrar, asst. sec. of the company at San Francisco. Annual meeting, third Thursday in June.

General Balance Sheet, year ending December 31:

Assets—

Year	Property & Plant	Supplies	Cash, Ore & Concts.	Investment Reserve	Miscel.	Total
1918....	$44,933,202	$710,581	$1,670,573	$1,615,580	$526,939	$49,456,875
1917....	45,494,361	360,201	1,894,912	1,429,384	393,713	49,572,571
1916....	46,180,979	125,976	977,395	1,029,409	226,889	48,540,648
1915....	4,977,268	253,583	603,416	1,047,550	190,274	7,072,095

Re-valuation of mine increased the property account from $4,977,268 in 1915 to $46,180,979 in 1916. This was done to comply with Federal Revenue Act of September 8, 1916, and subsequent amendments, by which owners of mineral deposits are entitled to a deduction from gross income on account of depletion of natural deposits "not to exceed the market value in the mine of the product thereof, which has been mined and sold during the year, etc.," nor exceeding in the aggregate the capital originally invested, or in case of purchase prior to March 1, 1913, the fair market value as of that date.

Liabilities—

Year	Capital Stock	Surplus Account	Property Re-valuation Surplus	Miscel.	Total
1918.....	$3,270,000	$6,789,445	$38,188,589	$1,208,841	$49,456,875
1917.....	3,270,000	2,609,776	42,290,265	1,402.530	49,572,591
1916.....	3,270,000	2,761,946	42,290,265	218,437	48,540,648
1915.....	3,270,000	3,691,164	.....	110,930	7,072,095

Income Account:

Year	Operating Revenue	Other Revenue	Operating Expense	Operating Profit	Dividends Paid	Balance
1918...	$6,128,667	$713,473	$3,769,138	$3,200,417	$1,553,250	$4,179,669†
1917...	9,546,874	611,623	6,306,423	3,852,074	2,043,750	152,170**
1916...	6,223,162	579,355	4.437,477	2,365,040	1,716,750	929.219*
1915...	4,217,927	584,106	2,957,361	1,725,442	1,062,750	662,692†

* Stands in books as deficit due to ore depletion charge of $1,577,509.

** Stands in books as deficit to ore depletion charge of $1,634,690.

† Surplus.

Dividends: in 1910, $3.15; in 1911, $2.65; in 1912, $2.30; in 1913, $2.50-

in 1914, $3; in 1915, $3.25; in 1916, $5.25; in 1917, $6.25; in 1918, $4.75, and 75 cents in 1919, to April 4, making a total of $22,495,500.

As a result of apex litigation with the Caledonia Mining Co., B. H. & S. controls that company, owning 1,308,100 shares out of 2,605,000 issued. See Caledonia Mining Co. The Sierra Nevada is also a subsidiary of B. H. & S.

Property: about 5,000 acres, patented, at Kellogg, Coeur d'Alene, Idaho.

Geology: the larger part of the ore is principally a replacement of the Revett quartzite, in which the replacement is closely connected with fissuring. The principal ore minerals are galena with some pyrite and zinc blende, and in places a little argentite rich in silver. The orebodies are definitely related to a persistent fissure, strike N. 45° W., dip 38° S. W., locally known as the "foot wall fissure." The zone of fissured quartzite in which the orebodies occur has a maximum width of 300'; ore is found in the hanging-wall of the fissure. The orebodies are very irregular in form and may be several hundred feet in length and depth with width in places as much as 40'. For geology of this district, see U. S. G. S. Prof Paper 62, Geology and Ore Deposits of the Coeur d'Alene district, by F. L. Ransome and F. C. Calkins, in 1908.

Development: tunnels and shafts. The Kellogg tunnel, 8x9', in section, and about 2 miles long, is the main working level. It is equipped with electric locomotive.

Above the tunnel the orebodies have been explored to surface. Below the tunnel at 200' intervals are 5 working levels, Nos. 10, 11, 12, 13 and 14.

The persistence of value and size of orebodies down to No. 15 sub-level, a mile deep, was proven by work in 1919.

Development work has been as follows:

Year	Feet	Cost per foot
1918	1,740	$13.73
1917	1,524	20.06
1916	3,944	9.87
1915	4,783	9.32
1914	2,754	10.77

In the annual report 1918 of Robert Bell, State Mine Inspector, will be found interesting notes on the Bunker Hill & Sullivan ventilating systems and underground work.

Ore reserves: January 1, 1919, were 4,362,024 tons. Milling ore averages 9 to 12% lead and 3.7 to 4.5 oz. silver per ton. Shipping ore runs from 15% to 78% lead and 17 oz. silver per ton.

Equipment: includes 3 concentrators, power-plant, water power, machine-shops, saw-mills, etc. Replacement value of surface equipment is placed at $1,756,849. Mill extraction is about 85% for lead and 80% for silver.

The Sweeney mill, consisting of jigs, trommels, and tables, is treating 400 tons of old tailings daily.

The company has a 12-year contract, dated March 1, 1918, to sell portions of its ore, assaying between 40 and 66% lead to the A. S. & R. Co. As friction between the two companies had been constant, B. H. & S. Co. built its own smelter at Kellogg, in 1917. Initial daily capacity, 1,000 tons. Power obtained from the Washington Water Power Co. of Spokane.

Production:

Year	Ore Mined Tons	Concts. Tons	Lead Lb.	Silver Oz.	Cost per ton Mining	Cost per ton Milling
1918	389,027	84,169	67,125,717	1,191,907	$2.92	$0.71
1917	493,030	103,982	93,992,898	1,692,765	2.38	0.60
1916	475,784	76,284	77,298,879	1,406,260	2.36	0.43
1915	452,142	59,901	74,584,741	1,298,284	1.99	.....
1914	440,819	56,163	70,663,236	1,161,324	1.98	.....
1913	436,060	59,471	71,860,773	1,227,076	2.25	.....

Production since 1886 is 8,275,913 tons of ore worth $86,341,659 gross. Net smelter returns were $50,925,287, of which $28,771,132 was profit, plus $4,105,624 investments, etc., and $22,086,750 paid in dividends to end of 1918.

Cost of producing lead has been as under:

Year	Price rec'd c. per lb.	Cost per lb. c.
1918	7.375	5.340
1917	8.731	6.640
1916	6.881	5.670

Company issues a report containing considerable detailed costs, but little on underground conditions. The mine is a big one and will continue to pay dividends for many years. The general policy of company is progressive, with much initiative.

Bunker Hill Smelter.

Subsidiary of Bunker Hill & Sullivan Mining & Concentrating Co., which see.

Offices: Crocker Bldg., San Francisco; 1015 Paulsen Bldg., Spokane, Wash.; and Kellogg, Idaho.

Officers: Jules Labarthe, director; F. M. Smith, asst. director; M. H. Sullivan, smelter supt.

The smelter, erected in 1917, improved and enlarged since, is near Kellogg, at Bradley railroad station. The principal supply of ore and concentrate is from the B. H. & S. mines, but custom business is done, and by 1920 the company had arranged to receive ores from British Columbia, thus competing with the Consolidated M. & S. Co. at Trail, Northport smelter, and the A. S. & R. Co.

The works consist of 4 Traylor blast-furnaces, 48 by 180 inches at tuyeres, 2 I.-R. turbo-blowers of 12,000 cu. ft. capacity per min. at 48 in. pressure, slag settlers, 20-ton electric crane, 130 cu. ft. motor-dumping slag pots, 10-ton Baldwin-Westinghouse loco, Dwight-Lloyd sintering machines, two 50-ton drossing kettles, centrifugal pumps, two softening furnaces, 10-ton crane, Faber du Faur retort furnaces using powdered coal, cupel furnaces, and Cottrell precipitators. The furnace charge carries 35 to 40% lead, and the slag assays only 1% lead.

These works are in able hands, and are of great importance to the Northwest.

BURKE MINING CO. **IDAHO**

Address: J. C. Glahe, sec., Burke, Idaho.

Cap., $1,500,000; $1 par; assessable.

Property: 10 patented claims in Canyon creek, 2 miles E. of Burke, Shoshone county. Opened by 1,500′ tunnel.

BURLINGTON MINING CO. **IDAHO**

Address: John Hall, Grinnell, Iowa.

Cap., $2,500,000; $1 par.

Property: 17 unpatented claims in Evolution section of Coeur d'Alene, Shoshone county, developed by 1,600′ of tunnels.

BUTTE & COEUR D'ALENE MINING CO. **IDAHO**

Address: care Jos. Rosslow, Hyde Bldg., Spokane, Wash.

Inc. 1907. **Cap.,** $1,500,000; $1 par; assessable up to 10 cents.

Officers: L. C. Lens, pres.; Peter McGregor, v. p.; Joseph Rosslow, sec.-treas.; with R. C. Dillingham and J. M. Pickrell, directors.

Property: 8 claims, 1¼ miles from Mullan, in Shoshone county, adjoining the Gold Hunter mine on the east. Ore contains copper, silver, and lead.

Development: by 1,550′ tunnel, and 2-compartment winze 400′ deep, with 200′ and 400′ crosscuts at bottom.

Equipment: compressor, drills, hoist, dwellings, etc., for 35 men.

Little work done for several years past.

BUTTE & KELLOGG MINES CO. IDAHO

Address: Herman J. Rossi, Wallace, Idaho.

Cap., $150,000; 10c par.

Property: 10 claims, one mile from Kellogg, Shoshone county. Ore carries lead and silver.

CALEDONIA DEVELOPMENT CO. IDAHO

Office: Wallace, Idaho. Chas. McKinnis, mgr., associated with others in the Caledonia Mining Co., which see.

Company formed to examine and acquire a new mine for the Caledonia Mining Co.

Cap., $1,500,000; $1 par.

In 1916, an option was acquired on the stock of the Jemison Mines Co., Mohave county, Ariz., after examining its mine and its operations for several months. Stockholders in the Caledonia Mining Co. had the privilege to April 30, 1917, of subscribing to 200,000 shares of J. M. Co. treasury stock at 20c a share.

CALEDONIA MINING CO. IDAHO

Office: Wallace, Idaho. **Mine office:** Wardner, Shoshone county, Idaho.

Officers: S. A. Easton, pres.; J. E. Gyde, v. p.; Chas. McKinnis, sec.-treas.-mgr.; with C. F. Kratzer, directors.

Inc. July 9, 1907, in Idaho. **Cap.,** $2,605,000; $1 par; assessable; all issued. Transfer office at Wallace, Idaho. Listed on San Francisco and Butte Exchanges. Cash surplus December 31, 1919, was $570,520, equal to 22 cents per share.

Dividends: at rate of 3c a month in 1917 and 1918; reduced to 1c in January, 1919. Total dividends to December 5, 1919, amounted to $3,985,650.

Company has acquired stock control in the Jemison Mines Co., which see. Also Caledonia Development Co.

Property: 5 unpatented claims, about 50 acres; adjoining property of the Bunker Hill & Sullivan M. & C. Co., at Kellogg, Idaho, showed a strong fissure vein with an ore-shoot 1,000′ long, that is in places 50′ wide and carries cupriferous silver-lead ores, averaging 15 to 40 oz. silver, with a little native copper.

Development: by a 500′ shaft and 2 tunnels, lower tunnel, 4,000′ in length, giving backs of about 1,300′. The 1,000′ level showed 7′ of shipping ore, though broken faulted ground was encountered. Most of the ore was mined between the 500 and 700′ levels. Management reported May 1, 1917, that development had failed to disclose new ore, and that the downward extension of the orebody has been faulted and could not be found. Further work during 1917, 1918, and 1919 failed to find new ore.

The mine was idle from 1912 to July, 1914, on account of litigation with the Bunker Hill & Sullivan over apex rights. A compromise was effected whereby the capital of the Caledonia company was increased from $1,500,000 to $2,605,000, B. H. & S. taking 550,000 shares. The company is virtually a subsidiary of B. H. & S.

Equipment: includes an electric hoist, air-compressor and electric pumps. Ore is treated at the mill of the B. H. & S. Company employs about 35 men.

Production:

Year	Ore tons	Copper lb.	Lead lb.	Silver oz.	Net profits	Dividends
1914....	.....	245,610	6,599,720	537,854	$761,797	.....
1915....	15,005	659,660	11,142,580	1,212,730	760,324	$755,450
1916....	17,464	741,225	10,412,640	1,297,193	1,154,762	911,750
1917....	17,983	544,802	9,434,900	1,068,700	1,227,155	937,800
1918....	17,971	94,326	6,038,784	668,784	647,819	937,800
1919....	15,225	55,999	4,224,053	507,962	420,197	312,600

The cost of mining and shipping was $9.05 per ton in 1919.

CALIFORNIA CONSOLIDATED MINING CO. IDAHO

Address: S. Severance, sec., Pittsburgh, Pa.

Cap., $1,000,000; $1 par.

Property: 4 patented claims in Placer Center section of Coeur d'Alene, carrying lead and silver.

CARBONATE HILL MINING CO. IDAHO

Absorbed by Idaho Carbonate Hill Mining Co., which see.

CEDAR CREEK M. & D. CO., LTD. IDAHO

Address: Wm. Becker, sec., Wallace, Idaho.

Cap., $1,000,000; $1 par. A 3-mill assessment was levied in Sept., 1919.

Property: 15 claims in Summit section of Coeur d'Alene, Shoshone county, developed by over 5,000′ of workings. Operations were under way early in 1918 and resumed in September, 1919.

CHAMPION COPPER MINING CO. IDAHO

Probably defunct. See Vol. XII. Property at Mullan, Idaho.

CHESTER MINING CO., LTD. IDAHO

Address: S. P. Fairweather, sec., Wallace, Idaho.

Cap., $1,000,000; $1 par.

Property: 6 patented lead-silver claims in Evolution district, Shoshone county, on which $25,000 had been spent to mid-1918.

CHICAGO-BOSTON MINING CO. IDAHO

Address: W. S. Bangs, sec., 514 California Bldg., Tacoma, Wash.

Officers: C. W. Gossert, pres., with W. S. Havin, H. M. Mumford and J. R. Neely, directors.

Cap., $1,500,000; shares $1 par.

Property: 10 claims on Lake creek, 2 miles W. of Wallace, Shoshone county, one mile from rail and electric power available. Examined in June, 1919, by C. W. Newton.

There are two ore-bearing veins, one the Tincup, having high-grade gray copper ore, from which shipments have been made. The second vein, the Killbuck, is said to have 8 to 12′ of lead-silver milling ore, opened by No. 6 tunnel. The copper vein is up to 5′ wide, and some ore carried 20 oz. silver per ton. So far as explored, the property is within the Revett quartzite.

Development: by 6 tunnels and shaft. Some milling ore has been blocked out. Sinking 200′ is suggested, which can easily be done by the Cons. Interstate-Callahan.

Recent information is to the effect that the option held by E. R. Day in 1917 was dropped; that J. A. Percival of the Cons. Interstate-Callahan had acquired control of the mine in November, 1918; and in July, 1919, work was resumed after a shut-down.

CLIMAX SILVER-LEAD MINING CO. IDAHO

Address: H. V. Edwards, Jr., Wallace, Idaho.

Cap., $375,000; 25c par.

Property: 4 claims in Revenue gulch, 2½ miles N. W. of Wallace, Shoshone county. Opened by short tunnels. Equipped with compressors and drills.

COEUR d'ALENE ANTIMONY MINING CO. IDAHO

Office: Kellogg, Idaho.

Officers: M. E. Jolley, pres., Coulee City, Wash.; H. J. Hibschman, v. p.; C. M. Powell, sec.-treas., Kellogg, Idaho.

Cap., 1,500,000 shares; 10c par; assessable; 789,466 issued. An assessment of 3 mills per share was levied June 20, 1919, and another on October 30th.

Property: 2 claims, including an antimony mine on Pine Creek, west of Kellogg, that had been idle for 10 years.

Development: by 300′ shaft being sunk 300′ deeper in 1919, and tunnels, said to show two shoots of ore, the largest being 240′ long and 4′ wide. The high-grade ore is said to assay 35% antimony.

Equipment: 100-ton mill employing flotation. Work resumed Feb., 1920, after a 3 years' suspension.

COEUR d'ALENE CHAMPION MINING CO. IDAHO

Address: James Keeth, sec., 510 Kuhn Block, Spokane, Wash.

Cap., $1,500,000; $1 par; assessable.

Property: 17 claims near Burke, Shoshone county, carrying lead and silver. Developed by 4,000′ of tunnels and fairly well equipped.

COEUR d'ALENE CRESCENT MINING CO. IDAHO

Address: 404 Jamieson Bldg., Spokane, Wash.

Officers: L. W. Bonney, pres.; J. B. Millspaugh, v. p.; F. W. Mauser, sec.-treas.; with F. R. and G. E. Crocker, directors.

Cap., $1,250,000; $1 par; assessable, 675,000 issued.

Property: 5 unpatented claims and millsites, one mile N. W. of Osborne, Shoshone county. Vein is in quartzite carrying silver and lead, assaying $2.50 to $25 per ton.

Development: by 300′ shaft and 500′ tunnel. No work has been done for over two years.

Controlled by Stewart Mining Co. and described thereunder.

COEUR d'ALENE EMPIRE M. & M. CO. IDAHO

Address: A. Herman, Rookery Bldg., Spokane, Wash.

Officers: F. D. Garrett, pres.; Frank Johnson, v. p.; A. Herman, sec.-treas., with T. H. Holland, directors.

Inc. 1917, in Washington, to take over property of Coeur d'Alene M. & M. Co. **Cap.,** $1,500,000; $1 par; assessable.

Property: 9 silver-lead claims near Wardner, Shoshone county.

Development: by tunnels and workings aggregating over 3,000 feet.

COEUR d'ALENE EXPLORATION CO. IDAHO

Address: O. A. Olsson, sec., Wallace, Idaho.

Property: 10 claims near Wardner, Shoshone county.

Idle.

COMET GOLD & COPPER MINING CO., LTD. IDAHO

Office: care Jos. F. Whelan, sec., 408 Sixth St., Wallace, Idaho. Mine near Mullan, Shoshone county, Idaho. Archibald McCullom, pres. and gen. mgr.; A. L. Honeker, treas.

Cap., $100,000; shares 10c par; assessable, ½ mill per share levied 1913 and 1914.

Property: 4 claims, adjoining the Springfield, east of Mullan, on Stevens Peak, and near 2 railroads, shows 2 veins, of 10′ and 15′ estimated width, about 150′ apart, carrying chalcopyrite and bornite, with iron and quartz gangue.

Development: by tunnel, cutting a hematite vein, with about 1,600′ of workings. Property worked in a small way, with proceeds of assessments levied, but no orebodies of commercial value have thus far been developed.

COMSTOCK COPPER MINING CO., LTD. IDAHO

Address: Wallace, Shoshone county, Idaho.

Officers: E. S. Amsden, sec., Wallace, Idaho; Otto A. Olsson, treas.; John H. Nordquist, mgr., with C. W. Anderson and A. Swan, directors.

Inc. in Idaho. **Cap.,** $1,500,000; shares $1 par.

Property: on Baldy mountain, east of Burke, developed by 800′ tunnel and 700′ of drifting on the vein. Is developing on a small scale, raising money by assessments of 1 mill per share. No recent news.

CONSOLIDATED INTERSTATE-CALLAHAN MINING CO. IDAHO

Name changed to Callahan Zinc-Lead Co., in 1920.

Offices: 61 Broadway, New York. **Mine office:** Interstate, Idaho.

Officers: John A. Percival, pres.; M. G. Rodearmel, 1st v. p.; Milie Bunnell, 2nd v. p.; with J. B. Cotton, A. L. Warner, S. S. Titus, Jas. F. Callahan, J. S. Macnie, R. M. Fox, C. W. Newton, Gust Carlson, and D. A. Callahan, directors; C. W. Newton, supt.; J. B. Parker, met. eng.; H. T. McMeekin, sec.-treas.

Inc. June 12, 1912, in Arizona as a consolidation of the Interstate Silver-Lead Mining Co. and the Callahan Mining Co. **Cap.**, $5,000,000; $10 par; 373,303 outstanding, as explained below. Listed on New York Stock Exchange. Title Guarantee & Trust Co., New York, transfer agent; Registrar & Transfer Co., New York, registrar.

Outstanding shares totaled 464,990 up to October, 1918, when they were reduced to 319,893. In April, 1914, the company made a contract with the American Metal Co., Ltd., for the sale of the entire output of its mine and mill for a 10-year term commencing September 22, 1916, the prices to be spelter at St. Louis, less certain deductions. Owing to continual controversies between the two companies in regard to modifications of the contract, asked by the American Metal Co., it was finally decided to cancel the contract in October, 1918, the consideration being the delivery and surrender to the Consolidated Interstate-Callahan Mining Co., of 145,097 shares held by the Metal company. In addition, company acquired at cost of $9 per share from parties affiliated with the Metal company their holdings of its stock of 21,590 shares thus reducing the amount of stock outstanding to the amount shown above.

Since the above was arranged, the mining company made a contract with the Grasselli Chemical Co. of Cleveland, Ohio, for sale of its zinc until July 1, 1919. The lead-silver ore is sold under contract to the Am. Smelting & Refining Company and treated at Colorado smelters.

Financial Statement—Years ending June 30, to 1916, and December 31, thereafter:

	Current assets.					
Year	Cash	Ore account	Other	Total	Current liabilities	Surplus
1919.....	$74,909	$264,156	$398,888	$737,954	$119,324	$618,630
1918.....	57,855	75,762	297,393	431,011	176,,458	254,553
1917 (18 mos.)	252,542	253,149	160,409	666,100	114,159	551,941
1916.....	143,573	596,289	101,709	841,571	34,860	806,711
1915.....	316,588	784,190	50,864	1,151,642	56,780	1,094,862

Comparative Operating Statement—Years ending June 30, to 1916, and December 31, thereafter:

Year	Income	Op. & Gen. charges	Profit	Surp. from last year	Dividends	Surplus
1919.....	$972,665	$602,902	$369,763	$248,867	.....	$618,630
1918.....	1,228,616	968,328	260,289	450,486	456,222	254,552
1917(18 mos.)	4,179,932	1,854,055	2,325,876	783,509	2,557,445	551,941
1916.....	4,013,172	912,681	3,100,491	1,142,967	3,254,930	806,711
1915.....	2,161,177	569,404	1,591,773	200,686	697,597	1,094,862

Dividends: initial paid April 1, 1915, amount that year being $1.50 per share; $7 in 1916; $5.50 in 1917; $1.25 in 1918; 50c. on March 30, 1920; grand total being $15.75 per share, or $7,126,029, equal to $3.15 per annum.

Company is a consolidation of two prospects, called the Interstate and Callahan groups, the first named developed and the Interstate vein found while Walter Harvey Weed was consulting engineer, on whose advice the present consolidation was effected at a time when this part of the Coeur d'Alene district was regarded by many mining men as worse than unpromising. The mine has developed into one of the principal zinc-lead producers in America; in fact, the third largest, and one of the world's greatest.

Property: 79 claims, 1,250 acres, 601 patented; also the Nipsic group, 7 claims, the Blue Grouse (two combined have 225 acres); and a controlling interest in the Silver State Mining Co., adjoining the Interstate, all in the Coeur d'Alene district, Wallace, Shoshone county, Idaho. The Amazon-Manhattan mine was relinquished in 1917, by order of the Courts on account of defective title. Little ore was found in it. In the dispute over the

Virginia claim, located in 1883, Cons. Interstate-Callahan was adjudged the owner in January, 1920.

Geology: the two fissure veins thus far worked in the property are the Interstate and the Callahan. The veins cut through Prichard slates, which are intruded by a monzonite porphyry dike and by small diabase dikes. The Interstate vein varies from 3-20′ in width, the Callahan from an inch to 8′. For geology of the district see U. S. G. S. Professional Paper by F. L. Ransome and F. C. Calkins in 1908; also reports of the mining industry of Idaho, by Robert N. Bell, especially that for 1918, covering general conditions.

Development: totals over 47,000′, of which 1,088′ was done in 1919. The principal working level is tunnel No. 4, about 1,200′ below the mountain top, where an ore-shoot 1,200′ long has been encountered, running from 1 to 54′ in width. This ore extends from the uppermost tunnel down, with equally good metal contents on the lowest level. The 3-compartment shaft was sunk during 1917 and 1918 to 1,100′ below No. 4 level, the main working tunnel. Exploration during these periods on the new levels has been very satisfactory. At the collar of this shaft is a station 25x25′, behind which a hoist room 40x40′. Hoist is driven by 250 h. p. motor. The engine is good for a lift of 12,000 lb. at a speed of 800′ per minute from an ultimate depth of 2,000′. By November, 1919, a large orebody had been opened on the 600′ level assaying 31% zinc, 34% lead and 7 oz. silver per ton.

A factor aiding deep development (to 3,000′, or 1,500′ below No. 7 level) is the construction of the O.-W. R. & N. Ry. branch from Mullan, up to Beaver creek.

Ore reserves: 310,000 tons Jan. 1, 1920, plus an equal amount from new orebody not yet fully developed, averaging 25% zinc. Development has not yet found lower limits of orebody.

The **Nipsic** claims are situated about a mile N. of the portal of Interstate No. 4 tunnel. The group lies between the Idora and Interstate-Callahan groups on the Beaver creek side of the Nine Mile divide. The claims are crossed by two fissure veins in quartzite and slate, that average 3′ in width and carry bands and shoots of lead and zinc ore, the lead ore carrying 4 oz. silver per ton to each 10% lead. The mine has been intermittently prospected since 1892, but no important orebody discovered. There are several tunnels, longest 1,200′, with a total of 2,140′ of workings. The group is intrinsically valuable, but has an additional value to the Interstate-Callahan, as it permits much deeper tunnel work than any now existing and gives an outlet on the Beaver creek side of the mountain, with easy access to the North Fork.

In connection with this work, in 1917 a crosscut was started from Interstate No. 6 level, across the Silver State ground, and into the Nipsic, to open the latter's vein at 1,000′ below the orebody indicated in the upper levels of the Nipsic. This crosscut will also develop the Silver State. By December 31, 1918, the drift was driven 2,282′ to the side-line of the Nipsic and 248′ into that ground. At 233′ from side-line, 12″ of clean ore, assaying 27% lead and 10 oz. silver, was cut. Ore carries very little zinc. Raising is under way. At a point 1,100′ above, there is 120 of high-grade ore from 18 to 24″ wide, so a substantial orebody may be developed.

Equipment: is modern, with a view to future big development. Buildings include saw-mill, bunk and rooming-houses for 300 men. The concentrating mill, which treated at the rate of 11,100 tons of ore per month during 1917, was completely remodeled during 1918 and a contract was made with the Minerals Separation Co. for the use of its patents. A 400-ton plant was constructed, consisting of a 75-h. p. motor, No. 8 Sturtevant blower of the Root type, two 18″ elevators, 2 Janney emulsifiers, and 16 double-cell Janney mechanical air flotation machines, each driven by an 8-h. p. motor. The blower furnishes air for agitation. There are 2 sets of roughing flotation machines and one set of cleaners. The former are in

parallel, each unit consisting of one emulsifier cell and 6 flotation cells, while the cleaners consist of 4 flotation machines in series.

The grinding department contains a 200-h. p. motor, a 6x10′ ball-mill, 2 Akins' classifiers, two 18″ elevators, and four 4″ Krogh sand pumps.

A Sauerman slack-line cable excavator is used to reclaim tailings from the dump. They are dumped into a hopper, and then conveyed to the new flotation plant. In 1917, there were 225,000 tons of these, 50% being fine slime assaying 12% zinc, and 2% lead; the remainder, from jigs, are coarse, and assay 8% and 2% respectively. By 1919 the tonnage had been reduced to 125,000 tons. In June, July, August and September, 1918, these plants treated 46,802 tons of slime tailing and 37,245 tons of coarse tailing. The flotation concentrates from these tailings were passed over 10-Deister-Overstrom slime tables and 4 Wilfley tables, separating some of the lead from the zinc.

During 1918 the old mill was altered to make room for 10-Deister-Overstrom and Wilfley tables; building elevator to feed tables; installing launder system and classifiers; and repairing line shafting and gearing throughout. A new set of rolls was built on concrete foundation; the trommel and jigs were repaired and duplicates built; a new 6x6′ ball-mill was put in; another Oliver filter was erected; the pumping system was altered; and a 30′ Dorr settler added. One of the great difficulties has been separation of lead from zinc, and experiments are being made with selective methods of flotation.

By December, 1919, zinc concentrate had improved from 45 to 50% metal content, lead from 50 to 59%, and silver from 15 to 20 oz. per ton.

There are 330 men employed, the full complement.

Production: during 1919, the mine was shut down from March 1st to October 21st, on account of low metal prices and labor conditions and also to permit improvements to be made in mine and mill. Production for the first two months of 1919 was 8,866 tons of 50% zinc concentrate, 3,010 tons of 59% lead concentrate and 55,445 oz. silver. Output for November and December, 1919, was 6,700 tons of zinc concentrate, 2,150 tons lead concentrate and 42,000 ounces silver.

Production gradually increased and is now normal, or about 4,500 tons of 50% zinc concentrate, 1,700 tons of 59% lead concentrate and 34,000 oz. silver monthly. Total production to March 1, 1919, 215,680,459 lb. zinc; 52,673,430 lb. lead; 949,980 ounces silver, realizing $11,461,364.

In January, 1920, an extension of the fifth level, 200′ below the haulage tunnel cut an orebody 22′ wide that assayed 23.7% zinc, 12.8% lead and 4 oz. silver per ton. In view of this work and the finding of the orebody across the fault, the ore reserves may be considered as doubled, and the net returns on the shares should be not less than $20 per share.

	1919	1918	1917	1916	1915
Ore mined, tons	67,952	85,363	240,858	.....	.....
Crude lead ore shipped, tons	634	1,634	3,469	781	9,498
Crude zinc ore shipped, tons	975	2,755	17,926	246	8,473
Ore milled, tons	52,526	69,002	197,388	.....	.....
Tailing treated, tons	.....	84,065	.....	.....	.....
Lead concentrate shipped, tons	4,722	3,518	8,944	3,723	2,563
Zinc concentrate shipped, tons	14,825	40,258	74,219	51,713	30,681
Zinc content, pounds	16,498,285	40,891,881	89,396,127	.....	.....
Lead content, pounds	7,993,664	12,098,429	24,357,826	.....	.....
Silver content, ounces	139,276	202,750	416,126	.....	.....
Gross value of all products	$724,535	$1,816,444	$5,153,398	.....	.....
Operating costs per ton of ore mined	.....	.....	$5.901	.....	.....

In December, 1919, the output was approximately 3,800,000 lb. zinc, 1,300,000 lb. of lead, and 22,000 oz. of silver.

Management is able and progressive. With spelter at 8c. and silver at $1, Interstate-Callahan should continue to make big profits on an average monthly output of 9,000,000 lb. spelter, 3,400,000 lb. lead, and 34,000 oz. silver, provided that the base-metal markets are favorable and costs are normal.

CONSTITUTION MINING & MILLING CO. IDAHO

Office: Columbia Bldg., Spokane, Wash.

Officers: Judge Geo. Turner, pres., 525 Seventh St., Spokane, Wash.; Frank H. Graves, v. p.; B. H. Kizer, sec.-treas.; Frank T. Post, Richard W. Nuzum and Thos. Thwaite, directors; Joseph Trainor, supt.

Cap., $1,500,000; increased Jan., 1916, from $1,000,000; shares $1 par; assessable; all issued.

Property: 350 acres patented, on east fork of Pine creek, 9 miles from Pine Creek siding on O.-W R. & N. R. R., Coeur d'Alene district, shows zinc-lead ore in veins 4′ to 8′ wide, in a shear-zone in Prichard slate.

Development: by adits, one at vertical depth of 150′ and the other at 400′. At 1,500′ south of the latter a 550′ crosscut tunnel cuts the vein 150′ below tunnel No. 2. This orebody is said to be several hundred feet long. A shaft, sunk at the portal of tunnel No. 2, is 200′ deep and from the bottom a 700′ drift is said to have been run on ore.

Equipment: includes hoist, compressor, 100-ton mill, sawmill, and electric motors.

Production: from Aug., 1917, to early in 1918, shipped 1,400 tons of crude ore, averaging 12% lead, 9 oz. silver, and 27% zinc; also 700 tons of 16% lead, 12 oz. silver, and 33% zinc concentrates.

Property is considered valuable, but operations have been hindered by lack of good transportation.

COPPER KING MINING & SMELTING CO. IDAHO

Address: Mullan, Idaho.

Officers: Sam. Edelstein, pres.; Dave Holzman, v. p.; Harry W. Ingalls, sec.-treas. gen. mgr.. with H. R. Schroeder, R. C. Vanderford, and John Jahde, directors.

Inc. October, 1901, in Idaho. **Cap.,** $1,500,000; $1 par; assessable; all issued. Assessment, No. 17, levied May 23, 1918. Annual meeting first Wednesday in September. Company expended $30,000 in development in 1918, and on March 17, 1919 had a bank balance of $2,020.

Another assessment, of 5 mills, was payable December 10, 1919.

Property: 18 claims surveyed for patent on the west fork of Deadman creek, adjoining the National mine on the west, in Shoshone county.

Development: two tunnels have developed a lead-silver orebody 250′ long and from 2 to 6′ wide, assaying 20% lead, 15 oz. silver, 4% zinc and 5% copper. Lower tunnel (No. 3), was driven a distance of 5,000′ at 100′ below No. 2 at a total cost of $14 per ft. Four separate orebodies have been opened on this level so far, but no extensive development has been done on any of them. About 3,000 tons of ore on dump average 4.5 oz. silver, 4% lead and 1% copper. Hand-sorted ore on dump assays, 30% lead, and 10 oz. silver. Three of the ore-shoots average 3′ wide and 50′ long, while largest shoot is 65′ wide and 100′ long. A raise is up 100′ on the latter. In September, 1919, a 50′ vein containing irregular bunches of lead ore was reported cut on the tunnel level.

Equipment: includes 1-drill Franklin air-compressor and 35 h. p. electric motor.

On February 15, 1919, property was under bond and lease to J. M. Jackson and associates of Seattle and Tacoma, Wash., for $250,000, payments to be made at the rate of $50,000 per year. Lessees furnish surety bond of $10,000, will erect 100-ton mill and plan to expend $75,000 on new development, sinking 200′ on orebody.

COPPER PRINCE CONSOLIDATED M. & M. CO. IDAHO

Mine office: Herrick, Shoshone county, Idaho.

Officers: S. B. Halbert, pres.; Samuel R. Hite, v. p.; Boyd Hamilton, sec.-treas.; W. M. Ramsey, with S. C. Dooley, W. Hankins, H. C. Crampton, and J. W. Wood, directors. Frank Drummond, supt.

Inc. July 30, 1910, in Idaho. **Cap.,** $4,000,000; reduced Sept., 1915, to $400,000; $1 par. Annual meeting, first Monday in September.

Property: 37 claims, unpatented, 740 acres in 2 groups on the north bank of the St. Joe river, 6 miles and 20 miles, respectively, above the head of navigation. Property includes water-rights. The Copper Prince group, formerly known as the Black Prince, has 13 claims, and the Idaho-Virginia, or Gold Ridge group, of about 24 claims, is about 6 miles east of the Copper Prince, and 3 miles from the C. M. & St. P. railway.

The Copper Prince group shows contact orebodies, between granite and Revett quartzite, of 20 to 30′ estimated average width, carrying chalcopyrite, bornite and gray copper, giving assays of 3 to 41% copper, and 8 to 13 oz. silver per ton. **Developed:** by 500′ of drift tunnels, driven from the sides of 2 canyons. The orebody has been traced by trenches and crosscut tunnels, on each claim, for the entire length of property, a distance of 7,800′.

The Idaho-Virginia group is reported to have a 15 to 20′ contact deposit, between granite and slate, carrying galena giving assays of 8 to 40% lead, and 14 to 46 oz. silver. **Developed:** by 2 shafts of 50′ and 250′ depth, and 3 crosscuts, intercepting a vein said to show galena ore of good quality. Buildings include a smithy, boarding house and a stable.

Company planned utilizing water power from Prince creek, by 6 miles of 3′ ditch and 1 mile of 3′ flume.

Equipment: includes 4 boilers, 2 hoists, 2 six-drill air-compressors, and a saw-mill. In 1916, S. B. Holbert, brought suit against company to recover $27,970 for services rendered and money advanced.

No recent information is obtainable.

COPPER QUEEN MINING & MILLING CO. IDAHO

See Reindeer Queen Mining Co.

CORBY LODE MINE IDAHO

Address: J. B. Steffes, 709 Division St., Kellogg, Idaho. C. W. Simmons, v. p.

Property: 4 claims surveyed for patent, on Pine creek, Shoshone county, adjoining Federal M. & S. on west, owned by 5 people, but controlled by J. B. Steffes and wife. A quartz fissure in slate carries $7.20 gold per ton and some antimony.

Development: by 488′ tunnel, attaining depth of 400′. Examined by Oscar Hershey.

A prospect.

CROWN POINT LEASING CO. IDAHO

Out of business after Coeur d'Alene Development Co sold mine to Stewart Mining Co. See Vol. XIII.

CUSTER CONSOLIDATED MINING CO. IDAHO

Address: Wallace, Shoshone county, Idaho.

Inc. July, 1910, in Nevada. **Cap.,** $1,000,000; shares $1 par.

Property: near the Tamarack & Chesapeake mine, was acquired by stock control by the Day Bros. Property a good one.

DADDY MINING CO. IDAHO

A co-partnership, not incorporated.

Address: A. D. Coplen, 2324 Altamonte Bldg., Spokane, Wash.

Property: 25 acres, Murray district, containing a 10-acre fissure vein in Prichard slate; gold value is reported to be $30 per ton.

Development: by 800′ tunnel with 4,000′ of workings.

Equipment: 10-stamp mill. Production to date is $200,000.

DOUGLAS MINING CO. **IDAHO**

Address: R. S. Clough, sec., Wallace, Idaho.

Cap., $1,500,000; $1 par assessable; 1,200,000 issued. Two dividends of 1c each paid in 1917, and ¾c in January, 1918. An assessment of 2 mills was levied November 12, 1919.

Property: 7 full claims on Pine creek, which were under option to the Anaconda Copper Mng. Co. until December, 1918, when it was relinquished, probably due to transportation difficulties.

Development: by 1,550′ of tunnels and several hundred feet of other work. Reserves are said to be 100,000 tons.

Production: Anaconda shipped 198 carloads of ore assaying 25% zinc, 8% lead, and 5 oz. silver per ton.

DU BOIS MINING CO. **IDAHO**

Address: G. W. Coleman, Kellogg, Idaho.

Officers: H. E. Ginter, pres.; J. B. Eberhart, sec.-treas., with J. W. James, Austin Blakeslee and S. J. Schreckengast, directors.

Inc. in Idaho. **Cap.,** $1,000,000; $1 par.

Property: 80 acres, 2 miles E. of Kellogg, Shoshone county, carrying gold, silver, and copper, and developed by 1,500′ tunnel and 600′ shaft. There is a 10-stamp mill available.

Mine has been idle for years.

DULUTH-MINNEAPOLIS MINING CO. **IDAHO**

Address: O. B. Wallace, mgr., Wallace, Idaho.

Officers: G. W. McClelland, pres.; R. M. White, v. p.; P. M. Olsen, sec.; J. J. Ecklund, treas., with J. S. Graves, directors.

Property: on Grouse gulch, Coeur d'Alene district, Idaho.

Development: by 1,850′ of tunnels. Crosscuts said to have opened from 12 to 20′ of lead-zinc ore. No recent returns.

EAST ALAMEDA MINING CO., LTD. **IDAHO**

Address: Alexander Murphy, treas.-mgr., Wallace, Shoshone county, Idaho.

Cap., $1,000,000; $1 par; 650,000 issued; assessable.

Property: 2 claims, 1 patented. Is a lead-silver prospect adjoining the Headlight and Big Divide mines in the Coeur d'Alene region.

EAST CALEDONIA MINES CO. **IDAHO**

Address: W. A. Bartee, sec., First National Bank Bldg., Kellogg, Idaho.

Officers: Herman J. Rossi, pres., Wallace; W. H. Nichols, v. p., Butte, W. A. Bartee, sec.-treas., with W. I. Hall, Kellogg, and Frank Pfeiman, Wallace, directors.

Inc. March, 1915, in Idaho. **Cap.,** $1,000,000; 25c par; assessment of 1c a share levied August, 1917.

Property: 130 acres, including the Keating mine at Wardner, Shoshone county, Idaho. **Ore:** is silver-lead in 4 known veins, from 9 to 25′ wide. Assays said to run from 1½ to 36% lead, with good silver values. Company claims to own or control 2,300′ of the Silver-King-Caledonia vein system for length of 4,500.′

Development: several tunnels and the Keating 600′ vertical shaft. The mine has been worked intermittently for several years before present company acquired control. In February, 1918, the vein was cut on 600′ level, 60′ from the shaft, showing some galena.

Equipment: hoist, 60-h. p. engine, air-compressor, pump, shaft-house and blacksmith shop.

EAST HERCULES EXTENSION MINING CO. **IDAHO**

Office: 337 Rookery Bldg., Spokane, Wash.

Officers: J. B. Millspaugh, pres.; C. S. Crawford, v. p.; W. H. Macfarlan, sec.-treas.; W. H. Reeves, mgr., Cheney, Wash.

Inc. in Idaho. **Cap.,** $1,500,000; $1 par.

Property: 8 claims, unpatented, 176 acres, 4 miles east of Burke, Idaho,

and about 2½ miles from the Hercules mine, reported to show a quartz vein carrying gold, copper, silver values.

Development: by tunnels 137′ and 500′ long, and 150′ of surface cuts. Annual assessment work only being done. Is a prospect.

EAST SNOWSTORM MINING CO. **IDAHO**

Mine near Larson, Shoshone county, Idaho. A fraud order was issued, 1911, by the postal authorities against C. E. Mitchell, promoter of this company, and also against the company. The title was changed, 1911, to "The Snowstorm Deep Mines, Ltd.," which has also been branded fraudulent. Property described Vol. X, Copper Handbook.

EAST STANDARD MINING CO. **IDAHO**

Address: Wallace, Idaho.

Officers: Joseph Matt, pres.; Hans Helgeson, v. p.; Gus Lohoeffer, treas.; C. E. Inskip, sec., with F. J. Ryan and Swan Swanson, directors.

Property: 4 patented claims adjoining the Hecla on the west in Coeur d'Alene region.

Development: is under way from a 2,100′ tunnel, which has opened mineralized ground.

ECLIPSE MINING CO. **IDAHO**

Was formerly the Lead King Mining Co.

Address: E. W. Conrad, pres.-mgr., Eagle Block, Spokane, Wash.

Property: 13 claims, in McFarren gulch, about 1 mile south of Osborne, Shoshone county, said to carry 2 veins, one with outcrops of high-grade galena, the other showing silver-copper ore.

Development: mainly by 4 tunnels, longest 550′, with open-cuts and shallow shafts, showing silver-lead and gray copper ore, giving good assays.

Equipment: includes several small cabins for mine purposes.

Mine was dormant from 1913 to April, 1918, when present company opened some ore in a tunnel.

ENTERPRISE MINING CO. **IDAHO**

Address: Kellogg, Idaho.

Officers: Fred F. Donaldson, pres.-mgr.; Gust Samuelson, v. p.; W. S. Tuson, sec.-treas.

Inc. June 17, 1910, in Idaho. **Cap.**, $1,000,000; $1 par; assessable; 775,000 issued. A 2 mill assessment was levied on October 29, 1919.

Property: 55 acres unpatented, 2½ miles E. of Kellogg, S. side of Coeur d'Alene river. Ore consists of lead and silver in a fissure in Prichard formation. Vein is said to be 30′ wide, dipping 40°.

Development: 1,200′ tunnel giving a depth of 600′, also 1,400′ of workings. Small shipments have been made in the past to Anaconda. Nonproductive in 1919, but crosscut tunnel had cut silver-lead ore early in 1920.

EUREKA MINING & MILLING CO., LTD. **IDAHO**

Address: Wallace, Idaho.

Officers: W. R. Powell, pres.; C. B. Fly, v. p.; A. D. Marshall, sec.; C. A. Sterling, treas.; and J. S. Mooney, directors.

Inc. 1905, in Idaho. **Cap.**, $1,000,000; $1 par.

Property: 1½ miles N. of Wallace, on Nine Mile creek, Shoshone county, carrying lead-silver ore. Developed by tunnels, one being 1,200′ long. Work was under way in 1919 and a motor-driven compressor installed.

EXCELSIOR MINING CO. **IDAHO**

Letters returned in September, 1918, from Burke, Shoshone county, Idaho. Chas. Chriswell, supt., at last accounts.

Property: 6 claims, carrying a 15′ vein, said to show copper carbonates and galena at surface.

Development: by 2 tunnels, over 1,000′ long.

FEDERAL MINING & SMELTING CO. **IDAHO**

Offices: 32 Broadway, New York, Wallace, Idaho, and Dover, Del.

Officers: F. H. Brownell, pres.; H. A. Guess, v. p.; F. C. Druding, treas.,

with H. W. York, F. R. Raiff, W. E. Bennett, E. L. Newhouse, G. F. Hilton, Fredk. Burbidge, Wm. Loeb, Chas. Earl, and Roger W. Strauss, directors; M. A. Shepherd, sec.; Fred. Burbidge, gen. mgr.; Wallace M. Murray, supt., Mullan, Idaho.

Inc. 1903, in Delaware (charter perpetual), amended Aug. 22, 1903. **Cap.**, authorized $20,000,000 pfd., 7% cum., and $10,000,000 com.; shares $100 par. Outstanding, $12,000,000 pfd. and $6,000,000 com. Preferred stock has no voting power except in connection with the increase of preferred stock, but is preferred as to assets. One-sixth entire capital stock said to be held by American Smelters Securities Co. Federal Guaranty Trust Co., New York, transfer office; U. S. Mortgage & Trust Co., New York, registrar. Annual meeting, second Monday in April. Listed on New York and Spokane Exchanges.

Dividends, per cent:

Year	Pfd.	Com.	Year	Pfd.	Com.	Year	Pfd.	Com.
1903.....	1¾	....	1908.....	7	....	1915.....	4	....
1904.....	7	4½	1909.....	7	1½	1916.....	4¼	....
1905.....	7	6(a)	1910-11....	7	....	1917.....	5¼	....
1906.....	7	6(b)	1912-13....	6	....	1918.....	7	....
1907.....	7	6(c)	1914.....	5	....	1919.....	2	....

(a) 4% extra. (b) 11% extra. (c) 8½% extra.

Preferred dividend rate reduced August 18, 1914, to a 4% basis. Accumulated dividends on this stock amounted to 12% up to 1920.

Summary of annual reports, income account:

	1918	1917	1916	1915	1914
Value of product	$2,408,867	.....	$5,204,513	$2,782,658	$2,200,777
Operating costs, etc	1,793,453	.....	4,159,745	2,326,719	2,011,684
Operating profit	$615,414	$1,446,937	$1,044,767	$455,939	$189,093
Miscellaneous earnings	308,611	176,000	613,311	352,662	702,462
Total earnings	$924,025	$1,622,937	$1,658,079	$808,601	$891,556
Deductions	1,397,889*	.....	789,880	498,234	339,160
Net credit to profit and loss	$473,864**	.....	$868,198	$310,367	$552,396
Less dividend on preferred	838,854	$839,027	509,409	479,444	599,305
Net to surplus account for the year	.....		$358,789	$169,076	$46,908
Balance at first of year	$1,601,157	$1,578,325	$1,219,536	$1,388,613	$1,435,522
Balance at end of year	285,440	1,601,157	1,578,325	1,219,536	1,388,319

* Includes $347,234 for Liberty Bonds, $598,229 for purchase of property, and $142,536 for Minerals Separation settlement. ** Loss.

Working capital, years ending December 31:

	Shares in other companies	Supplies	Accounts Receivable	Cash	Total current assets	Total current Liabilities	Excess of assets
1918.....	$288,627	$328,959	$277,475	$1,052,674	$1,967,735	$141,000	$1,826,675
1917.....	316,263	276,746	415,698	2,021,157	3,029,864	467,594	2,562,270
1916.....	288,620	174,603	655,496	1,136,983	2,255,702	373,719	1,881,983
1915.....	286,120	120,840	521,531	548,704	1,477,195	257,658	1,219,537
1914.....	286,120	114,376	261,040	770,496	1,532,032	211,887	1,320,145

Cash includes Liberty Bonds.

Smelting contract: the Federal has a contract with A. S. & R. Co., dated October 16, 1905, terminating August 31, 1930, by which the Federal company must sell all of the silver-lead ore, slime and concentrate, of its own or leased mining properties, and all owned or leased property of any company in which the Federal owns 75% of the capital stock to the A. S. & R. Co., and the latter agrees to take all such output.

The A. S. & R. allows the Federal 90% of the contents of the latter's lead ore at 90% New York quotations, when lead sells at less than $4.10 per 100 lb.; when the price is over $4.10 they divide the difference between $4.10 and the market price. Contract for silver calls for 95%, based on Handy & Harman quotation. Contract for gold calls for 95% at $20 per oz., provided ore contains 0.05 oz. per ton. Contract provides deductions of

$8 per ton for treatment charge plus freight to smelter (which was about $7.17 per ton), and 50c per ton for each 1% or fraction of 1% of zinc in excess of 10%. Federal cannot lease or dispose of its stock in a company owning or leasing mining property without previous written consent of the A. S. & R. Co.

Apex litigation with the Bunker Hill & Sullivan, started in 1908, was settled in 1910 by agreement between the two companies. The Federal company holds 28,000 B. H. & S. shares.

Property: company entered upon the operation of its properties Sept. 1, 1903. Of the preferred stock, $10,500,000, and of the common stock, $5,250,000, were issued upon the acquisition of all the mining property formerly owned by the Empire State-Idaho Mng. & Dev. Co., by the Standard Mining Co., the Mammoth Mines in Idaho, and certain smelting property at Everett, Wash. The smelting property has since been sold without loss to the company. The above mentioned mining property consists of silver-lead mines in the Coeur d'Alene mining district.

In 1910, company acquired an option on a portion of the stock of the Govt. Gulch Dev. Co., lying east of the Black Hawk mines in the Wardner district. On account of default of the stockholders, 414,000 shares out of a million reverted to the Federal Mining & Smelting Co. The property of this company consists of 1 patented and 6 unpatented claims. Company also controls through stock ownership the Black Hawk Mng. & Dev. Co., Ltd.

The company exercised an option on 7/10 of the Cleveland group of the Idaho Investment Co., and started negotiating for remaining 3/10, also for the Green Hill ground. This resulted in the organization of the consolidated Green Hill-Cleveland Mng. Co., to which company Federal deeded its 7/10 interest, and the owners, thereof deeded their 3/10 interest in the Cleveland group, and also all of the Green Hill ground. Subsequently Federal leased to the Green Hill-Cleveland Mng. Co. all of the mining and milling plant of the Mace mines for an indefinite term, until the ores in the ground belonging to the new company are exhausted, receiving therefor a rental of $180,000, payable out of the first profits of the new company, before any dividends were declared. Ownership of the Green Hill Co. lies 50% with the Federal company and 50% with the Green Hill interest. Owners of each half interest share equally in directorate and management of the new corporation, operations of which were started November 1, 1912. Dividends received by the Federal from the Green Hill-Cleveland Co. amounted to $352,000 in 1913, $576,000 in 1914, $192,000 in 1915, $160,000 in 1916. The Green Hill-Cleveland group was finally worked out early in 1918, and closed.

The Helena-Frisco property was purchased in January, 1913, for $100,000. Operations proved unprofitable and the mine was closed down, Aug. 9, 1916. The mill, plant and buildings were sold to the Tamarack Custer Cons. Mng. Co. for $150,000, the Federal company retaining all mineral rights.

In July, 1915, Federal purchased, at receiver's sale, the mine, concentrator, power line and supplies of the Iron Mt. Tunnel Co., at Superior, Mineral county, Mont., for $100,000. The mine is an old one, having been stoped for 1,700′ above water level 20 years previous. Operations proved disappointing and the mine was closed down, August, 1916. Salvage value of plant was $78,331.

In the 1916 annual report the following active properties are named: the Wardner, which includes the Last Chance mine at Wardner; the Mace, or Standard-Mammoth, one mile west of Burke: the Morning, at Mullan.

The Wardner group consists of 40 patented and numerous unpatented claims, also several hundred acres of agricultural land. Mineral claims cover over 7,000′ in length of the Wardner lode, developed by the Last Chance mine, north and west of the Bunker Hill & Sullivan; orebodies belong to the same vein as those worked by that company, and lie chiefly

along the Jersey fissure zone. The Sweeny adit level is the principal level. It is about 700′ above the Kellogg tunnel of the Bunker Hill & Sullivan. Ore is hauled to the Arizona portal, from there over a spur of the O.-W. R. R. Co.'s line to the mill at the mouth of Government gulch. Below the Sweeny tunnel is an inclined shaft several hundred feet deep with several levels. The mine has been a steady producer for 25 years, but is approaching the end, together with the Mace. Only the prevailing high metal prices during 1916 made profitable operations possible.

Negotiations for the purchase and development of the Independence mine at Hailey, in Wood River district, Idaho, for $500,000, were completed late in 1917. Although considered a good prospect, at last accounts no great quantity of ore had been developed. The ore is easy to treat, being almost free from zinc. It consists of shattered quartz coarsely crystalline galena and a little pyrite. Six levels have been opened at 100′ intervals. In 1918, a shoot 80′ long and up to 30′ wide was developed. A small mill is making concentrates. It is proposed to drive 3,000′ and connect this mine and the North Star.

The Morning mine, ½ mile N. W. of Mullan, is one of the large lead-silver properties in the district, and one of the best equipped. It is the most important mine of the Federal group, though its ores are the lowest grade of any property in the district and very difficult to treat. This is a sub-level mine, in that below the main or No. 6 tunnel is a shaft, the 18th level being 1,000′ below it. Some interesting notes and diagrams on the mine will be found in the report of the State Inspector of Mines, R. N. Bell, for 1918.

The new 2,000′ sub-level opened in 1919, shows normal ore 3,000′ vertically below the apex of the vein.

Adjoining the Morning mine is the property of the Star Mining Co., which late in 1917 brought suit against the Federal company, alleging wrongful extraction of ore, and claiming $500.000 damages. Many well-known engineers were retained by both sides. In March, 1918, the Star lost the case, and appealed. By this decision the Federal added considerably to its reserves of ore.

Development of company's mines in the Coeur d'Alene region is by shafts, the deepest being 1,250′, while at the Morning mine tunnels aggregate 12,000′. Reserves now total 1,519,280 tons compared with 890,000 in 1917; 1,170,000 in 1916; and 1,050,000 in 1915.

Ventilation of the mines has been attended to, and in February, 1918, a Sirocco fan of 30,000 cu ft. capacity per minute was installed at the Morning, and one of 60,000 cu. ft. was ordered.

The North Star-Triumph mines, near Hailey, Idaho, acquired under bond, 1916, have a 300-ton concentrator with flotation system and electric separator under construction. The properties are said to carry a large tonnage of complex ore, containing 14% zinc, 8% lead and 8 oz. silver. The ore-shoots are 20′ thick and several hundred feet in length and depth. Treatment is hindered by an excess of arsenical pyrite and some antimony.

Equipment: company is amply provided with modern concentrating (one of 1,000 tons capacity employing flotation at Wardner), pumping, hoisting, compressing and electric plants.

Production:

Year	Ore, tons	Lead in products, tons	Silver in products, oz.
1919 (9 months shipment)....	36,772	.....	.....
1918	360,588	.....	.....
1917	728,359	.....	.....
1916	.....	.....	.....
1915	461,252	26,777	983,830
1914	421,631	25,487	913,498

Production—Continued.

Year	Ore, tons	Lead in products, tons	Silver in products, oz.
1913	691,487	36,687	1,344,074
1912	836,947	50,937	2,649,667
1911	784,600	52,272	3,304,538
1910	741,650	48,155	2,801,319
1909	832,568	56,904	3,111,931

The data on the Federal M. & S. Co. is unsatisfactory, as information has been withheld in recent years. The above table shows that though the company has been a big producer in the past, its Coeur d'Alene mines apparently are nearly worked out. Recognizing this, company has bought new properties in Kansas and Oklahoma described elsewhere. Inasmuch as $12,000,000 7% preferred stock is in arrears over $1,000,000, and common has received no dividend since 1909, and is now worthless, the principal property, the Morning mine—has a heavy load to carry.

FLORENCE MINING & MILLING CO. IDAHO

Address: John B. Steffes, sec.-treas., Kellogg, Idaho.

Officers: Chas. Dallaire, pres.; J. D. Chisholm, Jas. Ezkiel, and John Haalund, directors, at last accounts.

Inc. 1908, in Idaho. **Cap.**, $1,000,000; shares $1 par; assessable; 440,000 issued. Assessment of 2 mills levied on October 11, 1919. Annual meeting, second Tuesday in July.

Property: 10 claims, 170 acres, due E. of the Alhambra and S. E. of the Sherman and Roanoke mines in the Yreka section of the Coeur d'Alene district. Ore occurs in vein in Revett quartzite, carrying lead, silver, and copper. Orebody is 100′ wide, has dip of 70° and S. E.-N. W. course.

Development: by crosscut tunnels, 150′ and 300′ long, with a total of 800′ workings. The lower tunnel started in 1917 to intercept the vein at depth of 1,000′ is still in progress. The power line was installed in 1916, and a compressor was added in 1917-18.

FLYNN GROUP MINING CO. IDAHO

Address: Wallace, Idaho.

Officers: J. T. Hayes, pres.; J. F. Whelan, sec.; with J. J. Cronin, B. W. Kern, and T. McCarthy, directors.

Inc. 1905, in Idaho. **Cap.**, $1,000,000; $1 par; 704,888 issued in 1916.

Property: 4½ miles N. E. of Wallace, Shoshone county, on the high ridge between Canyon creek and the South Fork of Coeur d'Alene river. It includes 16 unpatented claims owned outright, and an interest in 3 others. The Black Bear and Frisco mines are on the west, and the East Flynn and Ivanhoe on the east. Examined by Rush J. White in 1916. By securing an option on control of the Black Bear shares, a right-of-way through the Black Bear is now possible, and $3,000 monthly is to be spent in exploration.

There are 3 veins in Burke and Revett quartzite. No. 1 vein carries a little lead; Nos. 2 and 3 have no mineralization, though the latter is honeycombed and well oxidized. Little development has been done, but on the adjoining property, the Black Bear Fraction vein, has been developed to a depth of 1,160′, at a point within 300′ of the Flynn. The shoots are irregular and from 5 to 7′ wide, the ore assaying 2.2 oz. silver, 7.76% lead, and 16.57% zinc. Future development can best be effected by tunnels. Transportation is good, and power is obtainable nearby. More work is required to prove whether this property has merit or not.

FOUR TIMBERS MINING CO. IDAHO

Address: Wallace, Shoshone county, Idaho.

Property: between the Ray-Jefferson and Amazon-Manhattan mines.

Development: by tunnels, the uppermost 600′ long, cutting a well-defined vein. The lower adit was 900′ long with two shifts working late in 1919.

Equipment: electric power, 3-drill air-compressor, etc.

Company expects to obtain as good ore as that in the adjoining properties, named above.

FRIEND MINING CO. **IDAHO**

Address: 321 Lindelle Bldg., Spokane, Wash.

Officers: Wm. Schierding, pres.-treas.-mgr.; David Barth, sec.; T. F. Havens, v. p.; with Geo. Baxter, Herbert Nuffer, directors.

Inc. 1915, in Idaho. **Cap.,** $150,000; 10c par.; assessable. Annual meeting first Wednesday in August. Assessment of 3 mills was payable January 28, 1920.

Property: 9 unpatented claims in Beaver Creek district, Shoshone county, carrying veins with lead, silver, and zinc. It is reported that considerable ore was blocked out in 1919.

GERTIE MINING CO. **IDAHO**

Office: 708 Hutton Bldg., Spokane, Wash. **Mine office:** Burke, Idaho.

Officers: L. W. Hutton, pres.; A. A. Booth, v. p.; G. N. Crawford, sec.; John Harvey, treas., with Mrs. E. C. Travers, directors.

Cap., $150,000, increased in 1914 to $250,000; shares 10c par; non-assessable. Listed on Spokane Stock Exchange.

Property: 3 patented claims, 35 acres, near Burke, adjoining Hecla mine on the S. E. and Maher Ahern group on the W. Also owns about 10 acres at mouth of crosscut tunnel. Company has driven a 4,100′ tunnel with back of 1,400′, in the expectation of cutting ore in a vein mined on the Hecla property. This vein is said to have shown 3 or 4″ of clean galena, 300′ from the Gertie line and 250′ farther back Hecla is said to have mined 3 to 5′ of clean ore. A large vein was cut 1915, but results, being disappointing, management started a crosscut tunnel to Gertie claim to find the vein. Expenditures are over $75,000. In March, 1919, mine was closed down. In January, 1920, the Gertie had filed suit against the Hecla, alleging wrongful extraction of ore by the latter.

GIANT LEDGE MINING CO. **IDAHO**

Office: Spokane, Wash.

Officers: J. J. Taylor, pres.; J. Erikson, v. p.; W. W. Johnson, sec.-treas., Spokane; with D. S. Prescott and A. B. Shelton, directors. Chas. G. Taylor, mgr.

Inc. 1913, as a reorganization of the Granite Allie Co. **Cap.,** $1,500,000; $1 par; shares, 1,350,000 issued.

Property: on Granite gulch, 4 miles E. of Murray, Shoshone county.

Development: by 400′ shaft and over 900′ of other workings. On the 400′ level the vein is 20′ wide, averaging $7 per ton in silver.

Equipment: 7-drill compressor, hoist, pumps, 1½ mile flume and electric power. A 150-ton mill started 1917, was not finished March, 1919, when work was resumed after a 6 months shut-down. Favorably regarded.

GIANT MINING & DEVELOPMENT CO. **IDAHO**

Address: 517 Bank St., Wallace, Idaho.

Officers: A. Rechsteiner, pres.; E. R. Turk, sec., with G. Malcrida and P. Liever (mgr.), directors.

Cap., $100,000; 10c par; assessable; 4 mills per share levied, August, 1917.

Property: 7 claims in Beaver district, Shoshone county, opened by 1,600′ of workings, which show some lead-silver ore.

GOLD HUNTER MINING & SMELTING CO. **IDAHO**

Office: Mullan, Idaho.

Officers: P. J. Hennessy, pres.; E. C. Hennessy, sec.; T. F. Keeley, treas.; C. L. Herrick, managing supt.; C. K. Cartwright, mine supt.; G. Almquist, mill supt.

Cap., $2,000,000; $10 par; is a close corporation.

Property: 7 claims and a fraction, 240 acres, patented, in Hunter district, Coeur d'Alene region, Idaho; also 20-acre millsite.

Geology: fissure zone in quartzite and shale. Lead-silver sulphide ore occurs as shoots with dip of 80° S. and course of N. 75° W. The mineralized area is 200′ by 1,800′.

Development: by tunnels and shafts. Main tunnel 4,800′ long. Winze down 1,200′ below tunnel level. Two shoots developed, the N. 12′ wide, the S. 20′ wide. Best ore came from east part of Yolande and west part of West Hunter claims. In November, 1919, a cave-in of slopes imprisoned 2 men for 2 weeks.

Equipment: includes 150 h. p. electric hoist, two 3,000 cu. ft. compressors, 100 g. p. m. pump, 400-ton mill using 9 flotation cells on the Callow system.

Results of operations:

	Tons Ore	Gross	Cost Mining	Trans. and Treatment	Improvements	Net Profit
1915.....	118,764	$614,590	$333,904	$214,315	$34,707	$31,662
1916.....	119,490	815,779	482,275	180,186	8,044	161,361
1917.....	116,562	994,407	525,493	293,202	44,892	130,812

No later figures obtainable. The monthly output of concentrate is 1,200 tons.

GREAT DUNKER M. & M. CO. **IDAHO**

Address: E. C. Connor, Kellogg, Idaho.

Company was organized in July, 1919, to develop ground near Kellogg. $40,000 was to be spent on equipment and new work.

GREAT EASTERN MINING CO., LTD. **IDAHO**

Address: Wallace, Idaho.

Officers: John Carlson, pres.; Charles A. Solberg, v. p.; John C. Furst, sec.-treas.; with Edwin Erickson and Charles Bollinger, directors.

Inc. Sept. 19, 1900, in Idaho. **Cap.,** $1,000,000; shares $1 par; assessable. Annual meeting in April.

Property: the Great Eastern group, 14 claims, patented, at Gem, 4½ miles N. E. of Wallace, Shoshone county, said to show silver-lead-zinc ore in fissure veins.

Development: by shafts and tunnels, longest tunnel 3,000′. Claims are still in the development stage, and have been for a number of years. Management states that $6,000 was spent in 1915 on development work. Property is easily accessible to Northern Pacific and Union Pacific (O.-W.) railroads.

GREAT WESTERN MINING CO. **IDAHO**

Address: Burke, Shoshone county, Idaho.

Officers: Jesse Norton, pres.; Victor Hunt, v. p.; W. S. Bowie, sec., with W. K. Karnes, F. T. Robinson, and J. J. Jenkins, directors.

Property: 7 claims, patented, 3 miles from Burke, show vein traced for about 1,200′ by trenching, carrying copper and lead ore.

Development: tunnels of 1,270′ and 900′ and a 207′ shaft. Work was begun Aug. 12, 1904. A raise driven in 1914 was reported to have opened a 12′ orebody, assaying 7% lead, 1.54% copper and 0.4 oz. gold.

Equipment: includes hoist and small air compressor, driven by a 6-h. p. motor. Idle since 1917.

GREEN HILL CLEVELAND MINING CO. **IDAHO**

See Federal Mining & Smelting Co.

GUELPH MINING & MILLING CO., LTD. **IDAHO**

Head office: Kellogg, Idaho. **Mine office:** Sunset, Idaho.

Officers: Byrd Coyle, pres.; W. C. Boyle, v. p.; A. P. Corby, sec.; Eliza H. Steffes, treas.; J. I. Joy, T. J. Yarbrough, H. H. Rhodes, J. B. Steffes and S. D. Lemieux, directors.

Inc. Mar. 6, 1916, in Idaho. **Cap.,** $1,500,000; $1 par; 1,300,000 outstanding.

Property: 5 patented claims, in Placer Center district, adjoining the Hercules, Ambergris, Sunset, and Cons. Interstate-Callahan mines, Shoshone county.

Geology: quartz vein in Burke quartzite, with dip of 55° and strike, S. E. to N. W. Ore occurs as streaks and contains lead carbonate and silver chloride.

Development: by 225′ shaft to be sunk another 100′ and by 2,200′ of tunnels.

Equipment: includes 75 h. p. hoist, compressor, pump, and electric power. Development was in progress late in 1919.

HAMBURG-AMERICAN COPPER M. & M. CO. **IDAHO**

Address: Kellogg, Idaho.

Officers: Wm. Schaefer, pres.; Elmer Brown, v. p.; F. P. Jones, sec.; W. W. Papesh, treas.; Paul Jacobs, H. Froehlich, and Frederick Bell, directors.

Inc. Nov., 1908, in Idaho. **Cap.,** $1,500,000; $1 par; assessable.

Property: 8 claims, between the Handspike and Riverside, on the Little North fork, 18 miles from O.-W. R. & N. line.

Development: 1,100′ tunnel opening copper ore. No data since 1917.

HAYES CO. **IDAHQ**

Officers: A. Hayes, pres., Kellogg, Idaho; Martin Nicholson, sec.; S. A. Easton, treas.

Inc. 1917, in Idaho. **Cap.,** $50,000; shares $1 par.

Property: company had a lease on about 1,200 acres, including 3 miles of river bed along the Coeur d'Alene river, and operates a 200-ton flotation plant costing $50,000, for recovery of lead and silver from slime from the bed of the south side of Coeur d'Alene river.

Production: to Aug., 1917, 9 cars of slime running about 22 oz. silver and 30% lead.

HEADLIGHT MINING CO., LTD. **IDAHO**

Address: Wallace, Idaho, and Markwell Bldg., Long Beach, Cal.

Officers: F. P. Markwell, pres.; Alex. Murphy, v. p.; Everett H. Pattison, sec.; Oscar Nordquist, treas., with C. A. Markwell and Angus Sutherland, directors.

Inc. 1900, in Idaho. **Cap.,** $1,800,000; $1 par; 1,438,995 issued. Bonds: $50,000 issued.

Property: 13 claims, 10 patented, 130 acres, in the Leland mining district, Shoshone county, reported to show lead-silver ore in fissure veins in quartzite. Developed by tunnels. Idle, 1917-1919. Ground is said to contain the extension of the Standard-Mammoth vein, but is reported that there has been friction with the Federal company over apex rights, though the Headlight has lacked funds to prove its contention.

HECLA MINING CO. **IDAHO**

Office: Wallace and Burke, Idaho.

Officers: Jas. F. McCarthy, pres.-treas. and general manager at Wallace; with Sarah E. Smith, Carl Landsee, F. J. Kipp, W. J. C. Wakefield and H. C. Lambach, directors. L. E. Hanley, sec., Wallace, C. H. Foreman, engineer; J. B. Sloan, mechanic.

Original Hecla Mining Co., inc. in Idaho in 1891, with cap., $500,000 and shares $1 par, owned the Hecla and Katie May claims. **Re-incorporated** July, 1898, in Washington. **Cap.,** $250,000; shares 25 cts. par; all issued and fully paid. Security Transfer and Registrar Co., New York, transfer agent; Metropolitan Trust Co., New York, registrar. Annual meeting in April. Listed on New York Curb, Los Angeles and Spokane Stock Exchanges.

Financial Statement for years ending December 31:

	1919	1918	1917	1916
Ore sales and sundry revenue	.....	$4,035,339	$3,671,818	$2,549,195
Operating charges, depreciation, etc.	$1,692,771	1,980,621	1,507,868	791,567
Net profit	1,066,232	2,054,718	2,163,950	1,757,628
Dividends	626,539	350,000	1,600,000	1,550,000
Current assets	1,822,226	2,467,607	.....	544,868
Current liabilities	63,318	76,933	.....	111,949

Dividends: $420,000 up to Aug., 1905, then as under, years ending Aug. 1, to 1911, after which, Jan. 1:

Year	Amount	Year	Amount
1906	$340,000	1913	300,000
1907	540,000	1914	320,000
1908	29,000	1915	220,000
1909	250,000	1916	565,000
1910	170,000	1917	1,550,000
1911	210,000	1918	1,600,000
1912	130,000	1919	600,000

The total to end of 1919 was $7,855,000.

Property: 29 patented claims, 347 acres, near Burke, also mill-site at Gem.

Geology: ore is chiefly silver-lead sulphides accompanied by sphalerite and pyrite, occurring in the Hecla lode; strike N. W.-S. E., with average dip 80° to N. E. General country rock is sericitic Burke quartzite. The lode is intimately associated with a lamphrophyric dike, which has an average width of 2′. Ore averages 5′ to 6′ in width, occurs mainly in the quartzite on one or both sides of the dike, and, to a large extent, fills fissures. The pay-shoot has an extreme length of 1,200′. The Hecla ore carries lead and silver, and that of Ore-Or-No-Go carries zinc as well. For geology of Coeur d'Alene district, see U. S. G. S. Prof. Paper No. 62, published in 1908; also paper by Oscar A. Hershey, published by M. and S. Press. In November, 1919, it was reported that the Federal M. & S. Co., for the Marsh Mines Consolidated was to institute an apex suit against the Hecla, alleging ore was wrongly extracted from the east orebody of the Hecla. The Gertie M. Co. also started suit in January, 1920.

Development: is by tunnel and shaft. Extensions amounted to 6,420′ in 1916; 12,386′ in 1917, and 13,566′ in 1918.

The main shaft was 2,000′ deep in 1918, at which depth a station, sump, and skip-pocket were cut and the vein cut, the drift showing ore 12″ wide. Work continued on the East orebody between No. 3 adit and the 900′ level; also from No. 2 shaft level to 1,200′ on the Ore-Or-No-Go orebody.

Reserves were estimated at 1,296,000 tons in 1916; 1,326,399 tons in 1917; 1,584,115 tons in 1918, and 1,549,833 tons in 1919, plus 750,000 tons probable.

Equipment: the property is one of the best equipped in the district, with hoists, compressors, machine-shops, and a 500-ton concentrator. The mill at Gem has a flotation unit. Electric haulage was started in 1917.

Production:

	1918	1917	1916	1915	1914	1913
Ore milled, tons	309,656	292,726	184,209	.....	.....	.....
Ore and concentrate shipped, tons	52,894	45,517	40,832	26,214	20,052	19,937
Lead produced, lb.	51,635,676	44,363,559	40,217,573	24,917,867	18,957,823	18,832,534
Silver produced, oz.	1,590,062	1,366,960	1,195,841	692,444	509,200	507,236
Zinc produced, lb.	433,341	507,888	.....	.....	.....	.....
Average lead price, cents per lb.	7.35	8.47	6.94	4.87	3.87	4.36
Average silver price, cents per oz.	98.00	82.90	67.30	50.40	55.00	59.50
Average zinc price, cents per lb.	7.64	9.06	.....	.....	.....	.....
Cost of mining, sorting and general expenses, per ton	$4.316	$3.493	$2.346	.....	.....	.....
Cost of milling and transportation	0.674	0.686	0.612	.....	.....	.....

In 1919, shipments were 24,726,015 lb. lead and 795,058 oz. silver.

In 1917 company made a very favorable 5-year contract with the Bunker Hill & Sullivan Co. for the smelting of its lead-silver ore and concentrate at the Kellogg plant. Prior to this arrangement these products were sent to Tooele, Utah.

The Hecla mine, though unsuccessful in its early years, has become one of the steady dividend-payers of the district. The property is kept up to a high standard, is efficiently managed, and costs are low.

H. E. M. MINING CO. **IDAHO**

Consolidated with the Aurora-Sampson Mining Co., to form the Western Union Mining Co., which see.

HENRIETTA EXPLORATION CO. **IDAHO**

Address: Wm. A. Beaudry, mgr., Wallace, Idaho.

Organized, 1917, by Wm. A. Beaudry, P. Weber, Ben. Harmon, Sidney Shonts, and Frank H. Skeels. Has a 5-year lease from 1917 with option to purchase at $80,000, on the Bear Top mine, formerly owned by the late M. S. Simmons of Murray.

Property: about 5 miles from Murray, shows a vein in slate, carrying silver-lead ore in pockets and irregular shoots. Lessees operate on a royalty basis, paying 15% on lead settled for under 7½c per lb., and 20% for shipments netting above that figure.

Development: 2,200′ of tunnels and over 2,000′ of other workings.

Equipment: power plant and concentrator, but no returns are published therefrom.

HENRIETTA LEASING CO. **IDAHO**

Name changed to Henrietta Exploration Co., which see.

HERCULES MINING CO. **IDAHO**

Address: Eugene R. Day, mgr., Burke, Idaho.

Company is a partnership, not a corporation, the Day family owning a half interest and dominating the policy. It owns 500,000 shares Northport Smelting & Refining Co., at whose smelter at Northport, Wash., ore and concentrate from the Hercules and other mines is reduced.

Hercules holds the following stock:

168 shares Pennsylvania Smelting & Refining Co.
9,800 shares Hidden Treasure Co.
720,330 shares Idaho & Eastern Mining Co., a controlling interest.
912,719 shares Hummingbird Mining Co., a controlling interest.
505,333 shares Ambergris Mining Co., a controlling interest.
840,854 shares Basin Mining Co., a controlling interest.

Property: the Hercules mine near Burke, is the greatest bonanza of the Coeur d'Alene region. It has one big vein in quartzite and slate, cut by two cross-faults and one dike.

Development: by tunnels. In the lowest or Hummingbird tunnel nearly level with the town of Burke, there is an 800′ shaft, making a total depth of 2,500′ below the apex. Early in 1918, No. 5 level of this shaft, 2,000′ below the surface, entered rich lead-silver ore, opened for a length of 480′ at last accounts.

Production: 1901 to October 28, 1916:

	Average Price			Milling Ore		Shipments		Crude Ore	
			Tons	Lead	Silver	Crude	Concts.	Lead	Silver
Year	Lead	Silver	Mined	%	oz.	Tons	Tons	%	Oz.
1901....	4.36	58.95	362	.....	.....	362	.....	59.84	132.13
1902....	4.10	52.16	5,003	.....	.....	5,003	.....	62.34	83.92
1903....	4.26	53.57	10,043	.....	.....	10,043	.....	62.28	89.69
1904....	4.32	57.22	12,266	.....	.....	12,226	.....	56.40	77.55
1905....	4.70	60.35	14,691	.....	.....	11,384	38	55.47	68.81
1906....	5.66	66.79	74,998	7.34	6.90	9,379	8,178	57.53	58.55
1907....	5.35	65.32	90,683	7.82	7.54	9,537	10,929	54.20	54.29
1908....	4.23	52.86	90,087	9.53	9.32	6,395	13,050	56.61	52.55
1909....	4.30	51.50	61,820	10.07	9.43	6,076	11,874	54.16	47.01
1910....	4.49	53.49	161,550	10.70	9.86	6,627	19,138	46.00	38.87
1911....	4.46	53.30	176,325	9.49	8.32	8,459	22,940	49.79	44.89
1912....	5.15	60.83	180,286	9.20	7.90	11,402	22,595	44.06	40.44
1913....	4.39	59.78	132,955	10.76	7.97	15,684	25,008	52.02	42.65
1914....	3.87	54.81	192,361	12.45	10.58	20,364	39,282	57.32	52.61

Production—Continued.

Year	Average Price Lead	Average Price Silver	Tons Mined	Milling Ore Lead %	Milling Ore Silver oz.	Shipments Crude Tons	Shipments Concts. Tons	Crude Ore Lead %	Crude Ore Silver Oz.
1915....	4.67	49.69	215,089	10.10	8.02	12,603	36,428	51.20	39.61
1916....	6.85	65.66	231,568	10.88	8.73	20,400	49,144	47.29	35.40
Total.	.....	.....	1,650,087	.....	.....	165,984	258,604	.....	.....
Average 11 yrs	.....	.....	.....	9.85	8.60	.....	.....	51.83	46.08
Average 16 yrs.	4.70	57.27	.....	.....	.....	.....	.....	54.16	59.93

Year	Concentrate Lead %	Concentrate Silver oz.	Value per Ton	Receipts	Profits	Dividends
1901.....	....	....	$84.53	$27,810	$20,567	$8,000
1902.....	....	....	55.12	266,785	169,527	94,200
1903.....	....	....	69.75	667,616	438,746	257,800
1904.....	....	....	63.55	731,107	430,418	544,000
1905.....	....	....	66.87	725,218	375,348	228,000
1906.....	57.53	58.55	74.51	1,272,000	787,534	880,000
1907.....	54.20	54.29	65.62	1,296,328	765,160	800,000
1908.....	56.61	52.55	48.46	907,071	383,751	448,000
1909.....	54.16	47.01	44.70	798,245	325,305	352,000
1910.....	46.00	38.87	36.52	874,955	418,542	384,000
1911.....	47.23	37.52	38.30	1,148,574	544,429	329,227
1912.....	48.18	39.34	43.36	1,415,462	715,763	704,000
1913.....	54.91	41.77	51.83	2,055,633	1,207,326	1,024,000
1914.....	55.76	46.56	50.76	2,991,148	1,868,761	2,176,000
1915.....	53.14	38.67	44.03	2,103,955	1,096,019	320,000
1916.....	47.95	34.33	54.22	3,690,703	2,368,682	1,432,000
Total.....	.....	.....	.....	$20,972,610	$11,915,878	$9,981,227
Average 11 years.	52.33	44.49				

Production: for years ended May 1, as made to County Assessor, is as follows:

Year	Ore mined tons	Gross value	Cost of mining	Cost freight and treatment	Cost of betterments	Net Profits
1917....	87,179	$7,272,258	$1,501,129	$2,634,028	.....	$2,931,136
1918....	108,052	9,880,978	2,140,052	3,765,024	$282,500	3,690,400

The property normally employs 500 men. On account of the lead market, mine was closed for 5 months in 1919.

Litigation in which the Hercules is involved is known as the Cardoner case. On October 28, 1916, a 1/16 interest in the mine was purchased from Mathilde Cardoner of Albuquerque, New Mexico, by Eugene R. Day, for $350,000. Later it was alleged that he did not give correct statements as to the value of the mine, therefore Mrs. Cardoner was not paid enough for her interest. On January 25, 1918, the U. S. District Court upheld the legality of the sale, but in August the case was appealed.

Equipment: electric locomotives on No. 5 tunnel, Ilgner type electric hoist, machine and other shops, and 700-ton mill employing flotation at Wallace.

HIGHLAND SURPRISE CONSOLIDATED MINING CO. IDAHO

Address: First State Bank, Kellogg, Idaho.

Officers: W. W. Papesh, pres.; M. J. Sinclair, v. p.; Chas. Weigand,

sec.-treas.; preceding with Chas. R. Mowry, George Lamielle, and L. F. Macheski, directors.

Inc. 1912, in Idaho. **Cap.**, $1,200,000; shares $1 par; assessable; assessments of 1c share are levied occasionally, to provide fund for development work. Last assessment due September 18, 1919.

Property: 18 claims, 3 patented, 400 acres in Pine Creek, 15 miles by road S. of Kellogg. Also 9 claims, lying east and on the strike of the Highland vein, tying up property to the Bunker Hill & Sullivan ground.

Ore: carries silver-lead-zinc sulphides in fissure veins in slate; veins strike N.; 60° E., dip 70°.

Ore said to average 5 oz., silver, 8% lead and 20% zinc. A shoot of zinc ore opened is 640 long, 3 to 12′ wide.

Development: by 2 main tunnels with 5,000′ of workings.

Equipment: includes 175-ton mill erected in 1915, using rolls, jigs, tables, tube mill and Callow flotation plant.

Early in 1919 a few men were employed on development work, which the company reported as being very satisfactory. See Vol. XIII, for details of property.

HILARITY MINING CO. **IDAHO**

Consolidated January, 1917, with the Pine Creek M. & M. Co.

Address: W. H. Moffitt, sec., Wallace, Idaho. Jacob Lackman, pres., Nampa, Idaho.

Cap., $1,000,000; $1 par. Listed on Butte Exchange.

Property: 18 claims in the Pine Creek district, Shoshone county, covers about 1 mile along strike of vein said to be the extension of the Constitution and Douglas.

Ore: carries lead and zinc.

Development: by 2 tunnels with 700′ of workings. Property is a prospect. No recent returns.

HILL MINING & MILLING CO. **IDAHO**

Address: Josiah Hill, Kellogg, Idaho.

Property: a group of claims near Kellogg, Shoshone county.

Development: by tunnels, one 900′ long, exposes some lead ore in vein cutting slate and quartzite.

HORSESHOE MINING CO. **IDAHO**

Address: Mullan, Idaho.

Officers: Lawrence Hollywood, pres.; P. J. Scoles, sec.-treas., with P. B. Scoles, directors.

Inc. 1908, in Idaho. **Cap.**, $1,500,000; $1 par; 900,000 issued.

Property: 12 claims, 1½ miles S. E. of Mullan. Shoshone county, and adjoining the Kennedy group in Rio Grande gulch.

Ore: carries silver and lead occurring as carbonate and galena in fissure veins in quartzite.

Development: by tunnels.

HORST-POWELL COPPER MINING CO. **IDAHO**

Merged August, 1919, with the Linfor Copper Co., which see.

HYPOTHEEK MINING & MILLING CO. **IDAHO**

Address: Wallace, Idaho. **Mine office:** Kingston, Shoshone county, Idaho.

Officers: J. H. Kerns, pres. and gen. mgr.; J. H. Guenther, v. p.; O. A. Olsson, sec.-treas. and mgr.; with W. W. Davidson, J. H. Kirk and S. A. Covert, directors.

Cap., $200,000; 10c par; assessable. Bonds; $105,000, 7%. 12-year, authorized in 1914. An assessment of 5 mills per share was levied in April, 1918. Listed on Spokane Exchange.

Net smelter returns from November 1, 1916, to February 11, 1918, were $207,911, and expenses for same period totalled $211,829. In August, 1918, the option on 1,100,000 shares, held by J. E. George of New York at 15 cents each, was relinquished Share prices have been very erratic, jump-

ing from 4 to 22 cents within 2 months. In September, 1919, the price was 2½ cents bid.

Property: 9 claims, 6 miles from Enaville, Shoshone county, located 1886, by Octave Guay, shows 3 veins, 2 of 10 to 20′ estimated width, the third vein, known as the Great Western, of 8 to 25′ width, having a 12 to 18″ paystreak carrying native copper and cuprite, assaying up to 16%, balance of vein carrying low-grade ore, estimated to carry 2% copper, with small gold and silver values in quartz gangue.

Development: by 1,000′ tunnel and 3-compartment shaft to the 1,100′ level. The 523′ level (750′ below surface) opened up a fine shoot of commercial lead ore. The 900′ level showed this ore to be 6′ thick and 400′ long. This is the deepest mining work in the Prichard slates of the Coeur d'Alene sedimentary series, a formation hitherto considered unpromising. The finding of chalcocite at this mine below 1,000′ of Burke quartzite completely contradicts all former views. In February, 1916, a crosscut on the 1,100′ level opened up a vein of solid galena ore from 18 to 24″ wide. In December, 1919, a new tunnel was being driven.

Property examined by J. V. Richards in June, 1917, who reported that the ore shoot opened by the 700′, 900′ and 1,100′ levels was 400′ long and averaged 3′ in width. The ore is largely lead carbonate, assaying 10% lead and 1 oz. silver per ton. Half-way between 900′ and 1,100′ the shoot is cut off and but little ore is found at 1,100′, or 100′ below it, although the vein is strong. Reserves would not exceed 20,000 tons. In 1917, the company let a contract for drilling the ground north and south of the vein, also below 1,200′, and it was reported that 4′ of 20.5% lead ore had been cut by the drill.

Equipment: the mine is electrically equipped and has a 200-ton concentrator with Chilean mill, Wilfley tables, Frue vanners, etc., A 3-mile aerial tram was installed to convey ore from the mine to the railway.

Production: 25 tons of crude ore and concentrate weekly in 1917. No recent news.

IBEX MINING CO. **IDAHO**

Address: Amalgamated Stock Holding Co., Wallace, Idaho.

Inc. April 15, 1911, in Idaho. Company still in existence, but comatose.

Property: 4 claims, adjoining Idaho, Boulder Creek and Bitter Root mines. Three-fourths of a mile S. of Mullan and 300′ from N. P. R. R. Property shows 4′ iron vein adjacent to a diabase dike. Developed by 2 tunnels, the lower one starting from the Coeur d'Alene river to cut vein at 700′ below outcrop.

IDAHO CARBONATE HILL CONSOLIDATED MINING CO. IDAHO

Address: A. W. Witherspoon, Peyton Bldg., Spokane, Wash.

Inc. 1917. **Cap.,** $750,000; 25c par.

Officers: W. D. Greenough, pres., Alfred Thompson, v. p.; A. W. Witherspoon, sec.-treas.; with Herbert Wheeler and Dr. R. A. Griffiths, directors. W. E. Greenough, mgr.

Property: 24 claims formerly owned by the Carbonate Hill and Idaho Giant Mining companies purchased 1917 for $275,000. Total area 473 acres, 2½ miles S. E. of Mullan, Shoshone county.

Development: both groups are opened by tunnels, workings aggregating over 5,000′. Ore carries lead and zinc. A shaft has been sunk 800′ below the Carbonate Hill tunnel, at a point 1,200′ from portal. Encouraging results were reported from the 400′ level in September, 1919.

Equipment: 12 by 15″ hoist, water-driven compressor, at Snowstorm mine at Larson connected by 11,000′ pipeline, dwellings, and shops. About 25 men are employed.

IDAHO CONSOLIDATED PLACER MINING CO. **IDAHO**

Address: Fred A. Clauson, 309 Broadway, New York City.

Inc. 1919, in Delaware. **Cap.**, $1,500,000; 600,000 shares in treasury. Stock to be offered at par.

Equipment: 6 giants, 2 small, 4 large, handle 7,000 cu. yd. daily.

IDAHO COPPER MINING CO., LTD. **IDAHO**

Office: Wallace, Idaho, and Mullan, Shoshone county, Idaho.

Officers: John H. Nordquist, pres.; A. N. Stroud, v. p.; Geo. F. Stoney, sec.; A. H. Featherstone, treas.; W. H. Herrick, gen. mgr.

Property: 6 claims, 3 patented, on the Continental divide, between Idaho and Montana, near the head of Willow creek, in the Hunter district, west of the Reindeer Copper & Gold M. & M. Co., Ltd. Claims carry about 4,500′ of the strike of the extension of the Reindeer vein, and are developed through the 3,000′ Reindeer crosscut tunnel. Idle at last report.

IMPERIAL MINING CO. **IDAHO**

Office: Wallace, Idaho.

Officers: John H. Nordquist, pres.-gen. mgr.; J. N. Thennes, v. p.; H. G. Brown, sec.; with G. A. Lahaefer, directors.

Inc. Sept. 12, 1908, in Idaho. **Cap.**, $1,000,000, increased later to $1,500,000; $1 par, assessable; 1,486,469 issued.

Property: 8 patented claims, 159 acres, adjoins the Copper King on the west, 1 mile E. of Burke.

Development: by 5,000′ of tunnels and crosscuts; a 750′ raise is to be driven when work is resumed. Deposit is a fissure vein in Revett and Burke quartzite, carrying silver bearing lead ore. Over $15,000 worth of development work done, including diamond drilling and raising, to prospect the orebody found in the upper or 4,000′ tunnel, which was not encountered below.

Equipment: 3-drill electrically-driven compressor.

After being closed down for 2 years, mine was reopened in 1915, but again shut-down in 1918. Work is to be resumed as soon as conditions permit.

INDEPENDENCE LEAD MINES CO. **IDAHO**

Officers: Maurice W. Bacon, pres.; John H. Wourms, v. p.; W. E. Cullen, Jr., sec. Hyde Bldg., Spokane, Wash.; with R. A. Carnochan and C. Van Ordstrand, directors.

Inc. Nov., 1914, in Idaho, as a reorganization of the Independence Gettysburg Mining Co. **Cap.**, $1,500,000; $1 par; assessable, 1,400,000 shares issued. Stock listed on the Spokane Exchange.

Property: 10 patented claims and a ½ interest in the Key Lode claim, in the Coeur d'Alene district, 1 mile from Mullan, on the N. P. R. R. Claims adjoin the Gold Hunter M. Co. holdings to the E. and the You-Like and Morning mines of the Federal M. & S. on the W. Mine shows 3 veins believed to be the extension of the Morning-Evening, You-Like and Midnight orebodies, which have been profitably worked to depth of 2,800′ on adjoining properties.

Development: mainly by 4 crosscut tunnels, 200′, 400′ and 1,800′ long. The longest, or No. 4 tunnel, 370′ vertically below No. 3, early in 1916 intercepted the You-Like vein, showing 8′ of ore assaying 4 oz. silver, 3% lead with some iron sulphide. In 1918 this tunnel was continued north to reach the Morning vein. Mine was formerly owned by F. A. Heinze, and $50,000 has been spent in exploration. In 1918, it was reported that the Federal M. & S. Co. had obtained control.

INDEPENDENT COPPER MINING & MILLING CO. **IDAHO**

Address: Wallace, Idaho.

Officers: John H. Nordquist, pres.; J. N. Thennes, v. p.-gen. mgr. and agt.; Otto A. Olsson, sec.-treas.; with James A. Bean, Aug. Matt, Chas. McKinnis, Forest Clark and Henry Bilberg, directors.

Inc. 1907, in Idaho. **Cap.**, $1,250,000; $1 par; issued $950,000; assessment to date 1½ cts. per share. First meeting in 7 years held June, 1914.

Property: 3 claims, the Bullpen, San Quentin and Independent Frac-

tion, in the Snowstorm copper belt, 3½ miles N. E. of Mullan in the Hunter mining district, Shoshone county. Claims show quartzite cut by 4′ fissure vein running N. 72° W., 80° S., the vein underground said to be 10′ wide and to carry scattered bunches of 2% copper ore.

Development: includes 800′ crosscut tunnel, with 300′ or more of drifts at a depth of 300′ below the outcrop. Property idle 1908 to 1913; later work has not developed ore in commercial amount.

INDEPENDENT DEVELOPMENT CO. **IDAHO**

Address: W. A. Smith, Wallace, Idaho.

Cap., $100,000; shares 10c par.

Organized 1917 to treat tailings from the Coeur d'Alene river between Kingston and Dudley and to extract the galena by flotation. Claims said to contain 500,000 tons worth $3.54 per ton, that could be treated and marketed at $1.64 per ton, according to information supplied in 1917. No recent returns.

INLAND EMPIRE MINING & MILLING CO. **IDAHO**

Address: Box 73, Burke, Idaho.

Officers: Mary Madar, pres.; Frank Bath, v. p.; Geo. Clair, sec.; John Madar, treas.

Inc. Feb., 1910, in Washington. **Cap.,** $1,000,000; $1 par; assessable: 1,000,000 issued.

Property: 11 acres, patented in Leland district, Shoshone county. Sulphides of lead, silver, zinc, with low gold values occur in a quartz vein 80′ wide in Burke quartzite. Selected sample assayed $59 per ton.

Development: by 225 inclined shaft, tunnel 450′ and 500′ long, and 1,200′ of workings.

Equipment: a 5 h. p. electric hoist, small compressor, 10 h. p. electric pump and partly completed mill. Expended $15,000 in 1918. No production as yet.

IRON SPAR COPPER MINING CO. **IDAHO**

Address: A. L. Honeker, Wallace, Idaho.

Officers: Wesley Everett, pres.; A. L. Honeker, v. p.-treas.; G. W. Doherty, sec.; with A. L. Nicholson, directors.

Inc. May 4, 1904, in Idaho. **Cap.,** $1,000,000; $1 par; assessable.

Property: 4 claims, 80 acres, in St. Regis district, east Coeur d'Alene, partly in Idaho and partly in Montana, 1½ miles from N. P. R. R. Vein carries gold-silver values in copper ore, encased in quartzite walls.

Development: by 600′ tunnel. No equipment on property.

IVANHOE MINING CO. **IDAHO**

Address: C. D. Miller, Wallace, Idaho.

Officers: J. A. Bean, pres.; C. D. Brock, v. p.; C. D. Miller, sec.-treas.; with S. C. Bean, J. H. Foss, and J. H. Nordquist, directors.

Cap., $1,500,000; $1 par; an assessment of 1½ miles was levied early in 1918.

Property: 2 claims, the Ivanhoe and Palisades, patented, adjoining the Star group on the S., 3 miles N. W. of Mullan, Shoshone country, shows lead-silver-zinc ore. Mine supposed to have continuation of Morning vein. A crosscut from the Star main tunnel (4,200′ long) intersected the main vein at 1,400′ vertical depth. Drifting on the ledge for 200′ proved it to average 6′ in width with 2′ of low-grade milling ore. Property has been under development since 1904. Diamond-drilling was suspended early in 1918 on account of litigation between the Federal and Star companies.

JIM BLAINE SILVER SYNDICATE, LTD. **IDAHO**

Address: Charles Lafavre, Kellogg, Idaho.

Officers: M. Baumgartner, pres.; R. L. Brainard, v. p.; W. L. Niehorster, sec.-treas.; with Charles Lafavre and John Jahde, directors.

Inc. 1920 in Washington.

Property: 8 claims on Pine creek, near the new Nabob mill, Shoshone county.

Development: by 500′ crosscut tunnel and a drift on the vein, which contains silver-lead ore. Work is to be continued.

JUMBO MINING CO. **IDAHO**

Address: Wallace, Idaho. John Carlson, of Gem; J. N. Morgan, of Mace, and John Wood, C. E. Conn and Chas. Minch, of Gem, Idaho, incorporators.

Inc. Aug. 28, 1913. **Cap.**, $1,000,000; $1 par. No returns secured.

KELLOGG GALENA MINING CO. **IDAHO**

Idle. **Office:** Old National Bank Bldg., Spokane, Wash.

Officers: C. C. McEachran, pres.; S. A. McCoy, v. p.; H. F. Aldrich, sec.-treas.; with J. K. Smith and Geo. W. Sommers, directors, all of Spokane.

Inc. 1915, in Washington. **Cap.**, $1,500,000; 10c par; 1,260,000 issued. Annual meeting second Tuesday in February.

Property: 2 groups, each of 7 claims, one 3 miles N. W., the other 2 miles S. E. of Kellogg, adjoining the Bunker Hill & Sullivan. Deposit is quartzite with iron carbonate and small values in silver and lead. It is opened by a 700′ tunnel; a 500′ shaft is to be sunk when company starts operating mine.

KELLOGG SUNNYSIDE MINING CO. **IDAHO**

Absorbed by Kellogg United Mines Co., which see.

KELLOGG UNITED MINES CO. **IDAHO**

Address: Old Nat'l Bank Bldg., Spokane, Wash.

Officers: S. A. McCoy, pres.; J. A. McEachran, sec.; G. W. Sommer, treas. and Theo. Brown, directors.

Cap., $500,000; shares 25c par. Is a consolidation of the Kellogg-Sunnyside Mining, Brown Leasing, and Coeur d'Alene Atlas Mining Companies.

Property: 3 groups of claims, about 1,000 acres, in the Pine Creek district, Shoshone county, said to have 40,000 tons of lead-zinc-silver ore.

Development: by tunnels and shafts, workings aggregating over 5,000′.

KENNAN MINING CO. **IDAHO**

Office: Wallace, Idaho.

Officers: Robt. Scott Ord, pres.-treas., 2628 Manito Blvd., Spokane, Wash.; Chester J. Kennan, v. p.-sec.-mgr. and E. J. Roberts, directors.

Inc. 1917, in Idaho. **Cap.**, $250,000; shares $1 par. Annual meeting, June 23rd.

Property: about 1,250 acres on Pony creek, between Wallace and Murray, Shoshone county. Management reports having 6 gold veins, a tungsten vein and 8 silver-lead veins; latter having aggregate length of 8 miles.

John A. Percival, 61 Broadway, New York, holds an option on controlling interest.

KEYSTONE MINES CORPORATION **IDAHO**

Liquidated 1918, stockholders receiving 13½c per share for their holdings. Property sold to Armstead Mines Corporation.

KILL BUCK MINING CO., LTD. **IDAHO**

Owned by estate of Jos. Clark and by Hon. W. A. Clarke, 20 Exchange Place, New York.

Cap., $100,000; shares 10c par; all issued; unlisted.

Property: 5 claims on Lake creek, adjoins Chicago-Boston holdings, 2 miles S. W. of Wallace.

Development: by extension of Coeur d'Alene Vulcan M. Co. tunnel, 3,500′ southerly to cut vein, already opened 900′ above. Shipped silver-lead ore many years ago, but idle for years.

LACLEDE MINING CO. **IDAHO**

Address: 706 W. Euclid Ave., Spokane, Wash.

Officers: C. Fred Kratzer, pres.; O. W. Lewis, v. p.; Jas. A. Wayne, sec.-treas.; with E. H. Knight, J. M. Sheets, C. E. Sogn and E. G. Gnaedinger, directors.

Cap., $1,000,000; $1 par; increased, 1916, to $1,500,000; all issued; assessable at the rate of 3 mills every 3 months.

Property: lies between the Cons. Interstate-Callahan and Tamarack & Custer mines in the Coeur d'Alene district, Shoshone county.

Development: consists of 300′ crosscut tunnel and a winze down 300′ below the tunnel level, 600′ vertically below the apex of the vein, with levels run each way very 100′. Ore occurs irregularly.

The Day interests were reported to have secured control, June, 1917, by purchase of 400,000 shares at 9c each. No recent information.

LESLIE COPPER CO. **IDAHO**

Office: 508 Bank St., Wallace, Idaho. **Mine office:** Wallace, Shoshone county, Idaho.

Officers: Wesley Everett, pres. and mgr.; A. W. McLaughlin, v. p.; Hon. Herman J. Rossi, sec.-treas., with A. M. Stevens and O. E. Peppard, directors.

Inc. Feb., 1899, in Idaho. **Cap.**, $100,000; shares 10c par.

Property: 11 claims, 220 acres, adjoining the Amazon-Dixie, also a mill site and 2 water rights, lying east of Mullan. Has several fissure veins, in porphyry, the main vein, of 12′ average surface width, having a 35′ shaft.

Development: mainly by tunnels, with about a mile of openings. The upper workings show galena and copper ore, and a lower tunnel is to give a back of 650′. The property carries mainly silver-lead ore, of concentrating grade, with a narrow paystreak of copper.

Management reports no changes during 1919.

LEWIS & CLARK MINING CO. **IDAHO**

Address: J. Wm. Grismer, pres., Mullan. Shoshone county, Idaho.

Inc. 1907, in Idaho. **Cap.**, $1,250,000; $1 par.

Property: 9 claims, N. E. of the Snowstorm, has surface showing of red hematite, with silver and copper.

Development: consists of 120′ tunnel and 500′ of workings. Management was trying to raise funds for further development in 1917, but no information since.

LINFOR COPPER CO. **IDAHO**

Successor of the Horst-Powell Copper Mining Co.

Address: Box 2221, Spokane, Wash., and William Beaudry, Enaville, Shoshone county, Idaho.

Property: 5 claims and a 5-acre mill-site, well timbered, on the Little North Fork river near Enaville, Coeur d'Alene.

Development: by 3 tunnels, 300′, 600′ and 200′ long, and 2 shafts, 50′ and 100′. Vein is of 15′ estimated surface width, opened up for 800′ and proved to depth of 400′ with slate footwall and quartzite hanging wall, carrying copper ore averaging 2 to 6%.

Equipment: includes steam and gasoline power, with a hoist and necessary mine buildings. Mill installed 1916. Property is connected with Idaho No. R. R. at Murray by 5-mile wagon-road. Estimated 15,000 tons of copper ore on dumps in 1917, was under option until January, 1919, to the Empire Copper Co., the owners however operating the property, but later reported that option was dropped. The new control has an extensive program of development in hand.

LISTON MINING CO., LTD. **IDAHO**

Address: Matt Baumgartner, pres., 323 Lindelle Bldg., Spokane, Wash.

Cap., $1,500,000; $1 par.

Property: 17 patented and 19 unpatented claims in Big Creek district, east of Wardner, Shoshone county.

Development: by tunnels, 1,100′ and 2,300′ long, which expose fissure veins containing galena and copper sulphide ore.

Equipment: includes steam power, 3-drill compressor, drills, shops and suitable dwellings.

Worked early in 1918, and since July, 1919.

LOMBARDY MINING & MILLING CO. **IDAHO**

Address: Kellogg, Shoshone county, Idaho.

Officers: Peter Albinola, pres. and gen. mgr.; Ed. Albinola, v. p.; Herman J. Rossi, sec.-treas.; Robert Albinola, asst sec.; H. O. Beemis, mgr.

Inc. 1898, in Idaho. **Cap.,** $1,000,000; shares $1 par. Annual meeting fourth Thursday in April. Last assessment payable Jan. 26, 1920.

Property: 15 claims, one mile N. of Kellogg. A bedded vein estimated to average 27′ wide with shale foot and quartzite hanging wall has been traced for 800′. Ore is said to carry some copper, and, up to 47% lead and 33 oz. silver per ton.

Development: by tunnels of 360′ and 900′, and 200′ shaft, with about 2,000′ of workings. Management planned to crosscut at 200′ and drift into the orebody cut on tunnel level.

Equipment: includes 85-h. p. electric motor operating hoist and drills. Only assessment work being done at last accounts.

LOOKOUT MOUNTAIN M. & M. CO. **IDAHO**

Office: Kellogg, Idaho.

Officers: R. L. Brainard, pres.; Wm. Boro, v. p.; W. L. Penney, sec.-treas.; with W. F. Gardner, and W. T. Roach, directors.

Inc. 1916. **Cap.,** $375,000; shares 25c par, assessable. One mill per share payable Jan. 27, 1920.

Property: 10 claims and 2 fractions, about 225 acres, in the Pine Creek district of the Coeur d'Alene, said to show three veins in quartzite carrying lead-silver values.

Development: by 2 tunnels, lower one 300′ beneath upper, about 350′ long, to be extended to 500′. Management hopes to cut the downward extension of the 3 veins encountered in upper tunnel, which are reported to average 14″ in width and to carry 37.5% lead and 10 oz. silver.

LOST CABIN MINING CO. **IDAHO**

Letters returned in 1919, from former address: Wallace, Idaho. Wm. M. McCarter, Spokane, Wash., pres.; C. C. Landis, supt.

Inc. 1916, in Idaho. **Cap.,** $250,000; shares 25c.

Property: 5 miles from Murray, Shoshone county, said to carry lead-zinc ore.

Development: by 200′ crosscut tunnel.

LUCKY CALUMET COPPER MINING CO., LTD. **IDAHO**

Office: Eagle Block, Wallace, Idaho. **Mine office:** Mullan, Shoshone county, Idaho.

Officers: John H. Nordquist, pres. and gen. mgr.; Chas. H. Solberg, v. p.; Otto A. Olsson, sec.-treas.; with A. J. Olsson, directors; Al. J. Grills, supt.

Inc. Oct., 1906, in Idaho. **Cap.,** $1,500,000; shares $1 par; assessable. Last assessment reported was 5 mills per share, levied in 1914.

Property: 10 claims, patented, 181 acres, on Snowstorm hill, between the Independent and Snowstorm mines, and about 5 miles N. E. of Mullan, Property shows 2 fissure veins of 10 to 50′ width, in quartzite.

Development: by 3 tunnels. The upper one, of 1,700′ length, has a quarter-mile of drifts and crosscuts, which develop what is supposed to be the extension of the Snowstorm vein, showing low-grade ore carrying disseminated carbonates and bornite of 2 to 3% estimated copper tenor. The lower tunnel, a crosscut, from the head of Gentle Annie gulch, is 3,600′ long and has opened up a good body of ore, presumably the National at depth of 1,200′.

Equipment: includes electric power, with 2 motors, and a 5-drill air-compressor. Property is worked intermittently with proceeds of annual assessments, but information is hard to obtain from this as well as all other Nordquist companies.

LUCKY FOUR MINING CO. **IDAHO**

Office: corner E. 73rd and E. Gilson Sts., Portland, Oregon.

Officers: Chas. Hyle, pres.; Henry Wingert, sec.-treas.

Cap., $50,000; 5c par; $29,285 issued.

Property: lode and one placer claim in Summit mining district, Shoshone county, containing lead, silver, and zinc ore. Probably idle.

Company pronounced delinquent, Jan., 1920, by Secretary of State of Idaho, for failure to file 1919 corporate statement.

LUCKY FRIDAY MINING CO. **IDAHO**

Address: Wallace, Idaho. Is a reorganization (1914) of the Lucky Friday Mines Co.

Officers: Franklin Pfirman, pres.; Jas. A. Wayne, sec.; J. H. Wade, mgr.

Cap., $1,500,000; shares $1 par; assessable; 170,000 shares in treasury.

Property: 4 claims at Mullan, Shoshone county, adjoining the Hunter mine on the south.

Development: by 90′ shaft, 625′ upper crosscut tunnel and 800′ lower crosscut tunnel, developing a 10′ vein, with 4′ paystreak giving assays up to 3.5% copper, 29% lead and 89 oz. silver per ton.

Equipment: includes electric drilling plant.

Work was reported resumed in 1919.

LUCKY STONE MINING CO. **IDAHO**

Address: G. H. Walters, sec., Wallace, Idaho.

Cap., $1,000,000; $1 par; assessable.

Property: 14 claims near Osborne, Shoshone county, Idaho, and 7 claims in Granite county, Montana. The former carries gray copper and silver-lead ore.

Development: by 1,000′ of tunnel work in the Idaho group in which 12 to 14″ of $100 ore was disclosed in the summer of 1919. In the Montana property two veins have been exposed by over 600′ of drift tunneling.

LUCKY SWEDE GOLD & COPPER MINING CO. **IDAHO**

Office: 625 Cedar St., Wallace, Idaho.

Officers: Morris Pearson, pres.-gen. mgr.; Otto A. Olsson, sec.-treas., with C. E. Berglund, C. M. Clark, P. E. Johnson, and Rudolph Johnson, directors.

Inc. May, 1909. **Cap.,** $1,000,000; shares $1 par; assessable; assessment 1c per share, delinquent sale June, 1919.; 300,000 shares issued.

Property: 14 claims in the St. Joe district, Shoshone county, S. E. of Mullan, near the C. M. & St. P. R. R. shows 3 veins with surface ores giving good assays in copper and gold.

Development: assessment provided funds for a 1,500′ tunnel, the last to cut a copper vein expected to be reached at depth of 1,000′. This work was prosecuted in 1919.

Equipment: includes oil engines, compressor, and a Pelton wheel. No recent returns.

MAINE-STANDARD MINING CO. **IDAHO**

Address: 6 P. O. Bldg., Wallace, Idaho.

Officers: Alexander Murphy, pres.-mgr.; J. W. Tator, v. p.; E. H. Pattison, sec.-treas.

Cap., $1,500,000; shares $1 par; assessable.

Property: 5 unpatented claims in Yreka district, Coeur d'Alene region. on which $13,000 has been spent. Apparently idle.

MAJESTIC MINING CO., LTD. **IDAHO**

Address: Therrett Towles, sec., Wallace, Idaho.

Cap., $1,000,000; $1 par; assessable.

Property: 13 patented claims, 1½ miles N. E. of Burke, Shoshone county. Veins with shoots of lead-silver ore have been opened by 1,525′ of tunnel work. In June, 1919, work had been resumed after a winter's shut-down.

MARSH MINES CONSOLIDATED **IDAHO**

Office: 601 Empire State Bldg., Spokane, Wash. **Mine office:** Wallace, Idaho.

Officers: Edward Pohlman, pres.; M. M. Lee, v. p.; Joseph McCarthy, sec.; J. V. Pohlman, treas., with F. L. Bergen, (supt.), directors.

Is the successor of Marsh Mining Co., which was incorporated 1909 in Washington. Reorganized July, 1916, as the Marsh Mines Consolidated, stock being exchanged share for share. In addition, for each three shares of Marsh, stockholders subscribed for one share of new stock at 15c. a share.

Inc. May, 1916. **Cap.**, $1,500,000, increased to $2,000,000 at time of reorganization in July, 1916; shares 25c. par; reduced, 1918, to $500,000, same par value. Annual meeting in March. Stock listed on Spokane Exchange. Assessments, 1911 to Oct., 1918, aggregate $200,000.

The Marsh Mining Co. and Green Mountain Mining Co. are being liquidated, all assets being transferred to Marsh Mines Consolidated.

The chief reason given for shutting down the mines in 1916 was that litigation with the Federal Mining & Smelting Co. threatened. The latter company owns mining properties to the south and west of Marsh, and Marsh had been mining orebodies extending under the surface of the Federal ground, at a depth of 900′ below the main tunnel level and 1,300′ below the surface. This controversy has been settled, by agreement, with the Federal Mining & Smelting Co., Marsh getting a 10-years' lease on the Mono, Russell and O'Neil claims of the Tiger-Poorman group, which include the vein in controversy. This agreement provided for a complete settlement of all claims for alleged trespass.

Operations were suspended until March, 1917, when a new Gould pump was installed on the 900′ level, the mine was unwatered and milling resumed.

Exploration work on the Got-em-now vein, exposed in the Gertie tunnel, which traverses the Marsh property, is under way. This vein was cut 512′ from the portal of the Gertie tunnel and at a depth of 350′ to 400′ from the surface; ore from this vein can be quickly mined by utilizing the present working shaft of Marsh now 900′ deep and splendidly equipped to handle a large output.

Property: 7 claims, about 100 acres in O'Neil gulch, N. E. of Burke and adjoining the Tiger-Poorman mines. Claims show simple fissure veins in quartzite. The vein is 2′ wide in the upper 175′ tunnel, averaging 5′ on the 5th level. It carries silver-lead ore with zinc in shoots, the orebody thus far developed being 300′ long and 4½′ wide. The shoot is short, limited by a fault, and must be developed in depth to get tonnage.

Development: includes a main working tunnel and 940′ shaft with levels at 399, 550, 687 and 904′. Tunnel cuts the vein at 625′ and a drift follows it for 475′. The vein runs north 70° west and dips 78° south. A rich lead-silver vein was cut, 1917, on the 900′ level and produces a small quantity of ore. The shoot is narrow, but promising.

Ore reserves: were estimated at 26,000 tons in 1918, equal to 8 or 10 months' production. Arrangements were under way to deepen shaft to 1,100′, and a winze is to follow the shoot found at 900′.

Equipment: includes 1,150′ Ingersoll-Rand and 690′ Franklin compressors, 300-h. p. Nordberg electric hoist, 40-h. p. Lidgerwood and two Ottumwa hoists, Gould and Cameron pumps, Ingersoll, Waugh, and Wood drills, etc., with complete electrical equipment.

Company leases and operates the California or Pittsburg mill in Nine Mile Canyon, 2½ miles from Wallace. Freight on Northern Pacific costs 15c. a ton. This mill, remodeled at cost of $34,000 in 1915, handles 150 to 225 tons daily, saving 90% of the lead and 85% of the silver. It contains 2 sets of 14″x30″ rolls, 7′x10′ tube-mill, trommel, 4 Wood screens, 7 new concentrating tables, Pachuca agitator, Callow flotation cells, two 24′x10′ Dorr thickeners, etc.

The mill was operated jointly with the Hecla Mining Co., the March Co. treating 200 tons daily for 10 days each month, being under control of the Hecla the rest of the time. This tenancy by Hecla is subject to cancellation on 30 days' notice. Milling was suspended in Feb., 1918, and only a few men were employed on surface exploration during 1919.

Smelting contract with the A. S. & R. Co. runs for a period of 10 years from July, 1916.

Production: in July, 1917, 2,200 tons of ore, yielding 200 tons of con-

centrate assaying 52 to 58% lead and 22 to 28 oz. silver; also 100 tons of concentrate containing 21% lead, 33% zinc, and 12 oz. silver per ton. Output yielded $14,000 net.

Net returns from ore shipments have been as follows: 1911, $30,313; 1912, $114,648; 1913, $139,429; 1914, $81,944; 1915, $143,640; none in 1916. The Marsh mine and mill were closed down May 15, after operating a little more than 4 months in 1916, and producing 17,828 tons of ore, worth $139,111, which just balanced expenses.

In Nov., 1919, it was reported that a new and promising vein had been opened on the Russell claim, under lease from the Federal M. & S. Co. to July 20, 1926. A tunnel driven on this vein showed up to 6′ of lead-silver ore at 380′. This vein can also be reached by 1,100′ of crosscutting from the main Marsh tunnel. Recently a suit was started against the Hecla Co. for alleged wrongful extraction of ore from the east orebody (see Federal M. & S. Co.)

MAYFLOWER MINING & DEVELOPMENT CO. **IDAHO**

Address: John H. Foss, pres., Mullan, Idaho.

Cap., $1,250,000; $1 par; assessable.

Property: 13 patented claims in Hunter district, Shoshone county, on which over 4,000′ of tunnels, etc., have been driven, opening veins with lead-silver ore. After a 5-years' shutdown, work was resumed in 1918.

MIDNIGHT MINING CO. **IDAHO**

Address: M. F. Quinn, 50 Broad St., New York.

Officers: H. L. Carr, pres.; E. F. Carlson, v. p., with E. L. Kerstetter, sec.-treas.; also directors.

Inc. Jan. 5, 1917, in Delaware. **Cap.,** $1,500,000; par $1; assessable, 1,481,021 issued.

Operating expenses in 1918 were $114,755.

Property: 3 patented claims, 21½ acres, 1½ miles from Mullan, Shoshone county; side lines the Morning and You Like claims of Federal M. & S. Co. Deposit is a fissure vein in quartzite, carrying silver-lead ores.

Development: by 1,600′ tunnel, the 3,700′ of workings reaching a depth of 1,282′. Mine is being developed.

MIDWAY SUMMIT MINING & MILLING CO., LTD. **IDAHO**

Address: W. W. Waltman, sec., 419 Chamber of Commerce Bldg., Spokane, Wash.

Inc. 1911, in Idaho. **Cap.,** $1,500,000; $1 par; assessable.

Property: 11 claims, surveyed for patent, 1 mile S. of Burke, Shoshone county. Ore contains silver-lead.

Development: over 6,000′ of work has been done on property, without disclosing ore in commercial quantities, though some rich ore was opened.

MINERAL FARM MINING CO. **IDAHO**

Offices: Paulsen Bldg., Spokane, and Mullan, Idaho.

Officers: C. J. Carlson, pres. and mgr.; Wm. Sellars, v. p.; C. D. Miller, sec.-treas., with J. H. Pelletier, director.

Inc. 1904, in Idaho. **Cap.,** 1,500,000 shares; $1 par; assessable, outstanding 800,000. Annual meeting, first Monday in September. Listed on Butte Exchange.

Property: 8 claims, 7 patented, 170 acres, 1 mile west of Mullan, Shoshone county, has a fissure vein in Revett and Burke quartzite, on which work was started in 1908.

Development: 3 tunnels, 60′, 800′ and 1,445′ in length, with 3,700′ of workings. Probably idle.

MISSOULA COPPER MINING CO. **IDAHO**

Address: Mullan, Shoshone county. Idaho.

Officers: A. McLeod, pres.; C. A. Barnes, v. p.; J. R. Bean, sec.-treas., with R. J. McLeod, T. M. Brennan, L. Dooling, and H. E. Chaney, directors.

Inc. 1901, in Idaho. **Cap.,** $100,000; increased 1907, to $1,500,000; shares $1 par, assessable; issued, 1,350,000. Shares listed on Spokane and Vancouver Stock Exchanges. Annual meeting, first Monday in November.

Assessment levied in April, 1917, to pay for having examination made of property.

Property: 10 claims, about 175 acres, at the head of Deadman gulch, adjoining the Lucky Calumet, and about 1½ miles N. W. of the Snowstorm, in the Hunter section.

Geology: property has a wide fissure vein in Revett quartzite, carrying native copper, cuprite, azurite, malachite, bornite and chalcopyrite, with value mainly in sulphides, ranging from about 1% on the hanging, to 8% on the foot-wall, ore averaging about ½ oz. silver per unit of copper. The property also carries some argentiferous galena. Geology described U. S. G. S. Bull. 540 E., p. 48, 1913.

Development: consists of a 1,400′ upper tunnel and a 2,800′ lower tunnel, with a connecting shaft and nearly 1 mile of workings. The main tunnel runs N. 30° E. for 1,900′, then N. 70° E. for 700′, passing from purple St. Regis slates at the portal into Revett quartzite.

Equipment: includes a 100-h. p. electric plant, with an 8-drill air compressor and mine buildings.

March 1, 1914, ten of the largest stockholders formed an ironclad pool with 650,000 shares, deposited with Union Trust & Savings Bank of Spokane to March 1, 1916. In April, 1914, a lease and bond was given to Snowstorm M. Co. at $600,000, said agreement calling for expenditure of $2,000 for each month the option ran. Snowstorm expended $36,000, and option was cancelled on Sept. 12, 1915.

Missoula stockholders assert that property contains apex of National vein. The Missoula vein is flat, dipping about 37° S. towards National vein which was struck in long crosscut at vertical depth of 1,400′, and is said to show dip similar to Missoula's. It is said that National Co. feared to raise lest it prove apex in Missoula ground.

Diamond drilling was done October, 1917.

MOONLIGHT MINING CO. **IDAHO**

Address: E. Hedin, Wallace, Idaho.

Officers: Eugene R. Day, pres.; Jas. J. Murphy, v. p. and mgr.; E. Hedin, sec.-treas.

Cap., $1,500,000; shares $1 par; assessable.

Property: 9 patented claims, adjoining the Hercules mine on the east, in Shoshone county.

Development: the main tunnel through which the property has been worked is an extension of the old Trade Dollar tunnel, 600′ below the upper workings and 900′ below the outcrop. The vein was cut in 1914 and drifting was started, but vein was found to be cut off by a fault. A crosscut was then started 1,400′ back. About 800′ of drifting has been done, but little ore has as yet been found. Total workings over 5,000′.

Equipment: water power, compressor, etc., reaching depth of 1,600′. No recent returns.

MULLAN MINING CO. **IDAHO**

Address: L. Leighty, Wallace, Idaho.

Cap., $50,000; shares 5c par; assessable.

Property: 3 claims in Hunter district of Shoshone county, on which veins show lead-silver ore.

Development: a 1,000′ tunnel with 1,200′ of drift-work on vein. The 150-ton mill was reported as being remodeled early in 1919.

MURRAY HILL MINING CO. **IDAHO**

Address Jamieson Block, Spokane, Wash.

Officers: C. E. Mallette, pres.; J. C. Feehan, v. p.; A. Brounlow, sec.-treas., with J. C. Broad and James Wayne, directors.

Inc. Nov. 25, 1911, in Idaho. **Cap.,** $1,500,000; $1 par; all issued.

Property: 9 claims, 5 miles above Murray, Shoshone county, carrying zinc-lead-silver ore in veins in quartzite and slate. Examined by Rush J. White. Workings comprise 2,000′ of tunnels, etc.

Equipment: 10-drill compressor, tramway, and 150-ton concentrator. Mine closed down in March, 1919.

NABOB CONSOLIDATED MINING CO. **IDAHO**

Subsidiary of Stewart Mining Co., financing Nabob Cons. and Nabob Mining, described in Vol. XII of this work.

Offices: 1482 Broadway, New York, and Kellogg, Idaho.

Officers: J. E. Harrington, pres.; G. T. Witz, v. p.; John L. Williams, sec.-treas., with A. H. Featherstone, and Nash Rockwood (counsel), directors. C. C. Griggs, mgr., at Kellog.

Inc. 1917, in Idaho. **Cap.**, $3,500,000; shares $1 par; 2,600,000 issued; 1,750,000 shares held by Stewart Mining Co. Registrar, Metropolitan Trust Co., and transfer agent, M. A. Hennessey, both in New York.

Property: 28 claims on Pine Creek near Kellogg, Shoshone county. Principal claims are the Denver, Mascot, and Nabob. Ore occurs in Burke quartzite and Prichard slate.

Development: by 3,000′ tunnel, shaft, etc., totaling over 5,000′. Reserves in 1918 were estimated as 22,000 tons possible and 46,000 tons probable ore, but augmented by later work. In the Denver claim, ore averaging 10% lead, 16% zinc, and some silver has been followed for over 400′ on two levels. Several other tunnels and workings have opened a good deal of ore. A rich shoot of ore in the lower Nabob tunnel yielded several cars of ore in 1918. The mill ore carries 10% lead, 15% zinc, and 7 oz. silver per ton.

Equipment: complete for mine, 4,000′ aerial tram connecting No. 4 tunnel with Pine creek, and 150-ton mill started work early in September, 1918.

One of the drawbacks has been lack of rail communication from Kellogg down Pine creek, affecting other mines as well.

Mill construction work was financed by a loan of $60,000 from the A. S. & R. Co., through the Federal M. & S. Co., to be repaid by a smelting charge of $2 per ton on shipments of concentrate, while a smelting contract was signed for 5 years, with renewal privilege for a similar period. The sum proved insufficient owing to increased cost of labor and supplies, and a further loan of $15,000 was granted.

Application made February 6, 1920, for appointment of a receiver.

NABOB MINING CO. **IDAHO**

Absorbed by Nabob Consolidated Mining Co., which see.

NATIONAL COPPER MINING CO., LTD. **IDAHO**

Address: August Paulsen, Spokane, Wash., and Mullan, Shoshone county, Idaho.

Officers: August Paulsen, pres.; A. P. McCrae, v. p.; Chas. McKinnis, sec.-treas.; Jas. F. McCarthy, Mgr., with Harry White, H. H. Stambaugh and R. C. Steese, directors.

Inc. Sept. 22, 1906, in Washington. **Cap.**, $2,500,000; $1 par; increased from 1,250,000 shares in July, 1913; 1,800,000 issued; 800,000 shares treasury stock were sold at 50c. Assessments of 19½c. per share have been levied to date, a total of $342,000. Stock listed in Spokane.

Property: 9 patented claims, 180 acres, in Deadman gulch between Mullan and Larsen, on the north side of the Coeur d'Alene valley. It is about 1½ miles west of and in the same belt as the Snowstorm copper property, which it closely resembles in character.

Geology: ore occurs in a fault-vein in thickly-bedded white Revett quartzite, with talcose slips bordering the ore. The vein runs nearly E.-W., and dips steeply to south. The surface gives no indications of the orebody 1,700′ beneath it, in fact the ore-bearing quartzite does not show in the upper workings.

During the boom days of 1906-07, the company sank a 400′ shaft and drove an adit tunnel developing a fissure vein and a strong fault, but found no ore in commercial quantity. Dec., 1912, a large body of silver-bearing copper ore was cut at a distance of 4,800′ from the portal, about 1,000′ lower than the old tunnel and shaft. The crosscut tunnel runs for 4,000′ through very hard and tight Wallace slates and St. Regis quartzites to a slightly mineralized fault separating

the St. Regis from the more favorable Revett quartzite. The National vein is cut 200′ from this big fault. It is a vertical quartz vein, filling a fault in Revett quartzite. The vein carries copper ore and a drift east disclosed the orebody which gave the mine its short-lived prominence. A sample cut across the orebody where it was 85′ wide showed an average value of 2½% copper, 5 oz. silver, and 80c. in gold.

Development: by a 1,200′ upper tunnel, a 4,800′ lower crosscut tunnel with about 1,000′ of drifting on the vein, a 400′ shaft with 400′ of drifting and a winze sunk to the 1,500′ level. In Feb., 1916, company reported sufficient ore above the 1,200′ level to run the mill 2 years. Leached areas on the 800′ and 1,000′ levels make the extent of orebody uncertain. An estimate of 545,000 tons of ore available above the 1,000′ level, made 1913, was changed to 170,000 tons because of an unexpected barren streak.

Equipment: a 500-ton concentrator with Callow flotation plant, and 2-mile trolley line. The crushing plant can handle 500 tons in 16 hours and reduce the ore to ½″. The storage bins have a capacity of 1,100 tons, receiving the ore over a 2-mile electrically operated railroad. The various motors at the mill total 615-h. p.

Mill was operated two months early in 1914, and again in Oct., 1915, crushing 4,243 tons of 0.83% copper ore carrying 1.99 oz. silver per ton. Operations were suspended in June, 1916.

In August, 1917, a crosscut from shaft at depth of 535′ below main working tunnel, passed through 35′ of ore of better grade than in upper workings, which confirmed theory that better ore would be found at depth.

Property represents an investment of $400,000 without a dollar's profit, the mill having been built before a producing mine had been developed. Deep work alone can open up a large tonnage, but management announced this would not be done unless new work above the 1,200′ level justified it.

In May, 1918, a small profit was being made from 1½% copper and 4 oz. silver ore, but unluckily, the 1,500′ level showed the vein to be more oxidized and leached than on the upper levels. A new hoist and electric pump were installed in 1918, and the mill ran at 33% capacity, the ore coming from the 800, 900, 1,000 and 1,200′ levels. The mill treated 300 tons daily, early in 1919, the January output being 14 cars of concentrate running 15% copper and 40 oz. silver. A raise above the 800′ level opened good early in 1918, but the mill had to be stopped two months for repairs. The monthly output averaged about 15 cars of concentrates, netting approximately $20,000. Fifty men were employed in July. In September, the mine was closed indefinitely and a statement published that liquid assets, including $51,205 in cash, totaled $59,079. There were no liabilities. From Nov., 1917, to July, 1919, the mill treated 105,129 tons of ore averaging 1.05% copper and 3.27 oz. silver per ton. The value was $4.68 per ton, and costs were $4.085. The 5,931 tons of concentrate averaged $83.11 per ton, carrying 15% copper and 43 oz. silver; the recovery was 80% and 74%, respectively. No ore of commercial grade has been found below the 1,500′ level, as the Snowstorm fault ends the National vein a short distance below this horizon. The ore opened by 1,820′ of work carried up to 0.7% copper and 1 to 2 oz. of silver. This mine has proved to be a disappointment after extensive intelligent development and large expenditure of capital, and unless a new orebody is found the property cannot be made to pay. In January, 1920, it was decided to reopen the mine and continue the 1,000′ level crosscut 300′ further.

NELLIE MINING & MILLING CO. **IDAHO**

Address: A. H. Barnes, mgr., Tacoma, Wash.

Officers: C. E. Benedict, pres.; O. E. Cushing, v. p.; W. F. Cushing, sec.-treas.

Cap., $60,000; $1 par.

Property: 1½ miles from Osborne, Shoshone county, on O.-W. R. & N. R. R., has a fissure vein with gray copper ore (tetrahedrite) in quartz, the ore being said to carry 100 to 240 oz. silver per ton.

Development: by 3 tunnels, shafts and 10,000′ of stoping and raises. A crosscut on the 500′ level opened up a vein 3′ wide, showing good milling ore

Shipped 20 tons of high-grade ore in Sept., 1914, from leasing operations. Has water power plant for pumping and hoisting work, and a small mill. Company planned active development in 1919.

NEVADA STEWART MINING CO. **IDAHO**

Address: Wallace, Idaho.

Officers: Dr. C. R. Mowery, pres.; Dr. Herbert Mowery, sec., and H. E. Huemann, treas., with M. J. Sinclair and A. J. Devlin, directors.

Inc. Nov. 19, 1915, in Idaho. **Cap.,** $150,000; 10c par; assessable.

Property: 7 claims in Pine Creek district, near Kellogg, Shoshone county, adjoining the Highland Surprise on the west, shows lead, silver, zinc ore in veins. An 800′ crosscut tunnel has been driven, and total workings are about 1,000′.

Equipment: includes electric power and air-compressor. Plant burned down in 1917, but was rebuilt. Inactive since Nov., 1917.

NIPSIC MINING CO. **IDAHO**

Mine sold to Cons. Interstate-Callahan, which see.

NONPAREIL COPPER MINING CO. **IDAHO**

Idle, but not dead.

Office: H. C. McAllister, pres., and H. G. Loop, sec., Wallace, Idaho.

Inc., in Idaho. **Cap.,** $1,500,000; shares $1 par; assessable.

Property: 4 full and 3 fractional claims, on the west fork of Willow creek, across from the Carney mine, 3 miles S. 5. of Mullan, Shoshone county.

Development: by 4 tunnels. Surface ores have given assays up to 1.5% copper, and 8 to 19 oz. silver per ton.

NORTH AMERICAN M. & M. CO., LTD. **IDAHO**

Address: J. J. Presley, Kellogg, Idaho.

Officers: J. J. Presley, pres.; C. F. Reedy, v. p.; J. F. Morton, sec.; F. J. Presley, treas., with Alex Murphy, directors.

Inc. May, 1903, in Idaho. **Cap.,** $1,500,000; $1 par; none outstanding.

Property: 25 patented claims, 390 acres, 3 miles S. E. of Kellogg, Shoshone county, adjoining the Bunker Hill & Sullivan, and believed by manager to carry the continuation of the B. H. & S. main fissure. Examined, 1919, by F. J. Davey. Also 280 acres of millsite, water-rights, etc. The vein is in Revett quartzite, and ore averages 1% lead and ½ oz. silver per ton.

Development: by tunnels totaling 1,700′ reaching depth of 400′.

In 1916, company tried to raise funds with which to continue the main tunnel another 1,200′, by lurid advertisements, written by an "advertising agent." The engineer's report is worth quoting: "It is a good business proposition to go into, for while there may be some chance that ore will not be found in commercial quantities, it is remote under the conditions existing elsewhere in the same vein."

NORTH BUNKER HILL MINING CO., LTD. **IDAHO**

Address: N. T. Hardy, mgr., Kellogg, Idaho.

Officers: Elmer Brown, pres.; J. L. Trowbridge, v. p.; N. T. Hardy, sec.; F. C. Cartwright, treas., with A. W. Vangilder, Moses Eva, and Lloyd Drais, directors.

Inc. Feb. 16, 1907, in Idaho. **Cap.,** $1,250,000; shares $1 par; assessable; 4 mills per share called Sept. 24, 1919; 1,079,721 issued.

Property: 3 patented claims, 60 acres, at Wardner, Coeur d'Alene district, joined on the E. by the East Caledonia, on the W. by the Caledonia, and on the S. by the Bunker Hill & Sullivan Mines.

Development: by tunnels, and 300′ incline shaft sunk in the tunnel. A 200′ crosscut shows 5′ of ore in No. 1 vein that is reported to assay 15 to 25% lead and 25 to 40 oz. silver per ton. No. 2 vein was cut by this level, though little work was done on it. The shaft was to be sunk 200′ deeper at last accounts.

Equipment: 75-h. p. motor, 500 cu. ft. compressor, electric hoist, and pump.

Work is paid for by calling assessments, and the installation of the machinery noted shows that shareholders are getting good value for their money.

NORTHERN LIGHT MINING & MILLING CO. **IDAHO**

Offices: Kellogg, and S. L. Shonts, mgr., Wallace, Idaho.

Officers: W. G. Nye, pres.; Fred W. Sachse, v. p.; Tom J. McGrath, treas.; Benj. E. Harmon, sec., with S. L. Shonts, directors.

Inc. Jan., 1915, in Idaho. **Cap.,** $75,000; shares 5c par; assessable; one assessment levied Aug., 1915; 1,100,000 outstanding. Annual meeting, second Saturday in May, at Wallace, Idaho.

Property: owns 2 claims and has 7 adjoining claims under bond and option, about 234 acres, 2½ miles south of O. W. R. N. Ry. on Pine creek, about 5 miles west of Kellogg, and 3½ miles west of the new Bunker Hill smelter at Bradley, Shoshone county.

Mine reported on by Merriam Bros. of Wallace, and Albert Burch.

Property contains two veins: No. 1 vein is said to be 6′ wide and to carry clean, high-grade lead with 0.33 oz. silver, 10% lead, free from iron and zinc. Amount ore blocked out in this vein is estimated at 19,500 tons running 7% lead and 2.5 oz. silver. Extension of this vein into claims held under option shows 7,500 tons developed through 185′ shaft.

No. 2 vein, 247′ S. of No. 1, varies in width from 5 to 12′ with continuous oreshoot developed for 200′ by drift on 400′ level, a 60′ raise and 175′ winze, from 400′ level, also 100′ of openings at bottom of winze, called 500′ level. On 400′ level 20,000 tons of ore are estimated as blocked out, averaging 5.5% lead, 9.5% zinc and 2.1 oz. silver. A 200-ton mill will be erected.

Development: by 500′ tunnel and 400′ vertical shaft, with 2,400′ drifts and crosscuts, 100′ raises and 70′ winze.

Equipment: includes hoist at main shaft, Ingersoll-Rand compressor, electric power, Gould and Cameron pumps, air hoist in winze, machine drills, etc.

The secretary wrote in June, 1919, that the mine was not worked during 1918, because the shaft was flooded, power being disconnected. Work will be resumed when litigation over the power supply is settled.

NORTH FRANKLIN MINING CO. **IDAHO**

Address: Norman Ebbley, pres., Wallace, Idaho.

Inc. in Idaho. **Cap.,** $1,000,000; shares $5 par; assessable.

Property: 7 claims adjoining the Morning mine on north, near Mullan, Shoshone county, Idaho. About 3,000′ of work has disclosed bunches of lead-silver ore, but not in commercial amount. Idle for 3 years past.

OLD HICKORY MINING CO. **IDAHO**

Address: Oscar Nordquist, pres., 424 E. Nora St., Spokane, Wash.

Inc. Oct., 1918. **Cap.,** $150,000; shares 15c par.

Property: the Old Hickory claim of North Star M. & M. Co., adjoining You Like claim of Federal M. & S. Co. Lead ore was opened in 1919, in a tunnel, and geological conditions were said to be encouraging.

OLD VETERAN MINING CO. **IDAHO**

Office: Barnard Blk., Wallace, Idaho.

Officers: M. J. Farrell, pres.-gen. mgr.; Allan G. Kennedy, v. p.; L. L. Brainard, sec.-treas., with B. J. Farrell, directors.

Inc. March, 1915. **Cap.,** $150,000; shares 10c par; assessable; 750,000 shares were sold at 2 cts. per share, upon which assessments of 2 cts. are to be levied every two months.

Property: 10 claims, 2 miles above Burke, Shoshone county, shows several fault fissures.

Development: by 1,500′ of tunnels. No. 3 tunnel cut a few inches of ore. carrying 1.84% copper and ½ oz. of silver in 1918, and drifting continued in 1919, showing more or less copper, but no large orebody.

ONTARIO MINING CO. **IDAHO**

Address: Kellogg, Idaho.

Officers: M. A. Folsom, pres.; H. Nicholson, v. p.; Stanley A. Easton, sec.-treas. and gen. mgr.

Cap., $25,000; shares $1 par.

Property: on Ontario Creek, adjoining the Stewart in the Kellogg-

Wardner district, Shoshone county, shows quartz fissure veins carrying pyrite, sphalerite, and galena, and proved to be the southern extension of the main Stewart orebody. The vein system is faulted, as in the Stewart, and the ore crushed, making mine operations troublesome.

An apex suit brought by the Stewart Mining Co. was decided, in 1915, in favor of the Ontario Mining Co., giving the latter company a verdict for $48,245.

Development: by 800′ crosscut tunnel from which a shaft was sunk to 320′ depth.

Equipment: compressor, 200-ton mill, and complete plant.

Production: 8,209 tons of ore worth $712,666 in 1915, and 1,201 tons worth $32,811 in 1917. It is generally understood that this mine has made a profit of over $500,000, but this cannot be verified.

OOM PAUL CONSOLIDATED MINING CO. **IDAHO**

Office: Wallace, Idaho.

Officers: Jas. F. McCarthy, pres.-mgr.-treas.; F. H. Richardson, v. p.; supt.; L. E. Hanley, sec., with Edward Ryan, J. B. Sloan and Walter Mackay, directors.

Inc. April, 1907, in Idaho. **Cap.,** $1,600,000; shares $1 par; assessable; 7 assessments of 1c. each levied; 1,397,598 shares issued. Stock listed on Butte and Spokane Stock Exchanges.

Property: 10 patented claims, 200 acres in Coeur d'Alene district, near Burke, shows silver-lead ore in fissure veins traversing a quartzite formation.

Development: by 3,500′ crosscut tunnel, driven to cut the downward extension of the ore found above. A vein was cut but contained no value.

Equipment: consists of compressor. Work suspended, 1917, because of disappointing results. The Ajax Mining Co. which adjoins it, arranged for use of the tunnel to prospect its own ground during 1918.

PANDORA COPPER MINING CO., LTD. **IDAHO**

Address: care J. C. Weatherhead, Larson, Shoshone county, Idaho.

Inc. Oct., 1906, in Idaho. **Cap.,** $1,000,000; shares $1 par; assessable; issued 450,000. Annual meeting, fourth Wednesday in October.

Property: 10 claims, 150 acres, adjoining the Snowstorm mine on the east, and supposed to carry about 3,000′ of the Snowstorm ore zone. Property shows St. Regis and Revett quartzites, with copper impregnations in the latter.

Development: includes 1,750′ main, or working tunnel, which has not yet crosscut the vein. Only assessment work done in recent years.

PARAGON CONSOLIDATED MINING CO. **IDAHO**

Office: 436 Sibley St., St. Paul, Minn. **Mine office:** Paragon, Idaho.

Officers: Geo. S. Monson, pres.; M. O. Nelson, v. p.; F. O. Hammer, sec.-treas., with W. W. Dunn, Geo. J. Rank, R. C. Patterson, directors. L. W. Stedman, mgr.

Inc. Nov., 1908, in Minnesota. **Cap.,** $1,500,000; $10 par; oustanding, 1,205,430. Bonds: authorized $100,000; outstanding, $25,000. Annual meeting in November. Listed on New York Curb.

Property: 43 claims, 19 patented, about 850 acres, in the Coeur d'Alene district, Shoshone county, shows fissure and contact orebodies. Values are in lead, zinc, silver and gold. Extent of workings, about 16,000′.

Ore is concentrated in a mill, capacity about 100 tons, leased from the Black-Horse Co. Mainly zinc and lead concentrates are shipped. Power is developed at water-fall nearby, but operations have been hampered by scarcity of water. The mine has been an intermittent shipper during the past few years, but returns are not made public.

PARROT MINING CO. **IDAHO**

Absorbed by Sunshine Cons. Mining Co., which see.

PATUXENT MINING CO. **IDAHO**

Address: Wallace, Idaho.

Officers: Jas. F. Callahan, pres.; J. H. Wourmes, v. p.; F. C. Boutin, sec.

Property: adjoining the Cons. Interstate-Callahan on the S., in the

Coeur d'Alene district, Shoshone county, reported to show a 4′ vein of high-grade lead-zinc ore, in a fissure zone 50′ wide.

Development: totals 3,000′ of tunneling, crosscutting and drifting. Development operations are conducted through the Rex. Cons. workings.

PHEDORA SILVER-LEAD MINING CO. **IDAHO**

Address: Kellogg, Idaho.

Officers: Wm. Schaefer, pres.; Geo. Moison, v. p., with M. Mosauer, Al. Bland, Wm. Weyer, and Chas. Bollinger, directors.

Cap., $1,500,000; shares $1 par.

Property: 12 lead-silver claims, adjoining the Jack Waite, in Eagle district, near Murray, Shoshone county.

Development: about 1,000′ of workings.

PHOENIX MINING & MILLING CO., LTD. **IDAHO**

Address: Wallace, Idaho.

Officers: Norman Ebbley, pres.; Jos. Whelan, sec., with R. H. Kingsbury, and W. Roberts, directors.

Cap., $1,000,000; shares $1 par; assessable, 800,000 shares outstanding. Annual meeting, second Monday in May.

Property: 14 lead-silver claims, in Coeur d'Alene district, near Wallace, Shoshone county, opened by 1,500′ of workings, but still only in exploration stage.

PINE CREEK DEVELOPMENT CO. **IDAHO**

Dead. See Vol. XIII for data.

Mine held by Sherman Development Co., and Sherman Lead Co., which see.

PINE CREEK MINING & MILLING CO. **IDAHO**

Dead. Described in Vol. XIII. Consolidated Jan., 1917, with the Hilarity Mng. Co., Ltd., which see.

PLACER CREEK MINING & MILLING CO. **IDAHO**

Officers: F. C. Bailey, mgr., 2903 Sinto St., Spokane, Wash.; J. W. Wentworth, pres.; Geo. Yancy, v. p.; Ray E. Bigelow, sec.-treas., with Elmer West, and R. G. Mack, directors.

Cap., $1,000,000; $1 par.

Property: 5 claims, on Placer creek, 6 miles from Wallace, Shoshone county, developed by a 1,400′ tunnel, said to cut the vein at a vertical depth of 600′. There has been no change in two years.

POLARIS MINING & DEVELOPMENT CO. **IDAHO**

Address: Wallace, Idaho.

Officers: W. E. Mann, pres.; P. J. Gearon, mgr.; L. C. Wilson, sec.-treas., with P. Schmitz and H. M. Davenport, directors.

Inc. Dec., 1915, in Idaho. **Cap.,** $50,000; shares 5c par.

Property: 3 patented claims between Osborne and Kellogg, in the Coeur d'Alene, Shoshone county. Ore carries lead and silver, with some copper.

Development: by 1,100′ of tunnels, winze, and several hundred feet of other workings.

Production: several carloads shipped reported to average 140 to 200 oz. silver and 3% to 6% copper, and in 1916, 7 cars netted $25,163. No recent figures available.

PORTOMA MINING CO. **IDAHO**

Officers: D. C. O'Reilly, pres., Bates Bldg., Portland, Oregon. F. A. Knapp, sec.-treas.

Cap., $100,000; shares 5c par; $53,000 issued.

Property: 4 claims in Beaver district, Shoshone county, showing lead-zinc ore, opened by 1,300′ of tunnels, etc.

PURITAN MINING CO. **IDAHO**

Address: Wallace, Idaho.

Officers: Frank Boutin, pres.; Theo. Anderson, v. p.; Jas. F. Callahan, treas.; Chas. A. Solberg, sec., with O. B. Olsson, and John H. Roberts, directors.

Cap., $1,500,000; shares $1 par.

Property: 5 patented lead-silver claims in Placer Center mining district, Shoshone county, W. of the Tamarack & Chesapeake.

Development: by 1,100′ tunnel and over 2,000′ of other workings. No recent information published.

RAINBOW MINING & MILLING CO., LTD. IDAHO

Office: Peyton Bldg., Spokane, Wash.

Officers: Geo. Austin, pres.; S. Hofslund, v. p.; R. P. Woodworth, sec.-treas., with Terrett Towles, H. A. Nourse and A. E. Bronson, directors.

Inc. June, 1907, in Idaho. **Cap.,** $300,000, increased 1913 to $500,000; shares 25 cts. par, assessable; 800,000 in treasury, Aug., 1919. Annual meeting, June 1st.

Property: 19 claims, 7 patented, 360 acres, in 2 groups. The Rainbow No. 1 group, 3 miles west of Wallace on Shields creek, Shoshone county, has St. Regis and Burke quartzite cut by the Sunshine and the Rainbow veins. The Sunshine vein carries grey copper ore with iron and quartz gangue.

Development: 2,200′, includes a 40′ tunnel on the Sunshine vein and the main No. 3 tunnel on the Rainbow vein. Latter follows vein N. 75° W. for 1,350′, exposing 3″ to 4′ of vein filling with black footwall seam containing tetrahedrite, galena and chalcopyrite. Another tunnel on the opposite side of the creek is 450′ long. Commercial ore is expected at greater depth.

Equipment is ample, and railroad but ¾ mile away.

The second group, of 5 claims, bought 1910, is about 3 miles from the Handspike mine, and 15 miles from a railway, at the mouth of Bootjack creek, a tributary of the North fork of the Coeur d'Alene river, in Secs. 23 and 24, T. 31 N., R 1 W., in an unorganized district. This property shows a vein of 12′ estimated average width, traceable 6,000′, carrying lead and copper ore, associated with iron carbonate, in a quartz gangue.

Development: by crosscut and drift, by tunnels 800′ long.

Equipment: engine house, 25-h. p. oil engine, 8 by 9″ compressor and air pipe and flume supplying water to operate an air blast. Company is developing steadily with funds derived from stock assessments.

RAY-JEFFERSON MINING CO. IDAHO

Address: Daniel L. McGrath, mgr., Wallace, Idaho.

Officers: E. R. Day, pres.; J. J. Murphy, v. p.; P. J. Maggy, sec., with Geo. K. Garrett and D. L. McGrath, directors.

Cap., $2,000,000; $1 par; assessable. An assessment of 12 cents, 2½ cents at a time, was levied in May, 1919.

In May, 1916, control passed to the Day interests, owners of the Hercules, Tamarack and Custer mines, and of the Northport S. & R. Co. Company sold treasury stock to finance construction of mill and installation of electric haulage system, 1916.

Property: 38 claims, 600 acres in a compact group, adjoining the Consolidated Interstate-Callahan holdings and including the Hill group. Is reported to show the Interstate-Callahan, Amazon and Manhattan veins, one with an orebody 400′ long. The Carlisle is a cross vein running northerly and intersecting the Interstate. The latter is supposed to be of the Hercules vein.

Development: by the Blue Grouse and Carlisle tunnels. The Mountain Goat tunnel opens a shoot 300′ long, showing 3′ of shipping ore and 9′ of mill ore on the Callahan vein. The Carlisle tunnel has 400′ of drifting on the vein of this name, said to carry 5′ to 10′ of mill ore for the entire distance. A long tunnel was driven in 1918 to cut the vein 1,000′ below the upper workings.

The Beaver Creek branch of the O.-W. R. & N. line was completed to the Ray-Jefferson in Feb., 1917.

Equipment: compressor, drills, shops, tramway, and 400-ton mill.

No figures of output are obtainable. The 12 cent assessment was an unexpected blow to shareholders.

RED MONARCH CONSOLIDATED MINING CO. IDAHO

Offices: 300 Title Bldg., Spokane, Wash., and Wallace, Idaho.

Officers: G. I. Toers, pres.; Conrad Wolfle, v. p.; David Ackerman, sec.-treas., with Moritz Thompson, F. J. Guth, A. J. Davis, and H. E. Reiners, directors. D. M. Drumheller, supt.

Inc. in 1915, in Washington, **Cap.**, $2,000,000; shares $1 par; assessable; 1,533,000 issued. Annual meeting, first Tuesday in April.

Property: 43 claims, about 800 acres, in Beaver Creek district, Shoshone county, 9 miles north of Wallace, adjoins Cons. Interstate-Callahan on the west; claims are on S. W. slope of Sunset Mt. and on opposite side of the mountain from the Interstate. Said to show 5 well defined fissure veins of silver-lead-zinc ore in Prichard slate and Burke quartzite. Veins are parallel, strike N. 70° W., dip 80° to the S .W.

Development: up to the time acquired by the present company, Nov., 1915, consisted of 2,000′ of prospect tunnels and open cuts. Ore had been found in one tunnel, 650′ long, at a depth of 500′. Company has since been driving two tunnels from Missoula gulch, one north to attain a depth of 1,000′ within a length of 1,000′, and one south to attain a depth of 2,000′ within a length of 3,000′. By Oct., 1918, the latter was in 4,410′. It cut three promising lead-zinc veins which are to be developed.

Equipment: includes compressor, capacity 2,000 cu. ft., operated by a 250-h. p. G. E. motor.

Property is considered promising. Work was suspended for several months, but was to be resumed late in 1919.

REINDEER QUEEN MINING CO. IDAHO

Office: Wallace, Idaho. **Mine address:** Mullan, Idaho.

Officers: J. C. Glahe, pres.; A. P. McRae, v. p.; J. R. Bean, sec.; S. D. Lemieux, treas, with D. E. Keyes, directors.

Inc. Sept. 19, 1913, in Idaho. **Cap.**, $200,000; shares 10 cts. par; assessable. Company is a consolidation of the Copper Queen and the Reindeer Queen companies, whose holdings are contiguous and cover extensive copper exposures. The new company assumed all obligations of the old corporations and exchanged stock, share for share. The consolidation makes possible the speedy development of the orebody already cut by the Reindeer tunnel, which has been extended as a drift along the vein into the ground heretofore owned by the Copper Queen.

Property: 15 claims in the Mullan copper belt, including the Stevens Peak (or Copper Queen) group and the Reindeer group of 6 claims, all at the head of Willow Creek. The outcropping shows a big copper-stained fissure vein, 5 to 20′ wide.

Development: by a crosscut tunnel which has cut the vein at a depth of 800′, showing bornite and chalcopyrite ore opened by a drift on the vein. Some lead-silver ore occurring in Burke quartzite was encountered in drift, May, 1917, while in 1918 there had been opened 150′ of 2½% ore.

Equipment: includes compressor, 200-ton mill and electric power.

Examined by Rush J. White. No recent returns.

REX CONSOLIDATED MINING CO. IDAHO

Name changed, 1918, to Rex Mining Co., which see.

REX MINING CO. IDAHO

Office: L. E. Whicher, pres.; Raymond Guyer, v. p.-gen. mgr., 25 Broad St., New York.

A reorganization of the Rex Consolidated Mining Co., effected during 1918. This included the issuance of 5,000,000 shares of new stock, having a par value of only 25 cents, of which 2,000,000 shares were to be exchanged, on a basis of share per share, for the 2,000,000 shares of existing stock, having a par value of $1 a share and to offer rights to the present stockholders to subscribe to 1,500,000 more of the new shares at 15 cents a share, as well as to pay for the new properties with the remaining 1,500,000 new shares. By March, 1919, the Rex Mining Co. owned all the properties and equipment, free of encumbrance, and had cash assets of about $40,000.

Property: 15 claims and a mill-site, 185 acres, in Nine Mile section, Coeur d'Alene, including the Sixteen-to-One mine near the Cons. Interstate-Callahan and Success mines, held under bond and lease. Was extensively developed years ago by the Finch-Campbell interests of Spokane, but increase of zinc values at depth made operations unprofitable. In Dec., 1915, this com-

pany took an option on the property of the Black Bear Cons., which see; after paying $10,000, the option was relinquished.

On Sept. 29, 1917, it was decided to complete purchase of the Rex mine and Rex mill and develop at depth; also to acquire the Friel tract in the Miami zinc belt of Oklahoma, which has been extensively drilled.

The claims are in the slate belt, long considered valueless as an ore formation, until W. H. Weed challenged this view and demonstrated its falsity by work at the Interstate-Callahan. The claims contain 3 strong veins, the Rex, Okanogan, and Delaware, which converge at depth.

Development: through a main working tunnel 900′ long. Below this a 2-compartment shaft has been sunk to No. 9, or 1,280′ level. A crosscut at this depth cut 3 parallel veins. The Okanogan vein is from a few inches to 10′ in width. The Delaware outcrop is stronger than the Rex or Okanogan and lies 350′ S. of the latter. Underground work totals over 10,000′, and cost over $350,000. From a relatively small area in the upper workings there was produced more than $800,000 of silver-lead ore. Most of the zinc ore remains.

Equipment: 75-h. p. electric hoist and 3 air hoists underground, 15-drill compressor of 1,050 cu. ft. capacity driven by 200-h. p. motor and mill costing $200,000. On lead ore the mill had a capacity of 350 tons daily, and on zinc-lead ore, 200 tons. Plant includes flotation units and an Oliver filter. At upper terminal of the 6,600′ aerial tram of 400 tons capacity, a modern sorting plant is operated. Surface improvements include repair shops, bunk and boarding houses, dwellings, etc.

Production: during 1917 the mill treated 39,731 tons of ore, yielding 8,446 tons of concentrates producing 2,965,395 lb. of lead, 5,954,280 lb. of zinc, and 58,629 oz. of silver. The gross value was $492,943. Mining, development, equipment, freight, and treatment absorbed the whole amount.

Since the reorganization the upper levels of the mine have been leased and the main shaft deepened below the 1,380′ level, because exploration near this level has not revealed much ore, although the vein itself was persistent. No company work was done for a year ending March, 1919, but the results of lessees' work is very good. In May, 1919, an arrangement was to be made with the Monarch Cons. whereby the Rex shaft and Monarch tunnel could be connected to their mutual benefit. At the Marrs Hillside mine at Cima, 10 miles from the Salt Lake Route, a 50′ shaft, and a 75′ drift had opened 3′ of 14% copper, 2 oz. silver, and $1.50 gold ore. Company will not take up bond on this mine.

ROBERTA MINING & MILLING CO. IDAHO

Address: Alex. Penaluna, Wallace, Idaho.

Officers: J. Lutey, Jr., pres.; J. A. Shelton, sec.; Charles Youlden, treas., with Curtis Lewis and Alex Penaluna, directors.

Property: 12 claims, patented, well timbered, on Nine Mile creek, near Gem, Shoshone county, carry 4 known veins.

Development: by 4,000′ of tunnels, the lower to be driven 2,000′ to give backs of 800′ and to cut 4 veins, one of which shows lead and copper carbonates at surface, giving assays up to 6% copper, 10% lead, 16 oz. silver and $3 gold per ton. In August, 1919, it was reported that a vein 15′ wide had been cut in No. 2 tunnel.

RUTH CONSOLIDATED MNG. & MLG. CO. IDAHO

Address: Box 2186, Spokane, Wash.

Officers: C. M. Crego, pres.; Wm. Hoare, v. p.; G. D. Crego, sec.-treas., with O. B. Wallace, F. W. Tueting, M. H. McCall, and J. F. Thompson, directors.

Inc. 1905, in Washington. **Cap.,** $1,500,000; shares $1 par; assessable to 10 cents; all issued.

Property: 7 claims, 120 acres, in Placer Center district, 3 miles N. of Wallace, Shoshone county. Ore carries lead and silver.

Development: by 1,500′ tunnels, and a total of 4,000′ of workings, a depth of 700′ has been reached. About $2,000 was spent during 1918.

Equipment: electric power connections, compressor, drills, shops, and dwellings. No production reported.

SAINT JAMES MINING & MILLING CO. **IDAHO**

Address: Mrs. Theresa James, pres., Wallace, Idaho.

Inc. 1911, in Idaho. **Cap.,** $50,000; shares 5c par.

Property: the St. James mine, comprising the Ula and Try Me claims on Sunset peak near Wallace, Shoshone county. **Ore:** carries lead, silver, and zinc. No. 2 tunnel, started Nov., 1915, cut vein at 300′, showing 8′ of milling ore. By July, 1919, the lower tunnel was 1,200′ long, and the vein expected within another 100′. A 20′ vein was cut in the upper tunnels. A compressor was erected in April, 1919.

SENATOR MINING CO. **IDAHO**

Address: Ed. Ehrenberg, 1124 14th St., Spokane, Wash.

Inc. 1918. **Cap.,** $1,500,000.

Property: the Flynn group of 20 patented claims adjoining those of the Star company near Mullan, Shoshone county, and considered to contain an extension of the Federal company's Morning vein. A bond for $500,000 has been taken for 2½ years, from July 1, 1918. An arrangement was made with the Star company to explore the Flynn ground from the former's tunnel, and use its compressor and buildings. Two shifts were working in 1918, and in February, 1919, diamond-drilling was under way.

Property is considered to have considerable merit.

SHERMAN DEVELOPMENT CO. **IDAHO**

Described in Volume XIII. Absorbed by Sherman Lead Co., which see.

SHERMAN LEAD CO. **IDAHO**

Address: Charles McKinniss, v. p., Wallace, Idaho.

Inc. 1918, in Idaho. In return for an advance of $100,000, 51% of the shares were given to E. R. Day, who controls company.

Property: the Union claims, formerly owned by Sherman Development Co., on Canyon creek, near Burke, Shoshone county. Ore is lead and silver bearing.

Development: by tunnels. In 1918, No. 4 tunnel disclosed 4′ to 8′ of 20% lead ore for 180′, at a depth of 1,000′. To develop this shoot further, the old Creek tunnel of the Tiger-Poorman mine was cleaned out and is being extended. This orebody is considered to be on the strike of the Tamarack & Custer vein. In August, 1919, a raise had opened ore.

SIDNEY MINING CO. **IDAHO**

Address: L. W. Gay, Kellogg, Idaho.

Officers: L. W. Gay, pres.-treas.; E. H. Baker, v. p.; W. T. Simons, sec., with E. S. Gay, and E. H. Baker, directors.

Inc. in Idaho. **Cap.,** $1,500,000; shares $1 par; assessable, 1,275,000 issued.

Property: 19 claims in Pine Creek district of Shoshone county, adjoining the Denver mine of the Nabob Cons. Ore carries silver, lead, and zinc, and is developed by tunnels. In March, 1918, J. P. Acoam of Spokane, and others, secured a 3-year option on 900,000 shares of the company stock for $80,000.

SIERRA NEVADA CONSOLIDATED MINING CO. **IDAHO**

Subsidiary of Bunker Hill & Sullivan Mining & Concentrating Co., which see.

Officers: Stanly A. Easton, pres.; C. W. Simmons, sec.

Net profits in 1914 were $159,339; in 1915, $46,364; in 1918, $188,042.

Property: 5 patented claims in Deadwood gulch, Coeur d'Alene region, Idaho, developed by about 5,000′ of workings.

Production: company began shipping ore in July, 1913, selling its output under contract to April 29, 1915, to the A. S. & R. Co. Management being unable to extend contract satisfactorily, discontinued production during 1916 and 1917. Ore output was 15,159 tons in 1915, and 19,234 tons in 1918.

SILVERADO MINING CO. **IDAHO**

Office: C. D. Muxen, sec.-treas., Old National Bank Bldg., Spokane, Wash.

Officers: W. B. Pickerall, pres.; W. B. Turner, v. p.; C. D. Muxen, sec.-

treas., with W. Patterson, I. C. Newman, E. G. Ross, William Wood, H. A. Long, and A. O. Eyller, directors.

Inc. in Washington. **Cap.**, $2,500,000; $1 par; about 1,50,000 shares issued. Has a $4,000 mortgage.

Property: a group of claims near Osborne, Shoshone county, re-opened in 1915, after several years' idleness, shows fissure vein in shale, running downward into the underlying quartzite.

Development: 4,000′ tunnel, 400′ of it a drift on a 1 to 3′ vein showing 6 to 18″ silver-lead and gray copper ore. A 120′ winze shows persistence downward.

Reserves in September, 1917, were sufficient for several months' milling. At 4,000′ in main tunnel and at depth of 1,400′, there has been opened 100′ of ore 3′ wide, assaying 0.4% copper, 10.4% lead and 13.4 oz. silver per ton.

Equipment: includes 6-drill compressor and electric power. A 100-ton mill with flotation plant was working one shift daily in September, 1917. Mill seems to have been erected before enough ore was developed, as there was a suspension of operations during 1918 and 1919.

SILVER CLIFF GOLD AND COPPER MINING CO., LTD. IDAHO

Office: Wallace, Idaho.

Officers: Jas. D. Young, pres., treas. and gen. mgr.; Edw. C. Young, sec., with Gust Oberg, and J. A. McLachlan, directors.

Cap., $1,500,000; shares $1 par; an assessment of 5 mills was levied in Sept., 1919.

Property: 18 claims, 7 miles from Mullan, near Larson, Shoshone county, developed by 3 tunnels, the lower of 850′ and longest of 1,500′ showing copper ore with some lead and fair value in gold.

Equipment: includes a Pelton wheel and an 8-drill air-compressor.

No report received since 1916, save that an assessment had been levied to carry on work this winter.

SILVER DALE & BIG HILL MINING CO. IDAHO

Address: Kellogg, Idaho.

Officers: E. G. Johnson, pres.; Richard Meineier, v. p.; D. W. Knudson, sec.-treas., with J. Olson, P. Petterson and Carl Arenauder, mgr., directors.

Inc. Sept. 12, 1917, in Idaho. **Cap.**, $10,000; shares 1 cent par, assessable; 425,000 issued. Three mills per share, due Dec. 20, 1919.

Property: 21 claims on Big creek, east slope of Kellogg peak, the west line adjoining the Bunker Hill & Sullivan. Deposit is a contact in Revett and Burke quartzite. Ore carries galena, containing silver, and is developed by a 900′ tunnel. A 400′ tunnel, being driven, 1919, will give a depth of 700′. Outcrops are promising. In 1918, $5,783 was spent for labor and $8,080 on machinery (compressor, water power. etc.).

Owners are candid in saying that property is a wildcat project, whose proximity to the Bunker Hill & Sullivan warrants the real exploration now under way.

SILVER MOON MINING CO., LTD. IDAHO

Office: Gus Ehrenberg, Box 297, Spokane, Wash.

Officers: Eugene Sage, pres.; H. C. Lambach, v. p.; G. Ehrenberg, sec.-treas., with Geo. Steward and Ed. Ehrenberg, directors.

Inc. Sept., 1906, in Idaho. Cap., $1,500,000; $1 par; assessable; 946,903 issued.

Property: 9 claims, north side of Canyon creek, 4½ miles from Wallace, Shoshone county, adjoining the Frisco mine, shows 2 veins of lead ore in quartzite.

Developmnet: by 2,133′ crosscut tunnel and 1,533′ of other work, to depth of 600′. Prospecting being continued, while 2 veins cut in tunnel are to be opened.

Equipment: includes a 200 cu. ft. compressor, electrically driven.

Property is a promising prospect; but promoters were frank enough to state that "buyers must be prepared for a long pull."

SILVER MOUNTAIN MINING CO., LTD. **IDAHO**

Office: Potlach, Latah county, Idaho.

Officers: L. Tice, pres.; E. D. Wilkins, v. p.; W. E. Horstkotte, sec.; G. L. Fulton, treas., directors. Arthur Horstkotte, mgr.

Inc. in Idaho. **Cap.**, $1,500,000; shares $1 par; assessable.

Property: 9 claims, 4 patented, near the Alice mine, on St. Joe Gulch, shortly west of the Morning mill, about 3½ miles from Mullan, Shoshone county. The mine has three tunnels, and a 900′ crosscut tunnel intersects an 8′ vein carrying ore said to give assays of 2% copper, 3 oz. silver, and $1.80 gold per ton. In May, 1919, new work cut 18″ of ore assaying 8% copper and 12 oz. silver per ton.

Equipment: includes a small steam plant and air compressor. Developing with a small force.

SNOWSHOE MINING CO. **IDAHO**

Address: Mullan, Shoshone county, Idaho.

Officers: P. J. Gearon, pres.; Paul Lucia, v. p. and gen. mgr.; H. G. Loop, sec.-treas., with J. A. Bean, William Wallace, and A. P. McRae, directors.

Inc. Sept., 1903, in Idaho. **Cap.**, $1,000,000; $1 par; assessable; fully issued; 13 assessments of 5 mills each and one of 2½ mills levied to March, 1917. Shares are listed on the Spokane and Butte Exchanges.

Property: 7 claims, patented, adjoins the Snowstorm on the east and supposedly carries the extension of the Snowstorm fault, at the head of Gentle Annie gulch, near the top of Snowstorm mountain, in the Hunter district, 1 mile from railway. Claims show Revett quartzite, mineralized for 30′ in the Snowstorm fault, with some cuprite, azurite and chalcopyrite, giving assays up to 9% copper and 8 oz. silver per ton.

Development: by crosscut tunnels, longest 2,000′, and drifts, a total of about 5,000′ of workings, showing a mineralized zone of 30 to 40′ width, carrying various copper ores sparsely disseminated. Drifting on the N.-S. fissure opened up a body of high-grade copper ore, 8 to 24″ wide, at 650′ depth and about 1,600′ from portal of No. 2 tunnel. The upper crosscut tunnel, 700′ long, intersected a vein up to 60′ wide and running from 1-20½ copper, at a vertical depth of 250′. A second crosscut, 696′ vertically below No. 1, cut the vein 1,700′ in without disclosing any values.

Equipment: includes 3-drill air-compressor, power house and several buildings. Further development planned and necessary. No recent returns.

SNOWSTORM APEX MINING CO. **IDAHO**

J. H. McIntyre, M. E. Delgrove and B. V. May of Spokane, trustees.

Inc. 1908, in Washington. **Cap.**, $1,500,000; shares $1 par.

Property: on Snowstorm mountain, east of Mullan, shows 2 veins opened by a shallow shaft and a 130′ tunnel, with about 200′ of workings.

Letters returned from Mullan, Idaho. Probably idle.

SNOWSTORM EXTENSION COPPER MINING CO. **IDAHO**

Address: Mullan, Shoshone county, Idaho.

Inc. Oct., 1909, in California, as successor of Snowstorm Extension Mining Co., Ltd. **Cap.**, $1,000,000; assessable.

Property: 9 claims, adjoining the Snowstorm on the east, supposed to carry the extension of the Snowstorm ore zone. Pits and trenches have shown ore of about 3% copper tenor, markedly similar to that of the Snowstorm.

Development: by a drift tunnel, starting from North Fork creek, 2,000′ long at last accounts, planned to be driven to secure an eventual back of 1,630′, on the dip of the vein. No recent information.

SNOWSTORM MINING CO. **IDAHO**

Company dissolved, July, 1916, and succeeded by Snowstorm Mines Consolidated (Montana), which see. For production and description of organization, etc., see Vol. XIII.

SONORA MINING & MILLING CO. **IDAHO**

Address: W. A. Smith, White & Bender Bldg., Wallace, Idaho.

Officers: A. H. Featherstone, pres.; W. A. Smith, sec.-treas., with J. T. Boyle, C. B. Lund, M. Werkheiser, O. A. Dubach and H. S. Tofte, directors.

Cap., $1,000,000; shares $1 par; assessable. Last assessment of 2 mills per share delinquent on February 14, 1920.

Property: 12 claims, patented, over the hill from the Marsh mine above Burke, Shoshone county. Is an old mine worked intermittently since 1896; $75,00 expended and 3,200′ of work done prior to 1908, when a 6′ vein was cut at 1,400′ from portal and at depth of 800′.

In 1914, a contract with John Moffat was made to "find" the vein for 100,000 shares of stock. A shaft and winze was sunk on the Cooney vein at 1,950′ from the tunnel mouth, the ore-shoot proving elusive on the Sonora vein. In 1916, company let contract for 200′ extension of the 1,500′ tunnel, hoping to crosscut another vein. Another extension of 100′ was driven late in 1916. Total workings are over 4,000′.

STANLEY MINING CO. **IDAHO**

Address: Burke, Idaho.

Cap., $1,500,000; shares $1 par; treasury, 200,000 shares. Listed in Spokane. Controlled by Day family, principal owners of Hercules Mining Co.

Property: 12 patented claims, west of Benton and N. E. of Humming Bird, in George Gulch, half mile N. of Burke, Shoshone county, said to show antimony ore. Authentic information is scarce. The Humming Bird crosscut tunnel, run by the Hercules, passes through Stanley ground.

STAR ANTIMONY CO. **IDAHO**

Address: Kellogg, Idaho.

Officers: B. A. McIntosh, pres.; J. S. Ross, sec.; W. F. Smith, treas., with W. I. Hall, L. H. Timpe, E. W. Miller, T. Henwood, and T. Beeler, directors.

Inc. March, 1916, in Idaho. **Cap.,** $10,000; shares 1c par.

Property: the Brown & Fennell claims and others, eleven in all, on Pine creek, Coeur d'Alene district, Idaho. Ore carries stibnite (antimony sulphide).

Development: by 3 tunnels, equal to 1,500′. Exploration under way in 1917.

Production: 3 carloads in 1916, assaying 52.4 to 54.8% antimony. Mine assayer reports 50c. to $15.36 gold per ton. No recent returns.

STAR MINING CO. **IDAHO**

Address: Mullan, Idaho.

Officers: E. H. Moffitt, pres.; Charles Hussey, sec.-treas., with J. G. Cunningham and Austin Corbin, directors.

Cap., $1,000,000; shares $1 par.

Property: 7 claims adjoining Morning mine of Federal .M & S. on west, 2 miles from Mullan. Late in 1917 the Star company brought suit against the Federal for alleged wrongful extraction of ore from its ground. The case was heard in March, 1918, many well-known engineers being retained by both sides. The Star received an adverse judgment, from which it appealed in August. The final decision is not yet available.

STERLING MINING CO., LTD. **IDAHO**

Address: J. J. Presley, pres., Kellogg, Idaho.

Inc. 1903, in Idaho. **Cap.,** $1,500,000; shares $1 par.

Property: 12 unpatented claims, 240 acres, in Lake gulch, 3 miles S. W. of Wallace, Shoshone county. Contains a vein in Revett quartzite, surface samples assaying 13% lead and 8 oz. silver per ton. Developed by a 700′ tunnel. Examined by R. S. Merriam of Wallace.

STERLING SILVER MOUNTAIN M. CO. **IDAHO**

Address: 323 Lindelle Block, Spokane, Wash.

Officers: R. L. Brainerd, pres.; Harry Morrell, supt.,

Property: 7 claims on Big creek, adjoining the Yankee Boy, near Wardner, Shoshone county. Veins are in quartzite, and ore carries silver and lead.

Development: by crosscut tunnels, ore being driven 500′ to cut 2 veins.

Equipment: includes electric power, compressor, mills and buildings. Six men employed. A prospect.

STEWART MINING CO. **IDAHO**

Offices: 1482 Broadway, New York; and Kellogg, Idaho.

Officers: J. E. Harrington, pres.; J. L. Williams, sec., with W. H. Weed and W. Harrington, directors. C. C. Griggs, Western mgr. of mines; D. J. Cook, supt., in Nevada; W. A. Beaudry, gen. mgr., in Idaho. Nash Rockwood, counsel.

Inc. Aug. 29, 1902, in Idaho. **Cap.**, $1,250,000; shares $1 par, increased July, 1916, to $3,000,000; shares $1 par; 2,738,362 outstanding. No bonded indebtedness. J. L. Williams, New York, transfer agent; Metropolitan Trust Co., New York, registrar. Annual meeting in August. Listed on Boston and New York Curbs.

Company controls the Coeur d'Alene Development Co. through ownership of 562,498 of 1,000,000 shares; also the Nabob Consolidated Mining Co., holding 1,750,000 shares.

Current assets, June 30, 1917, amounted to $159,966, and liabilities, $21,996. A year later the respective totals were $256,787 and $100,525. The surplus was $670,186 in 1917, and $484,486 in 1918.

In January, 1920, the matter of arranging additional finances for subsidiaries was under consideration. On Jan. 23, 1919, there was assigned to the American Smelting & Refining Co. a mortgage by the Nabob Consolidated covering the Nabob mill in lieu of advances made by the A. S. & R. Co. to the Stewart Mining Co.

Dividends: paid at the rate of 10c quarterly from 1913 to Dec., 1915, with extra dividends amounting to 32½c. in 1913; 62½c. in 1914; 70c. in 1915. Rate was reduced to 5c. quarterly in 1916. None since then.

Property: the Stewart mine at Kellogg, 8 claims, partly patented, 150 acres. Along the outcrop of the contact 2,000′ carries silver-lead ore averaging $6.06 per ton. Country rock is soft Burke quartzite. Output during 1914 and 1915 averaged 500 tons daily, but declined to 125 tons in 1916. The mine is practically worked out, and as extensive development work in 1915 failed to find any new orebodies, management purchased properties at Tuscarora, Nevada, and the Coeur d'Alene Development Co. property, which adjoins the Stewart.

The Tuscarora property is estimated to contain from 400,000 to 600,000 tons of $14 ore, for which a 300-ton mill has been erected.

In Idaho the Nabob and Denver mines on Pine creek were bought. A mill was completed Sept., 1919, at the Denver mine. Country rock is one of the Algonkian sedimentary series, known as Prichard slate. Veins of these mines are true fissures cutting the bedding planes of the slate at nearly right angles. Faulting is common, though not troublesome. Lead occurs as galena and zinc as sphalerite. This group, which see under Nabob Cons., is developed by tunnels.

Equipment: the Stewart mill at Wallace, 12 miles from the mine, has a daily capacity of 500 tons. It includes crusher, 4 sets of rolls, 2 Huntington, 12 Wilfley tables, 18 Frue vanners, 35 Harz jigs, 4 Deister slime-tables, and a flotation unit. Concentration ratio is 6 into 1, the product averaging 50% lead and 50 oz. silver per ton. About 200,000 tons of tailings are still available for treatment.

Production: few figures are available. In 1915, 189,615 tons of ore was valued at $2,140,363. The profit from this was $554,433.

Management has been searching for new properties for some time, and various mines have been investigated and considered, including the Old Sport Group of the Quatsino Copper Co., comprising 26 patented claims, 2,000 acres, Vancouver, B. C., on which $100,000 was spent before the option was relinquished.

Litigation with the Ontario Mining Co., was decided adversely, April, 1915, and the Ontario company granted $48,000 for ore illegally extracted.

Notwithstanding the spectacular career of the Stewart company under the Heinze regime, the mine made good, paying $1,000,000 a year dividends for two years.

Coeur d'Alene Development Co.

Property: 10 patented claims, developed to 400′ level and equipped with a mill. Twelve years ago a rich orebody produced about $150,000 worth

of ore, but property was abandoned when this vein was worked out. Extensive development work was under way in 1917 and 1918, but no details are available.

SUCCESS MINING CO., LTD. **IDAHO**

Office, Wallace, Idaho.

Officers: Franklin Pfirman, pres.; E. C. Walker, v. p.; H. J. Rossi, sec.-treas., with W. R. Mullan, and M. L. Mahoney, directors. A. G. Kennedy, asst. sec.; F. W. Skeels, mgr.

Cap., $1,500,000; shares $1 par, all issued; assessable, an assessment of 2 cents was called November 29, 1919. Listed in Butte, Spokane, and on New York Curb.

Dividends: suspended April 20, 1913, totaled $345,000 to that date; resumed April 30, 1915, and $550,000 paid in 1915; $345,000 to July 26, 1916; none since.

Financial statement: at end of 1916, current assets were $122,749 in excess of liabilities, and $15,587 at end of 1917. The new management claimed profits amounting to $23,915 for the first two months of 1918. No statements are available since then. The mine had been worked at a loss of $150,000 since July, 1916.

Litigation with the adjoining Alameda company, which claimed payment for ore, said to have been extracted from its ground by Success, was decided in favor of Alameda Co., but the Success Co. appealed and won. This was followed by the Alameda appealing, but the court dismissed case in May, 1917.

Property: 8 claims on Nine Mile creek, 2 miles N. W. of Wallace, is one of the oldest located properties in the Wallace district; first operated by the Granite Mining Co., taken over in 1905 by H. F. Samuels, who organized the Success Mining Co., continued under his management until 1915, when control passed to "practical" mining men and brokers, and large blocks of stock, aggregating over 1,000,000 shares, were worked out through the New York, Duluth, Spokane and Butte exchanges.

The company had considerable publicity during 1917, due to stock manipulation, said to have been aided by the management, and to friction between the management and several publications on mining news. This was aggravated by the seeming aversion of the directors to take stockholders into their confidence, especially in connection with the new smelter contract with the Grasselli Chemical Co., effective May 1, 1916. The distrust of the management culminated, April, 1916, in the Success officials being summoned to court to show why stockholders should not know the terms of contract. This covered 2,000 tons monthly for 3 years, with minimum zinc content of 38%, and maximum lead of 5% at certain prices.

The old management was ousted in Dec., 1917.

The results of operations since Jan., 1918, show that unless a more favorable smelting contract is secured it is advisable to abandon the mine when the ore exposed is extracted. A new shoot of lead-zinc ore reported opened on the 1,500′ level in 1918, proved but a temporary help and in April, 1919, the mine was closed down, largely on account of an unfavorable and unprofitable treatment contract with the Grasselli Chemical Co.

Geology: according to U. S. G. S. Prof. Paper, No. 62, there is no vein, the ore occurring in masses of irregular form and size, which are chiefly replacements of quartzite in places where it has been most thoroughly fissured. The ore is strictly confined to the sedimentary rock; surrounding country rock is monzonite. Some discussion as to the geologic features of the mine appeared in the "M. & S. Press" of April, 1918; also in the 1918 report of the State Inspector of Mines for Idaho. Ore carries zinc, with lead and silver.

Development: by tunnels to 700′ level, and by shaft from 700′ to 1,600′ level. From July, 1916, to Feb., 1918, 4,000′ of driving was done on the 1,200, 1,300, 1,400, 1,500, and 1,600′ levels, and 480′ of sinking, revealing 25,000 tons of ore. Two years' work above the 1,200′, amounting to 5,000′, exposed 150,000 tons of ore. Exploration was practically confined to the known ore-shoot, but ground to the east was to be explored during 1918, and it is reported that the 1,500′ level shows 6′ of high-grade zinc ore and considerable lead.

Equipment: includes a 250-ton mill, employing flotation.

Production: in 1916, was valued at $693,045 from ore mined and flotation slime.

The mill was operated during part of December, 1918, and January, 1919. In February, 1919, the mine was closed indefinitely, excepting for work being done above the 700′ level by lessees, who were reported making regular shipments.

SUNSET-BANNER MINING CO. IDAHO

Absorbed, 1918, by Sunshine Consolidated Mining Co., which see.

SUNSHINE CONSOLIDATED MINING CO. IDAHO

Address: C. E. Mallette, Jamieson Block, Spokane, Idaho.

Inc. Jan., 1918. **Cap.,** $2,500,000; shares $1 par.

Property: a consolidation of the Idora Mining Co., Parrot Mining Co., Sunset Banner Mining Co., Sunshine Mining Co., Toughnut Mining Co. and Tuscumbia Mining Co., all operating on Beaver creek, Shoshone county. The Consolidation includes about 30 claims on which over 15,000′ of work has been done through tunnels, the Idora having one of 5,000′, and the Tuscumbia one of 4,000′. It is planned to drive a main working tunnel to serve the group and to open ore at much greater depth. Orebodies are in Prichard slate, and carry lead, silver, and zinc.

Equipment: each mine has suitable machinery and buildings, including compressors at the Idora, Sunshine, and Tuscumbia mines, drills, and aerial tram and 150-ton concentrator employing flotation at the Idora.

Producton: the Idora and Tuscumbia have shipped ore and concentrate for several years, but figures are lacking.

This consolidation should ultimately benefit these 5 properties, which have had but limited development for want of funds.

SUNSHINE MINING CO., LTD. IDAHO

Absorbed 1918 by Sunshine Consolidated Mining Co., which see.

SYNDICATE MINING & EXPLORATION CO. IDAHO

Address: Wallace, Idaho.

Property: a group of claims near Wallace, at the mouth of Big creek, Shoshone county.

Development: by a crosscut tunnel (1,000′ long Sept., 1919,) in which it was expected the vein would soon be cut.

TAMARACK & CUSTER CONSOLIDATED MINING CO. IDAHO

Address: Wallace. Idaho.

Officers: J. J. Day, pres., gen. mgr. and treas.; E. R. Day, v. p.; H. L. Day, sec., with R. M. Walker, E. H. Knight, E. Boyce, and F. M. Rothrock, directors.

Inc. 1913, in Nevada. **Cap.,** $2,000,000; $1 par; 1,776,250 issued.

Financial statement shows net profits for 1914, $187,063; for 1915, $346,796; for 1916, $338,746; and $350,857 in 1918.

Dividends: initial of 2c per share was paid May, 1916; total in 1916 was $71,050; $53,387 in 1917; $53,287 in 1918; $56,287 in 1919; total to end of 1919 was $446,992.

Property: about 40 claims and fractions, acquired from the old Tamarack & Chesapeake and Custer companies, on Nine Mile creek, Coeur d'Alene district, Shoshone county. The Hercules mine nearby is controlled by the same interests. Ore carries galena with silver values and as mined is part direct smelting and part concentrating material.

This company, together with the Hercules interests, built and operates the lead smelter at Northport, Wash.

Little specific information is available concerning this company, the policy of extreme reticence that has resulted in much criticism in the past being continued. Early in 1917 the 500-ton Frisco mill at Gem was purchased from the Federal Mining Co., for $150,000, also the 8,000′ Hercules aerial tram. To this line was added 2½ miles to connect the mine and mill. In June, 1919, operations were resumed after 3 months' suspension. The remodeled mill includes a flotation plant. About 350 men employed when operations are normal.

Production: during 1917, aggregated 16,916 tons shipped, valued at $1,338,321, yielding $350,857 net profit.

TEDDY MINING & MILLING CO., LTD. IDAHO

Address: J. B. Cox., sec., Kellogg, Shoshone county, Idaho.

Cap., $1,000,000; shares $1 par; assessable.

Property: 7 claims and a mill-site, 1 mile E. of Kellogg, shows 2 veins, 1 of about 15′ width, carrying copper ore with quartz gangue, and 1 of about 12 to 35′ width, carrying silver-lead ore giving assays up to 12% lead and 30 oz. silver per ton.

Development: by crosscut tunnels of 100′ and 550′, and total of 1,200′ of workings.

Property is leased to Kellogg and Wallace people.

TERRIBLE EDITH MINE IDAHO

Address: Washington Snyder, Murray, Shoshone county, Idaho.

Property: 4 claims, 1½ miles E. of Murray.

Development: by 1,300′ crosscut and 1,700′ of drifting, opening lead-zinc ore of shipping grade. Several shipments of 50% ore were made, prior to 1916, and that years' output returned $100,000.

TUCKER MINING & MILLING CO. IDAHO

Address: Box 551, Wallace, Idaho.

Officers; Peter Bahn, pres. and gen. mgr.; J. Pearson, v. p.; W. Turner, sec.-treas., all directors.

Inc. June, 1908, in Idaho. **Cap.,** $1,000,000; $1 par; assessable; 600,000 issued; given in exchange for the property. Annual meeting in June.

Property: 6 claims, unpatented, 120 acres, in the Hunter district, Shoshone county, 3 miles E. of the Snowstorm and 7 miles E. of the Morning, shows Revett quartzite, cut by a diabase dike with veins, 1 to 4′ in surface width, said to carry silver ore.

Development: by a 1,000′ tunnel. There is no equipment or production to describe. A prospect.

TUSCUMBIA MINING CO. IDAHO

Absorbed, 1918, by Sunshine Consolidated Mining Co., which see.

TYLER MINING & MILLING CO., LTD. IDAHO

Address: Albert Hausaman, sec., Burke, Idaho.

Cap., $1,000,000; shares $1 par; assessable.

Property: 8 claims, 17 miles from Burke, Shoshone county, but on the Montana side of the divide. Ore carries lead and silver and has been opened by 700′ of workings.

VIENNA-INTERNATIONAL MINING CO. IDAHO

Address: R. A. Marshall, sec., Wallace, Idaho.

Officers: A. H. Featherstone, pres.; Geo. Moison, v. p.; R. A. Marshall, sec.-treas., with A. B. Livingston and W. B. Lively, directors.

Cap., $1,500,000; shares $1 par. Annual meeting first Tuesday in September.

Property: 6 claims, 3 patented, and a mill-site, near the mouth of Flora gulch, on Placer creek, 6 miles S. of Wallace, shows banded shales and quartzites of the middle part of the Newland formation, striking N. 50 to 60° W., dipping 70° S. Principal vein has a quartz-siderite orebody, 3 to 5′ wide with strike almost E.-W. and vertical dip. Ore on the dump shows galena, pyrite and chalcopyrite in a quartz-siderite gangue of too poor a grade to be profitably concentrated.

Development: by a 400′ shaft, and 2 tunnels of 700′. Mine was optioned to Spokane people in 1916, but the bond was forfeited in 1917; company then did a little more work, but finally suspended development in 1918.

WALLACE MINING, MILLING & REALTY CO. IDAHO

Address: M. R. Evans, mgr., Wallace, Idaho.

Property: 9 claims on Placer creek, alongside of city limits of Wallace, Shoshone county, said to show a big vein with scattered galena ore.

Development: by 2,000′ tunnel, and total of 2,400′ of workings, the tun-

nel was being advanced 4′ daily in Oct., 1919. Is equipped with electric power, compressor, etc.

WARDNER LEASING CO. **IDAHO**

Address: J. D. Owen, Kellogg, Idaho.

Officers: R. A. Carnochan, pres.; D. W. Price, v. p.; J. D. Owen, sec.-treas., with C. E. Struthers, directors. W. A. Beaudry, mgr.

Inc. April, 1917, in Washington. **Cap.,** $500,000; increased to $600,000 in 1918; $1 par; assessable.

Property: has 25-year lease on 60 acres of patented ground in Wardner townsite. Company has definite development plans and sufficient funds. Contiguous properties are the Caledonia, Last Chance, and Bunker Hill & Sullivan, all well known producers.

Development: by 230′ shaft and over 1,000′ of lateral workings. The project is to find continuation of the Caledonia vein on the east side of the fault by driving a crosscut tunnel. This was 500′ long in January, 1920.

WESTERN UNION MINING CO. **IDAHO**

Is a reorganization of Aurora-Sampson and H. E. M. companies.

Address: Ben. L. Collins, sec.-mgr., Old National Bank Bldg., Spokane, Wash.

Officers: D. H. Anderson, pres.; Eric Hagnan, v. p.; B. L. Collins, sec.; Russel F. Collins, Spokane; J. E. Burbank, Cheney, Wash; P. A. Bounds, H. D. Winchester, Wm. Holm, Wm. Bjorklund, directors.

Inc. Jan. 1916, in Idaho. **Cap.,** $200,000; par 10c; 1,800,000 shares issued.

Property: 20 claims 2½ miles N. W. of Wallace, known as Aurora-Sampson and H. E. M. groups. **Geology:** fissure veins in quartzite and slate.

Development: aggregates 9,000′; chief working or main tunnel extended 500′ in 1919. An easterly drift exposed 10″ ore for 175′ at depth of 1,400′ below old upper tunnel that ran 58% lead and 58 oz. silver per ton.

The H. E. M. 100-ton concentrating mill at Wallace was sold in 1918 to the Bead Lake Mining Co. of Washington.

WEST HECLA MINING CO. **IDAHO**

Office: 601 Empire State Bldg., Spokane, Wash.

Officers: Morton Webster, pres.; J. V. Pohlman, sec.-treas., with A. A. Booth and T. A. Russell, directors.

Inc. in Washington. **Cap.,** $1,500,000; shares $1 par; assessable; 1,450,000 issued.

Property: 3 patented claims opposite the Hecla mine, Burke, Shoshone county.

In Sept., 1917, company was prospecting in quartzite for the Hecla lead-silver vein. Workings to depth of 650′ totaled 1,750′. No recent returns.

WEST HUNTER MINING CO. **IDAHO**

Address: J. L. Martin, Mullan, Idaho.

Officers: E. T. Davey, pres.; Wm. Flood, v. p.; J. L. Martin, sec.-treas.; with Mike Murray, and T. B. Cosgrove, managing directors.

Cap., 1,500,000; 10c par; assessable.

Property: 1 patented, 7 unpatented claims about one-half mile from Mullan, Shoshone county. The claims show a large body of quartz sprinkled with galena, which has been exposed by surface workings.

Development: a crosscut tunnel is being extended to cut downward extension of the ore exposed on the surface, and late in 1919 it was near the vein.

WEST NINE MILE MINING CO. **IDAHO**

Address: Chas. Heilbronner, pres. and gen. mgr., Wallace, Idaho. H. C. McAllister, treas.

Cap., $1,000,000; shares $1 par; assessable.

Property: 4 claims west of the Success and Alhambra mines on west fork of Nine Mile creek, Shoshone county.

Development: by 700′ tunnel shows a vein said to carry occasional bunches of ore. Only assessment work being done at last advice.

WISCONSIN MINING CO. **IDAHO**

Letters sent to Kellogg returned unanswered.

Officers: Louis Bolduc, pres.-treas.; P. Mason, v. p., with J. Bolduc, F. Jones and J. W. Thompson, directors; J. S. Ross, sec.

Inc. 1912. **Cap.,** $1,500,000; $1 par; assessable. Company is practically the successor of the Gold Leaf Consolidated Mines and the Coeur d'Alene Consolidated Mining Co., the shares of the old companies being made transferable share for share in the new company, upon payment of back assessments.

Property: 4 claims, unpatented, 2½ miles east of Kellogg, has 800′ of tunnels and crosscuts and one 90′ vertical shaft, developing a vein of 5 to 6′ width, carrying copper ore and a little lead.

Equipment: includes a 2-drill compressor, run by water power from Moon creek, and a hoist. Development work only has been done since .

WONDERFUL MINING CO., LTD. **IDAHO**

Office: Otterson Blk., Wallace, Idaho. A. H. Featherstone, sec.-treas.

Cap., $1,500,000; shares $1 par; assessable.

Property: 4 claims, patented, near Mullan, Shoshone county, Idaho, W. of the Bullion mine, on the eastern slope of Stevens peak. A 1,200′ crosscut tunnel developed a vein said to give a fair showing of galena and copper ore. No further information is available.

YANKEE BOY MINING CO. **IDAHO**

Address: D. W. Price, Kellogg, Idaho.

Property: up Big creek, near Kellogg, Idaho. Ground below 500′ level is leased until 1920 to Big Creek Leasing Co., which see. Palmer, Newton and others are leasing the upper workings.

Development: includes 3 tunnels, one 2,150′ long, opening good silver-copper ore.

Equipment: includes gasoline engine and compressor. A mill is to be built.

Production: see Big Creek Leasing Co. The other lessees in Dec., 1918, shipped one car of 200 oz. and another of 340 oz. silver ore; ore of similar grade was mined in 1919.

A small mine with promising prospects.

YUKON GOLD CO. **IDAHO**

Office: 120 Broadway, New York.

Officers: see description of company in United States section of this book. D. H. Ferry is in charge at Murray, Idaho.

Property: acquired in 1916 from Coeur d'Alene Mining Co., on Prichard creek, near Murray, Shoshone county. Estimates in that year showed 8,500,000 cu. yd. of gravel, containing $1,350,000 of gold, or about 16 cents per yard.

Equipment: a 7½-cu. ft. dredge with steel hull was moved from Dawson, Yukon territory, in 1917, and started work in December of that year. It is electrically driven, current being transmitted 11 miles from the Burke sub-station of the Shoshone County Power Co.

Production: from Dec. 4, 1917, to Dec. 30, 1918, a total of 1,448,306 cu. yd. was dug, yielding 12.97c. per yd. at a cost of 7.3 cents. The total operating profit was $82,305.

ILLINOIS

The metal mine output of Illinois is practically confined to lead and zinc ores. These come from two distinct areas of very different geologic character. Those of northern Illinois occur in gently folded dolomite and limestone (Galena and Platteville beds) of Ordovician age. The deposits of Harden and Pope counties occur with fluorite in fissure veins, controlled by jointing and faulting in Mississippi limestone, in the northern extension of the Kentucky fluorspar regions.

Zinc, lead, and silver recoverable from ores mined in northern and southern

Illinois during 1918 were valued at $1,021,081, compared with $1,123,897 in 1917. The tenor of the ore in the northern fields may be judged from the following:

	1917	1918
Crude ore, tons	237,340	280,900
Zinc, per cent	1.63	1.60
Lead, per cent	0.18	0.50
Zinc in concentrates, per cent	29.30	35.70
Lead in concentrate, per cent	75.40	75.50
Value of zinc concentrate, per ton	$26.18	$28.72
Value of lead concentrate, per ton	99.83	87.09

Little information of real value is obtainable from mine-owners in this State, despite our frequent requests for same, so we give the material as received from our correspondents and various other sources.

AMERICAN ZINC CO. OF ILL. **ILLINOIS**

A subsidiary of the Amer. Z. L. & Sm. Co. and described under that title. Plants at East St. Louis and Hillsboro, Ill.

BLEWETT MINING CO. **ILLINOIS**

Office: Galena, Ill.

Officers: J. H. Billingsly, pres.-mgr.; J. W. Westwick, v. p.; R. I. McKee, sec.-treas.

Inc. April, 1918, in Illinois. **Cap.**, $100,000; $100 par. Company is financed by the Burr Mining Co.

Property: 60 acres of zinc-lead land, 1½ miles N. W. of Galena.

Development: 230′ shaft to be sunk. **Equipment:** mill handling 200 tons of ore each 10-hour shift.

BURR MINING CO. **ILLINOIS**

Address: Connersville, Ind. Controls the Blewett Mng. Co., which see.

Officers: F. C. Bosler, pres.; Jos. R. Mountain, v. p.; P. H. Kinsler, sec.-treas.; J. H. Billingsly, gen. mgr., Galena, Ill.; J. H. Banghman, directors. F. J. Dewilde, cons. engr.

Inc. in Indiana and Wisconsin. **Cap.**, $30,000; shares $100 par.

Property: the Treganza lease, 40 acres mineralized land, near Galena, Ill. A 165′ shaft develops sheet-ground formation. Output was zinc concentrate. Shipping at the rate of 160 tons of 45% concentrates weekly, at last accounts.

COLLINSVILLE ZINC CORPORATION **ILLINOIS**

Office: Collinsville, Ill.

Officers: Otto F. Meister, pres.; R. W. Barrell, treas.; W. R. Wild, sec., with H. W. Schultz, Joseph Carr, and C. D. Lukens, directors. A. F. Versen, gen. mgr., H. E. Gillaspy, gen. supt.; A. J. Meier, director of operations; H. A. Kruger, supt of Lost Hill mine.

In January, 1919, company issued $500,000, 7% first mortgage, convertible gold bonds, due January, 1929.

Property: the Lost Mill mine of 80 acres at Moselle, Missouri, estimated to contain 300,000 tons of zinc-lead ore and barite. Also a smelter at Collinsville, Ill., of 50 tons daily capacity of metallic zinc, complete in every detail. The original plant was erected in 1873. Property and plant said to have been examined by the St. Louis Sampling & Testing Works, Inc.

Object of the bond issue was to equip a quarter of the smelter for the manufacture of 30 tons of lithopone daily. The demand for this pigment (mixture of 70% barium sulphate and 30% zinc sulphide) is reported large and increasing.

FEDERAL LEAD CO. **ILLINOIS**

Office: 120 Broadway, New York, N. Y.

Lead smelter at Alton, Ill.

FRONTIER MINING CO. **ILLINOIS**

Office: Fletcher Trust Bldg., Indianapolis, Ind.

Mines at Galena, Ill.

GREAT WESTERN LEAD MANUFACTURING CO. **ILLINOIS**

Letters returned unclaimed in 1919 from Galena, Ill.

Property: the Pittsburgh lead mine was the second largest producer in northern Illinois. Workings are down 140′ and a 100-ton mill was operated at last report.

GREAT WESTERN SMELTING & REFINING CO. **ILLINOIS**

Office: 41st and Wallace Sts., Chicago, Ill.

Officers: Ivan Reitler, pres.; Zachariah Lippe, sec.; Joseph Mathes, treas., with David Blum, Emile Benjamin, A. Glanz and Adolph Saltzer, directors. Samuel Spiro, mgr.; Charles Granberg, supt.

Inc. in Maine. **Cap.,** $30,000; $100 par; 18,000 outstanding.

Company is a smelter and refiner of metals, mostly secondary material, and has branches at Atlanta, Cincinnati, Cleveland, Portland, Ore., St. Louis, San Francisco, Seattle and Vancouver, B. C. The copper furnaces at Chicago have a capacity of 7,000 tons per annum.

HEGELER ZINC CO. **ILLINOIS**

Operates a zinc smelter at Danville, Ill.

ILLINOIS ZINC CO. **ILLINOIS**

Operates a zinc smelter at Peru, Ill.

JOPLIN SEPARATING CO. **ILLINOIS**

Address: Galena, Ill.

Company has a roasting and magnetic separtion plant of 50 tons capacity in 10 hours. Mill product carrying 16 to 40% zinc is partly roasted (without sizing) in a rotary tube, and then passed through a Cleveland-Knowles separator, which gives a 58% product.

LANYON ZINC & ACID CO., R. H. **ILLINOIS**

Operates a zinc smelter at Hillsboro, Ill.

MATTHIESSEN & HEGELER ZINC CO. **ILLINOIS**

Office: La Salle, Ill.

Officers: C. B. Lihme, pres.; Mary H. Carus and G. P. Blow, v. p.; F. W. Matthiessen, Jr., with F. W. Westmore, directors.

Owns and operates large zinc oxide and spelter furnaces, etc., and is a noted buyer of pure and high-grade zinc ores from the Missouri-Oklahoma and Wisconsin fields. Is also a manufacturer of sulphuric acid, zinc sheet, plate, and ribbon.

Company also has a mine in Illinois, producing coal for use at its smelters. Officers of the subsidiary are Joseph Brennemann, pres.; G. B. Blow, v. p.; C. B. Lihme, sec.; H. C. Nichol, treas.; M. A. Field, mgr. and D. McCrindle, supt.

MINERAL POINT ZINC CO. **ILLINOIS**

Subsidiary of the New Jersey Zinc Co., 160 Front St., New York. Mine office: Galena, Ill.

Property: the Marsden-Black Jack, the largest lead and zinc producer in northern Illinois, 3½ miles S. of Galena. The mine is on the southern limits of profitable ore in this district. The deposits were found in March, 1854, by Stephen Marsden, who extracted a large quantity of lead and zinc ore, and sold it in 1877 to the Illinois Zinc Co. ofPeru, Ill., for $20,000. This concern worked the Marsden until 1883, mining up to 325 tons of both classes of ore per month for a while. Low prices of ore, $13 per ton, caused a shut-down in 1883. A new mill was erected in 1903, but did not work until 1907. The Marsden-Black Jack Mining Co, resumed work in 1907, continuing until spring of 1908. Another drop in prices resulted in another stoppage. The mine wes reopened in 1911. See same company under Wisconsin for further details.

NATIONAL ZINC CO. **ILLINOIS**

Office: 61 Broadway, New York.

Roasting plants at Argentine, Kansas, and at Springfield, Ill. C. C. Conover, supt. at Illinois plant. At Argentine there are 10 De Spirlet furnaces in operation.

NORTHWESTERN MINING CO. **ILLINOIS**

Address: Galena, Ill.

Property: the Northwestern and Paragon mines in sections 22 and 23,

T. 29 N., R. 1 E., near the Illinois-Wisconsin line, and close to rail. The Paragon is leased by the company. Ore in the Northwestern occurs in thin sheets filling irregular fractures, consisting mainly of blende and galena. The main shaft is 121′ deep. The Paragon is an old mine, one lease dating back to 1840. About 27,000,000 lb. of lead was mined from above water-level. Shafts are 130, and 110′ deep. Ore carries lead and zinc. Equipment consisted of steam power, engine, compressor, hoist, etc.

ROSICLARE LEAD & FLUORSPAR CO. **ILLINOIS**

Offices: American Security & Trust Bldg., Washington, D. C.; and Rosiclare, Ill.

Property: is opened to 500′. Mill has 500-ton capacity. It is the largest lead producer in southern Illinois.

SANDOVAL ZINC CO. **ILLINOIS**

Operates a zinc smelter at Sandoval, Ill.

VINEGAR HILL ZINC CO. **ILLINOIS**

Address: Platteville, Wisconsin.

Property: the Unity and Graham mines in the Galena district, just south of the Illinois-Wisconsin line. The former is the third largest zinc producer in the State. Milling consists of sorting, rolls, trammels, jigs, rolls, and finishing jigs. See same company under Wisconsin.

WISCONSIN ZINC CO. **ILLINOIS**

Subsidiary of the American Zinc, Lead & Smelting Co., 55 Congress St., Boston, Mass.

Address: Platteville, Wisconsin.

Property: the Birbeck zinc mine in the Galena district, northern Illinois.

INDIANA

AMERICAN ZINC PRODUCTS CO. **INDIANA**

Office: Greencastle, Ind.

Officers: D. W. Kerr, pres.; F. W. Stillwagon, v. p.; J. H. Dietz, sec.

Inc. in Ohio. **Cap.**, $1,000,000

Works: modern zinc-rolling mill on Pennsylvania railroad, with monthly capacity of 1,000 to 1,500 tons of zinc plates and sheets. Described by J. H. Dietz in "E. & M. Journal" of Nov. 2, 1918.

INTERNATIONAL LEAD REFINING CO **INDIANA**

East Chicago, Ind. Is a subsidiary of the International Smelting Co., and described thereunder, in United States section.

KANSAS

The zinc and lead fields in the State just north of the Oklahoma boundary, are an extension of the Miami district. The low price of spelter curtailed mine development in the latter part of 1918, though the production for the year was greatly increased, the value being $6,525,638, a gain of $1,874,000. According to the U. S. Geological Survey, the total output for 1918 was 1,025,400 tons, compared with 903,400 tons in 1917. The metallic content is shown in the following table:

	1917	1918
Crude ore, tons	903,400	1,025,400
Zinc, per cent	2.49	3.27
Lead, per cent	0.33	0.70
Zinc concentrate, tons	38,766	55,979
Lead concentrate, tons	3,929	9,083
Value of zinc concentrate, per ton	$68.96	$52.48
Value of lead concentrate, per ton	93.91	90.90

In 1919, the output was 77,744 tons of blende and 15,256 tons of galena, worth $4,824,830.

Unlike the mine operators of other States, those of Kansas and the Tri-State field generally are rather secretive as to details of organization and mine

operations, a result of local competition and conditions. The facts given in this section have been checked so far as possible, but are not official—except in a relatively few cases.

ABBOTT, REBHOITZ & STEWARTY MINING CO. **KANSAS**

Address: J. J. Abbott, supt., Baxter Springs, Kan.

Mill and power plant erected in 1918.

ADMIRALTY ZINC CO. **KANSAS**

Address: Douthat, Okla. F. M. Aiken, Tulsa, Okla., pres.; O. F. Brinton, mgr.; John Griffard, supt.

Inc. in Delaware. **Cap.**, $750,000.

Property: 180 acres in Oklahoma and Kansas, shows a blanket deposit between lime and flint, carrying zinc-lead sulphides, said to average 10% in metal content.

Development: by vertical shaft to depth of 220′.

Equipment: includes 8″x8″ hoist, 3 compressors, 4 electric pumps, tramway and 4 mills, with a daily capacity of 1,200 tons. Ore treated during 1915-16 amounted to 51,200 tons, concentrates averaging 62.50% zinc and 81.50% lead.

Recent production has been as follows: in 1915, 936,750 lb. zinc and 156,000 lead; in 1916, 6,085,400 lb. zinc and 1,014,200 lb. lead. See same company in Oklahoma.

AKSARBEN MINING CO. **KANSAS**

Address: John Voorhees, pres., Anita, Iowa.

Property: a lease on the Cooper tract, just south of Baxter Springs. Operates mine whose output is concentrated in a mill erected in 1918.

AMBER MINING CO. **KANSAS**

Company composed of J. C. Jennings, Robert Christy, J. A. Madlam, and D. Bogam, of Muskogee, Oklahoma.

Property: a lease on 20-acre tract near Lincolnville, north of Quapaw. Six per cent. ore reported cut by drill in 1918.

ANDAYER MINING CO. **KANSAS**

Office: Joplin, Mo. Harry L. Ayer, treas.. 8 Hawley St., Boston, Mass. Is a close corporation, consisting of four stockholders, with mines at Galena, Kansas. Company has no stock for sale and refuses to furnish a report.

ANDREW BROS. MINING CO. **KANSAS**

Address: Galena, Kan.

Production: about 40 tons of blende (60% metal) per week.

BADGER MINING & DEVELOPMENT CO. **KANSAS**

Address: 103 Miners Bank Bldg., Joplin, Mo

Officers: A. W. Glasgow, pres.; A. W. Baker, sec.; J. B. Meredith, mgr.

Inc. 1917, in Missouri. **Cap.**, $250,000; $1 par.

Property: a lease on 210 acres at Badger, Kansas, developed by 4 shafts from 95 to 185′ deep. Ore is high in lead. A 250-ton mill was built in 1918. Production is said to approach $1,000,000.

BENDENE MINING CO. **KANSAS**

Office: 728 American Bank Bldg., Oklahoma City, Okla.

Officers: J. S. Pine, pres.; Will Brird, v. p.; M. G. Meister, sec.-treas.; J. R. Green, supt.

Inc. Jan., 1918, in Oklahoma. **Cap.**, $200,000.

Property: 20 acres south of Baxter Springs, Kansas, near State line. Zinc occurs in the usual sheet formation, and is 25 to 35′ thick. Developed by shaft 96′ deep.

Equipment: 400-ton mill (10 hours), closed since late in 1918, but to be reopened by 1920.

BETHLEHEM ZINC CO. **KANSAS**

Office: 229 Lee Bldg., Oklahoma City, Okla.

Officers: T. L. Wade, pres.; D. E. Rodgers, v. p., and J. F. Kroutil, didirectors. E. J. Delaney, sec.-treas.; H. H. Hughes, supt.; Jack Spain, asst. supt.

Inc. Aug., 1917, in Oklahoma. **Cap.**, $200,000.

Property: 160 acres at Lincolnville, formerly owned by the Oklahoma Investment Co., dissolved. Lead ore occurs in a deposit 25 to 45′ thick.

Development: shafts are 118 and 130′ deep **Equipment:** 300-ton mill, recently (1919) reconstructed.

BIG ELK MINING CO. **KANSAS**

Address: J. T. Whaley, pres.; L. R. Ealestor, supt., Treece, Kan.

Property: 40-acre lease N. of Treece. Ore was found by drills at 194′. Developed by two shafts.

Equipment: 250-ton mill moved from the Dorris mine at Quapaw, Okla. A dump on the ground assaying 30.6% zinc and 17.18% lead has been treated.

BIG LEAD MINING CO. **KANSAS**

Address: D. G. Bailey, sec., Muskogee, Okla.

Officers: J. A. Setle, pres.; J. J. Poole, v. p.; with J. E. Horshal, supt.; M. T. Hardin, J. S. Goldsmith, E. C. Wright and F. C. Hoffman, directors.

Has a lease on the Chubb land, also on Cooper land, 5 miles west of Baxter Springs. Two shafts were sunk and 250-ton mill built during 1918.

BIG SHOT LEAD & ZINC CO. **KANSAS**

Address: J. A. Frates, pres., Miami, Okla.

Property: a lease S. W. of Baxter Springs. Drilling exposed ore at two points in tract.

BLUE DIAMOND MINING CO. **KANSAS**

Address: John Hoffman, Treece, Kansas.

BLUE MOUND MINING CO. **KANSAS**

Office: 618 Bryant Bldg., Kansas City, Mo.

Officers: Wm. Kenefick, pres. and treas.; J. W. Hoffman, v. p.-mgr.; G. E. Rucker, sec.; N. Wagner, supt.

Inc. 1916, in Kansas. **Cap.,** $20,000; $100 par. Gross returns from ore sales were $812,707 in 1917.

Property: 145 acres, 7 miles S. W. of Baxter Springs, Kansas. Ore carries zinc and lead, totaling 9.11%. Company controls the adjoining Blue Diamond property.

Development: with the Blue Diamond, 5 shafts, 210′ deep. Mules are used underground for haulage.

Equipment: modern mining and milling plants on both properties. The concentrators treat 600 tons in 24 hours, and produce from 1,000 to 1,500 tons of concentrate monthly, that averages 61.5 to 62.5% metallic zinc.

BOOR MINING CO. **KANSAS**

Address: Galena, Kan.

Production: 24 tons of blende (60% metal) per week.

BOSTON MINING CO. **KANSAS**

Address: Elmer Mayerhoff, Commerce, Okla.

Property: 40-acre lease N. W. of Treece, Kan. Drill-holes show an orebody at depth of 205′. Shafts were sunk and a mill erected in 1918.

BRENZ MINING CO. **KANSAS**

Address: Galena, Kan.

Production: 5 tons of blende weekly.

BROWN & HEAD ZINC CO. **KANSAS**

Address: Joplin, Mo.

Officers: J. E. Head, Tulsa, Okla, principal owner; A. Rowe, gen. mgr.; D. D. Molloy, supt.

Property: a lease on the Cooper land, just N. W. of Picher, Okla., in Kansas, near the Blue Mound mine. Twenty-five drill-holes showed 7% ore.

Development: by 2 shafts, ore occurs at depth of 175 to 255′. A large mill was to be built at last accounts.

BUCKSHOT MINING CO. **KANSAS**

Address: Box 205, Miami, Okla.

Officers: J. A. Frates, Sr., pres.; J. A. Frates, Jr., v. p., with W. Matthews and R. E. Brooke (gen. mgr.), directors. J. H. Grant, sec.; G. E. Matt, treas.

Inc. in Oklahoma, **Cap.,** $300,000; $10 par; 8,000 issued.

Property: lease on three 40-acre tracts N. of Picher, Okla., just over the Kansas line, under development. Royalty payable is 10%.

Development: 12 test holes showed ore from depth of 315 to 340', some samples assaying up to 16% zinc. The ore is a dissemination in flint. Development done is considered to justify an expenditure of $200,000. A 200-ton mill will be moved from Joplin to the mine.

BUNKER HILL MINING CO. **KANSAS**

Address: Charles Clark, supt., Baxter Springs, Kan.

Property: S. W. of Baxter. Drilling exposed good ore at 155' depth, and a large mill was erected in 1918.

BUTTE-KANSAS MINES CO. **KANSAS**

Address: Box 433, Joplin, Mo.

Officers: C. I. Stralem, pres.; John MacGinnis, v. p.; L. P. Buchanan, mgr.; D. C. Corner, supt. Halgarten & Co., 5 Nassau Street, New York, fiscal agents.

Property: a lease on 120 acres, in Cherokee county, Kansas, and 130 acres in the Waco camp, Joplin district, Missouri. Ore carries 8% of blende. Reserves placed at 750,000 tons. Orebodies are long but narrow with 50' face.

Development: by five 200', one 120' and one 160' shaft in Kansas.

Equipment: steam power plant, air-compressors, oil engines, and two mills (in Kansas) of 500 tons capacity in 10 hours. The 400-ton mill at Waco, Mo., was burned in Dec., 1918.

Production: 300 tons of concentrate monthly, assaying 62.5% zinc and 0.05% lead. Costs are $1.70 per ton for mining and 40 cents for milling, a total of $2.10.

CATHOLIC MINING CO. **KANSAS**

Address: Lincolnville, Kan. Fathers Wagoner and Ketchum, directors.

Property: the Alabama Coon, S. E. of Lincolnville. Formerly operated by hand jigs, but mill was to be built at last accounts.

CHANUTE SPELTER CO. **KANSAS**

Subsidiary of American Metal Co., Ltd.

Offices: 61 Broadway, New York; Frisco Bldg., Joplin, Mo.; Keith-Burke Bldg., Baxter Springs, Kan. and 1625 Boatmen's Bldg., St. Louis, Mo.

Officers: Sol Roos, pres.; J. F. Haley, v. p.-mgr.; Otto Sussman, mg. director., with Wm. Simon and E. R. Rombauer, directors. G. B. Corless, asst. mgr.; T. J. Rightly, supt. of operations; H. E. Kingsbury, supt of sub-leasing, and M. M. Moritz, cashier.

Property: owns 628 acres and leases 17,000 acres in Cherokee county, Kan., selected after careful study of the geologic conditions governing ore occurrences in the district. About $1,000,000 has been spent in development and lease fees. Over 30 drills used to block out ore. Royalties vary from 5 to 12½% on sales-value of the ore produced. Water was troublesome during shaft sinking, so pumps were connected with the drill-holes. On 5 properties 700 holes were put down. Mills were erected during 1918.

COLUMBUS M. & D. CO. **KANSAS**

Property sold 1917 to American Metal Co. for $3,000, and a royalty of 2½% on future output.

COMMERCE MINING & ROYALTY CO. **KANSAS**

One of the largest operators in the Kansas-Oklahoma field. **Address:** Picher, Okla.

Property: the Webber mine in Kansas, just north of Picher, Okla., and the Pelican mine, S. W. of the Webber, in Oklahoma. At the former, G. L. Coleman is gen. mgr.; and John Newton, gen. supt.; while at the latter W. M. Garred is mill supt. Both mines have concentrators, the Webber also has a sludge plant. Treatment at the Jay Bird mill in Oklahoma includes a jaw-crusher, rolls, elevator, revolving trommel, rougher and cleaner jigs, rolls, jigs, and tables.

COOK & McCULLOUGH MINING CO. **KANSAS**

Address: W. McCullough, Baxter Springs, Kan.

Property: a 150-ton mill and complete mining plant was to be erected at last accounts.

DE ARMOND MINING CO. **KANSAS**

Address: M. M. DeArmond, mgr., Treece, Kan.

Property: near Treece. By mid-1918 two shafts were down 160′ and a mill erected which was remodeled early in 1919.

DIPLOMAT MINING CO. **KANSAS**

Address: Galena, Kan.

Production: 65 tons of blende (60% metal) weekly.

EUTERPE MINING CO. **KANSAS**

Address: C. Clark, supt., Baxter Springs, Kan.

Property: 200-ton concentrating mill, at Baxter Springs.

FEDERAL MINING & SMELTING CO. **KANSAS**

Office: 120 Broadway, New York.

See Lucky O. K. Mining Co.

GALENA LEAD & ZINC CO. **KANSAS**

Address: Galena, Kan.

Production: 2 tons of galena concentrate weekly.

GRACE WALKER MINING CO. **KANSAS**

Controlled by Commerce M. & R. Co. The 250-ton mill at Baxter Springs was destroyed by fire, in 1918.

HERCULES DEVELOPMENT CO. **KANSAS**

Address: Carl Carmen, supt., Louisville, Kan.

Drilling done and mill contemplated at last accounts.

INSPIRATION MINING CO. **KANSAS**

Address: Baxter Springs, Kan. B. E. Brown, supt. for the controller, Fred Huttig.

Property: zinc claims 7 miles W. of Baxter Springs. Drilling showed a deposit 108′ long, from a depth of 225′ to 275′. Ore carries 7% blende. Two shafts are 250′ deep. The A. R. G. 400-ton (in 10 hours) mill, formerly at Duenweg, Mo., was rebuilt here.

JOHNSON MINING & DEVELOPMENT CO. **KANSAS**

Property: a lease 1 mile N. of Baxter Springs. Ore said to have been cut at depth of 180′.

JOPLIN ORE AND SPELTER CORPORATION **KANSAS**

Offices: 40 Exchange Place, New York, and Joplin, Mo. Works at Pittsburg, Kan.

Officers: Wm. Barrett Ridgely, pres., Salt Lake City, Utah. E. Allendorf, Joplin, Mo., treas.

Inc. April, 1916, in West Virginia, to take over the property of the Joplin Ore & Spelter Co., of Missouri. **Cap.,** $2,000,000; shares $1 par, changed from $5 July, 1916; all issued and fully paid. Empire Trust Co., New York, registrar. Stock transferred at company's office.

Dividends: initial one of 5.5% paid May 25, 1916, followed by others in June and July.

Property: a zinc smelter at Pittsburg, Kan., about 37 miles from Joplin, Mo. Plant consists of 6 blocks of furnaces, each having 224 retorts, a total of 1,344 retorts. Two additional blocks, of 224 retorts, built in 1916, give the company a total of 1,792 retorts and an estimated capacity of 14,380,000 lbs. of spelter annually.

In the 9 months ended Dec. 31, 1916, gross income was $813,006, less $546,739 for ore purchased, leaving a gross profit of $266,267. Operations cost $209,761, leaving $56,506 net profit. Full capacity was not attained owing to the low price of spelter in 1916.

Company was exploited by Ridgely & Co. (Geo. Graham Rice), of which William Barrett Ridgely, former Treasurer of the United States, was the nominal head. On the New York Curb shares skyrocketted to $5 only to fall back to 5c. Appears to be a good property that was used for speculative purposes rather than mine profits.

KANOMA ZINC CO. **KANSAS**

Address: C. Playter, Treece, Kan.

KANSOURI MINING CO. **KANSAS**

Address: C. B. Boylan, pres., Miami, Okla.

Property: a lease northwest of Treece, in Blue Mound territory. Thirty drill-holes cut ore to depth of 270′. Two shafts were sunk and 400-ton mill erected. Shut down at mid-1919 on account of metal market.

KING-BRAND MINING CO. **KANSAS**

Office: Jefferson City, Mo.

Officers: A. W. Happy, pres.; D. W. Oberman, v. p.; F. J. Kersting, sec.-treas. Directors: Joseph Pope, Felix Senevey, Dr. C. F. Enloe, Lee Jordan, Horick McHenry.

Inc. August, 10, 1918, Missouri. **Cap.,** $20,000; $10 par. Issued and sold 100,000 shares.

Property: 45 acres in Cherokee county, Kansas. Ore contains galena and zinc blende in limestone and is mined by 280′ shaft. Ore reserves are stated as equivalent to 26,000 tons of concentrates, with 5,000 tons on dumps.

Equipment: steam hoist, 650 cu. ft. compressor. Reported March 6, 1919, letting contract for 200-ton concentrator with flotation.

LADD MINING CO. **KANSAS**

Mail returned unclaimed in March, 1919, from former address, J. L. Ladd, supt., Baxter Springs, Kans.

Property: north of Quapaw, Okla. Water interfered with shaft sinking early in 1919. A 200-ton mill was to be built.

LAWYERS MINING CO. **KANSAS**

E. G. McAdams, Oklahoma City, Okla., pres.; George Pearson, mgr., Treece, Kans. at last accounts.

Property: 36 acres, west of Treece and near Monarch. Rich ore being mined and a 250-ton mill was erected late in 1918.

LENABEE MINING CO. **KANSAS**

J. R. McCorkle, supt., Coffeyville, Kans., at last accounts. A 250-ton mill was to be built in 1919.

LUCKY GIRL MINING CO. **KANSAS**

Address: Emma Knell, sec., Carthage, Mo. W. H. Berry and W. W. Wilson, directors.

Property: lease on Ballard land, 1½ miles west of Baxter Springs.

Development: drilling cut good zinc ore from 160 to 254′ depth. Shaft was sunk and 300-ton mill proposed in 1918.

LUCKY JACK MINING CO. **KANSAS**

Address: G. K. Williams, Farmington, Mo., principal owner.

Property: near Baxter Springs. Drilling showed ore at depth of 150 to 200′. Shaft sunk and mill operating at last accounts.

LUCKY JENNY MINING CO. **KANSAS**

Address: Ira Turner, pres., Miami, Okla. Mine leased to L. Argyle and George Sullivan in March, 1919.

Property: 4 miles W. of Baxter Springs, near Hockerville. Sixteen holes drilled on the lease showed 3.6 to 19.9% blende, with some lead in places, and the dump contained 25,000 tons of rich ore. A 300-ton mill was erected late in 1918.

LUCKY JEW LEAD & ZINC CO. **KANSAS**

Address: Westville, Kan. John West, mgr., Picher, Okla.

Officers: Ira Smith, pres., Commerce, Okla.; W. M. West, sec.-treas., Ed. Depee, supt. Controlled by Bowman-Hicks Lumber Co., Kansas City, Mo.

Property: 120-acre lease in Baxter Springs district, Kan., near the U. S. Smelting property. Seventy holes drilled showed rich zinc-lead ore.

Development: by 3 shafts, 235′, 240′ and 200′ deep. Water is troublesome.

Equipment: a 300-ton mill was erected in 1919, and upwards of $200,000 is said to have been spent in preparing the property for production.

LUCKY JIM MINING CO. **KANSAS**

Address: O. C. Hamilton, supt., Galena, Kan.

A 200-ton mill and mining plant was erected late in 1918. In January, 1920, a new shaft was being sunk to cut ore at 110′ depth.

LUCKY O. K. MINING CO. **KANSAS**

Address: 120 Broadway, New York, and P. W. George, mgr., Baxter Springs, Kans.

Subsidiary of Federal Mng. & Sm. Co., of Idaho, which invested $171,283 in purchase of 55% interest. First earnings are to be devoted to re-payment of this sum at 6% interest, after which profits will be divided between company and former owners on basis of 55 and 45% respectively.

Property: the Lucky O. K. mine in Kansas, just north of Hockerville. Orebodies are horizontal, being in chert, at depth of 180 to 230′, carrying 1 to 5% lead and 3 to 15% of zinc. Mining is by room and pillar system.

Equipment: includes steam hoist, compressor, pumps, electric motors and oil engines for general power, and 300-ton mill employing the flotation process.

Concentrates carry 61% zinc and 82% lead. One month recently yielded 300 tons of lead and 280 tons of zinc concentrates.

LUCKY PAT MINING CO. **KANSAS**

Address: J. Screvner, supt., Lincolnville, Kan.

Cap., $125,000.

Property: E. of Lincolnville. A 200-ton mill was completed in 1919.

MARJORY STEWART MINING CO. **KANSAS**

Mail addressed to Harry Barndollar, Treece, Kan., returned unclaimed in 1919.

Property operated a lease N. W. of Treece, Kan. A 300-ton mill was moved to the property from Duenweg, Mo.

MERRILL MINING CO. **KANSAS**

Address: Baxter Springs, Kan.

Property: operated a lease on the L. D. Brewster land S. W. of Baxter and mined some extremely rich ore.

MIAMI-TEXAS MINING CO. **KANSAS**

Address: F. W. Stallings, supt., Treece, Kan.

Property: a lease N. W. of Treece. A 250-ton mill was moved from Webb City, Mo., to the ground in 1918.

MISSISSIPPI QUEEN MINING CO. **KANSAS**

Address: W. H. Berry, mgr., Baxter Springs, Kan.

Property: a lease just S. of Baxter. Eleven drill-holes showed ore from depth of 40 to 120′. A shaft was sunk, hand-jigs cleaned some ore extracted during sinking, and 250-ton mill erected late in 1918.

NATIONAL ZINC CO. **KANSAS**

Address: Argentine, Kan.

Works: include 10 De Spirlet zinc-blende roasters, described in "Met. & Chem. Eng." of January 1, 1918.

NEIL MINING CO. **KANSAS**

A 400-ton mill was to be erected at the Old Abe mine in Lincolnville district at last accounts.

NEMO MINING CO. **KANSAS**

Address: M. M. Kersh, Lincolnville, Kan.

A 200-ton mill was erected in 1918.

NUEVA DINERO MINING CO. **KANSAS**

Address: Baxter Springs, Kan.

QUAKER VALLEY MINING CO. **KANSAS**

Address: W. W. Wakeman, supt., Baxter Springs, Kan. Company was to build a 150-ton mill, at last accounts.

QUEEN ESTHER MINING CO **KANSAS**

Office: 805 Cosden Bldg., Tulsa, Okla.

Officers: F. M. Aiken, pres.; W. L. Curtis, v. p.; E. R. Perry, sec.; J. S. Cosden, treas., also directors. W. B. Shackelford, mgr.; F. W. Gooch, supt.

Inc. Aug. 18, 1915, in Oklahoma. **Cap.,** $50,000; $100 par; all issued.

Revenue from ore sales in 1918 was $47,388.

Property: a lease of 20 acres, 3 miles S. W. of Baxter Springs, Kansas. A mine was worked at Webb City, Mo., until it was exhausted in 1918, abandoned, and the machinery moved to present site. Deposit is a dissemination of galena and sphalerite in limestone, at depths of 30′ to 80′ and 120′ to 240′. Ore assays 0.672% lead and 4.704% zinc.

Development: by 180′ shaft. **Equipment:** steam and electric power, hoist, compressor, pump, and 300-ton mill with 3 jigs and 14 tables.

Production: from July to Dec., 1918, 302,000 lb. of lead and 2,116,200 lb. of zinc.

Mine is yet in development stage, but management considers that there are reasonable prospects for profits.

REBECCA MINING CO. **KANSAS**

Address: Treece, Kan.

Property: 252 acres N. W. of Picher, just over the State line in Kansas, was purchased a year ago for $30,000. Drilling revealed some rich zinc ore. Two shafts were sunk and a 300-ton mill constructed.

REDSKIN MINING CO. **KANSAS**

Address: F. R. Bouldin, mgr., Treece, Kan.

Officers: M. T. Stauffer, pres.; Fred Shaw, v. p.; L. B. Herring, sec.-treas.

Property: a mile N. of Picher, Okla., and a mile W. of Treece, Kan., on the State line.

Development: rich ore was opened at depth of 50′ and 300-ton (gas-engine driven) mill erected.

RIALTO MINING CO. **KANSAS**

Address: Baxter Springs, Kan.

RIGHT GOOD MINING CO. **KANSAS**

Address: W. T. Dunlap, mgr., Lincolnville, Kan.

Officers: Walter Glidden, pres.; E. D. Reed, v. p.; Arthur Gollaber, sec.

Property: a 40-acre tract W. of Lincolnville, in which 13 drill-holes found ore at 72′. It is 15′ thick, lying under flint formation. A shaft was sunk and a 250-ton mill proposed.

R. & N. KANSAS LINE MINING CO. **KANSAS**

Address: W. A. Meece, supt., Joplin, Mo.

Property: a 70-acre lease just across the State line. Nineteen holes were drilled, seventeen showing pay-ore. Lead starts at 116′, continuing to 197′, where blende comes into 226′. Hand-jigs were used for a while, but a 250-ton mill was to be erected at last accounts.

ROYAL SHELL MINING CO. **KANSAS**

Address: Baxter Springs, Kan.

SILVER FOX MINING CO. **KANSAS**

Address: F. J. Childress, mgr., Galena, Kan.

Property: a lease 1½ miles N. W. of Treece, Kan., an extension of the Picher, Okla., field. The 300-ton mill, erected in 1918, was burned in July, 1919, but was to be re-built.

SOUTHERN LEAD & ZINC CO. **KANSAS**

Address: Charles Neal, supt., Treece, Kan.; or H. S. Clarke, sec., Box 676, Miami, Okla.

Property: on tract of Cooper land, near the State line. Two shafts have been sunk and a 500-ton mill erected. Water was reported to be troublesome.

SOUTH SIDE MINING CO. **KANSAS**

Address: Galena, Kan.

Production: about 43 tons of blende and 9 tons of galena weekly during part of 1918.

SQUIRES MINING CO., C. W. **KANSAS**

Address: Galena, Kan.

Production: 35 tons of blende weekly.

STAG MINING CO. **KANSAS**

Mail returned 1919, from F. L. Cook, gen. supt., Galena, Kan.

A 200-ton mill was planned at last accounts.

UNITED STATES SMELTING CO. **KANSAS**

Address: U. S. S. R. & M. Co., 120 Broadway, New York City; or D. D. Muir, Treece, Kan.

Property: the Naylor tract; an extension of the Miami, Oklahoma deposits, acquired in 1917. Drilling revealed enough ore to open the mine and erect a mill. In 1918, developments came up to expectations.

Company also had zinc smelters at Altoona, Iola, and La Harpe, Kan. In 1916 and 1917 the supply of natural gas for fuel was so irregular that the works were all closed.

VINEGAR HILL MINING CO. **KANSAS**

Address: J. G. Trewatha, Baxter Springs, Kan.

WAYLAND MINING CO. **KANSAS**

Address: L. H. Phillips, mgr., Galena, Kan.

Property 1½ miles S. W. of Galena. Rich ore was opened to a depth of 300', as shown in the following log of one hole, in feet:

Character of ground	From	To	Thickness
Surface and hard white flint	...	59	..
Softer flint with good ore	59	69	10
Harder flint with good ore	69	84	15
Hard white flint with 'shines'	84	114	30
Soft ground	114	121	7
Hard ground	121	181	60
Lime with some flint	181	234	53
Spar ground with good ore assaying for 40-ft. sample from each 4 ft., making an average of 16.8% zinc	234	274	40
Lime with good flint 'shines'	274	296	22
Lime	296	300	4

Developed by 2 shafts and equipped with a mill.

Production: was 43 tons of blende and 53 tons of galena per week during the early part of 1918.

WEST VIRGINIA MINING CO. **KANSAS**

Address: W. W. Mucklow, Galena, Kan.

MAINE

DOUGLAS COPPER MINE **MAINE**

Blue Hill, Maine. Was operated by American Smelting & Refining Co. for the 60,000 tons of fluxing ore developed on property.

PISCATAQUIS IRON CO. **MAINE**

Address: Frederick Hill, pres.; Bangor House, Bangor, Maine.

Property: the Katahdin iron mine, on the Bangor and Aroostock railway, in Piscataquis county, Maine, 85 miles from tidewater. Examined late in 1917 by E. S. Bastin for U. S. Geological Survey. Under option to J. S. Morris 206 Spring Street, Portland, Maine. Mine was worked from 1846 until 1890 for iron ore, the gossan being mined. Beneath this is an orebody, 300 to 700' wide and 2,300' long, estimated to contain 5,000,000 tons of pyrrhotite, running 42 to 50% iron and 26 to 35% sulphur. It was proposed to extract the ore by quarrying, and sell it for its sulphur con-

tent. Total costs of delivering ore to New York or nearby were estimated at $4 per ton under conditions prevailing in 1918 and $2.90 for normal times.

MARYLAND

BALTIMORE COPPER SM. & ROLLING CO. MARYLAND

Address: Baltimore Copper Works, Fourth Ave. and Fifth St., Canton, Baltimore, Md.

Officers: Jos. Clendenin, pres.; Wm. H. Peirce, v. p.; H. A. Thoman, sec.; Chas. N. Sappington, treas. Company succeeded the Baltimore & Cuba Smelting & Refining Co., which built the first American copper smelter, 1845, and is controlled, through stock ownership, by American Smelting & Refining Co. (American Smelters Securities Co.)

Lands: 45 acres, located on one of the best harbors of the Atlantic seaboard, with direct rail connections, being advantageously located for both domestic and foreign business. The plant is large and modern, including a nickel refinery, electrolytic plant, and sheet copper rolling mill. The electrolytic refinery, of 1,000 tons daily capacity, has anodes arranged on both series and multiple plan. Material treated is entirely auriferous and argentiferous, being received in the form of blister copper from various western states, and from several foreign countries. Works employ about 3,500 men.

GREAT FALLS MINE MARYLAND

Formerly called the Hill-Townsend gold mine, in Montgomery county, Md. In 1914 the old workings were cleaned out, the shaft re-timbered and new drifts run. The 25-ton tube mill was only used to make tests of ore mined. Small shipments made to smelter with satisfactory results.

MARYLAND CHROME CORPORATION MARYLAND

Address: F. A. Dolfield, pres., Canton National Bank Bldg., Baltimore, Md.

Property: chrome deposit at Owings Mills, 15 miles from Baltimore, opened in 1827 was the first chrome mine of this country.

UNITED M. M. & COPPER SM. CO. MD. AND PENNSYLVANIA

Idle. **Office:** Frederick, Md. Mines at New London, Md., and Charmian, Pa. A. L. Wickart, sec., Allentown, Pa.

Inc. 1913, in New Jersey, as a merger of the Eagle Metallic Copper Co. and the Linganore Copper Co., now dead. Owns all the property of Linganore C. Co. **Cap.,** $2,000,000.

Property: 806 acres, in 2 groups, include the Dolly Hyde, New London, and Eagle mines, on the Western Maryland and Baltimore & Ohio railroads.

The Dolly Hyde mine, 220 acres, was for many years the principal copper property of Maryland, though never a large producer. The mine has contact deposits in dolomite and phyllite, carrying a little malachite in the upper workings, succeeded at shallow depth by bornite and chalcopyrite in white marble.

The New London or Linganore mine, 86 acres, with 14 acres of timber land, was opened and worked 1835-55, apparently at a profit, and was idle after 1881, until reopened, May, 1907, but is again idle. The property has two 4 to 5′ fissure veins in slate, with N.-E. strike, carrying bornite and gray copper, estimated to average 3% copper and 16 oz. silver per ton, with a trace of gold. Development is by a 250′ shaft and 4 tunnels, longest 340′, with a total of 1,095′ of workings, estimated to block out 17,307 tons of ore for stoping.

The New London mine has a 65-h. p. steam plant, with a 35-h. p. hoist, good for 500′ depth, and an 8-drill air compressor. There are 12 buildings.

The mill, 40x25′ in size, consisting of a ball mill and slime tables, was built in 1911.

The Eagle mine comprises 500 acres near Charmian, including an old copper mine, never successfully worked. Property shows a mineralized

zone of 400′ average width, carrying native copper, chalcocite, bornite, chalcopyrite and tetrahedrite, averaging about 2 oz. silver per ton, with traces of gold. Mine has a 480′ shaft at 40° incline, in ore from surface, giving assay up to 6% copper, but is worked opencast.

Equipment: includes a 175-ton smelter and 150-h. p. steam plant.

MASSACHUSETTS

DAVIS SULPHUR ORE CO. MASSACHUSETTS

Address: C. B. Stranahan, pres., 65 Wall St., New York.

Inc. 1907, in New York. **Cap.,** $25,000; $100 par; all issued.

Property: an old and long-worked pyrite mine at Davis, Franklin county, Mass., idle several years.

NEW ENGLAND MINING CO. MASSACHUSETTS

Office: 35 School St., Greenfield, Mass. **Mine office:** Chalemont, Franklin county, Mass. Othello A. Fay, pres.; E. Forrest Sweet, sec.; Capt. Geo. H. Davenport, treas. and gen. mgr., at last accounts.

Inc. 1902. **Cap.,** $500,000; shares $5 par.

Property: about 1,000 acres, 2 miles west of the Davis pyrite mine. Vein traceable 700′, is approximately vertical, conforming closely in dip and strike with the Savoy schist in which it occurs. Deposit apparently is a fahlband, lacking well-defined walls, ore occurring scattered through 15 to 20′ of the schist, with 6 to 12″ of quartz, well mineralized, on the south wall, and a heavy impregnation of chalcopyrite, 1 to 2′ wide, on the north wall. Property has been partly stripped, and vein trenched across. Idle.

REVERE COPPER CO. MASSACHUSETTS

See Taunton-New Bedford Copper Co.

TAUNTON-NEW BEDFORD COPPER CO. MASSACHUSETTS

Address: Taunton, Mass.

Officers: Henry F. Bassett, pres. and agt.; J. H. Barrows, treas.; F. J. Basset, sec.

Inc. Jan. 15, 1831. **Cap.,** $1,200,000; $100 par. Corporation does a copper manufacturing business, making sheet brass, copper print rollers, etc.

MICHIGAN

The mining industry of Michigan is confined to the iron mines of several ranges and to the copper mines of the peninsular region commonly called the Copper Range. The descriptions of all the copper companies are grouped together and those of the iron mining companies are given in another list, both lists being arranged alphabetically, irrespective of counties or ranges. The annual production of each metal and its value is as follows—U. S. Geological Survey figures:

Copper

Year	Ore tons	Copper, lb.	Silver, oz.	Total value
1919**	.....	163,000,000	.....	.....
1919	11,321,365	226,794,139	509,467	$56,527,619
1917	12,400,723	255,710,128	688,551	70,376,231

Iron Ore

	Tons	Value
1919**	13,088,000	.....
1918	17,805,000	$63,920,000
1917	17,712,916	62,833,624
1916	18,995,797	49,054,340

** Preliminary estimates of 1919 production from Eng. & Mng. Journal.

COPPER MINES OF MICHIGAN

ADVENTURE CONSOLIDATED COPPER CO. MICHIGAN

Office: 32 Broadway, New York. **Mine office:** Greenland, Ontonagon county, Mich.

Officers: W. Parsons Todd, pres.; Charles G. Lund, v. p.; Chas. J. Devereaux, W. R. Todd, Jas. L. Bishop and Chas. D. Hanchette, directors; W. A. O. Paul, sec.-treas.; E. W. Walker, supt.

Inc. Oct. 17, 1898, in Michigan. **Cap.,** $2,500,000; shares $25 par; paid in, $24. American Loan & Trust Co., Boston, registrar; Old Colony Trust Co., Boston, transfer agt. Annual meeting, first Thursday after first Wednesday in June. Stock listed on Boston Stock Exchange.

An assessment of $1 per share was levied July 20, 1911, and again in March, 1916. On December 31, 1918, debit balance was $11,295, which compared with $11,892 on December, 1917 and $53,784 credit balance on December, 1916. Gross receipts for 1918 totals $14,436 and expenses were $13,839, which compares with gross of $205,832 and expenses of $271,506 in 1917. The 1918 receipts came from rent, and sale of copper and silver on hand.

Property: consists of 3 old mines, the Adventure, Knowlton and Hilton opened in 1850, 1853 and 1863 respectively, 1,696 acres on the mineral belt, also a mill site on Lake Superior. The mineral lands are located in Secs. 35 and 36, T. 51 N., R. 38 W., and in Secs. 1 and 2, T. 50 N., R. 39 W. The tract is surrounded by the Toltec, South Lake and Mass, ground. The village of Greenland lies on the northwestern corner of the Adventure's principal tract, and the village of Maple Grove, controlled by the company, is near the mine.

The old Adventure mine was opened 1850, along a line of ancient pits showing prehistoric mining. The largest annual production was 233,941 lbs. fine copper, 1857. After being closed by owners, the old openings were worked for years by tributors, proving notably rich in silver.

The Hilton, or Ohio mine, opened 1863, on the Mass lode was never worked vigorously. The Knowlton was opened in 1853. These three old mines made 1,949,173 lbs. fine copper, previous to their merging as the Adventure Consolidated which started work November 1, 1898.

The **Adventure** property is crossed by the Evergreen belt of Ontonagon county, a series of upturned beds of trap, amygdaloid and conglomerate, 7 of these amygdaloidal beds carrying copper on the Adventure tract in a distance of 1,200′.

The cupriferous beds of the Evergreen belt though very rich in places are bunchy. On the Adventure tract the lodes run N. 73° E. on the main tract, where operations were conducted, shafts being sunk at an angle of 45°. The old mine had 4 tunnels and 4 shafts, all except No. 1, which is in the Merchant lode, being sunk on the Knowlton bed, at 45°.

Production from the old mines ceased, January, 1908, only exploratory and development work being done since. Shipments were resumed in November, 1916, and ceased due to labor shortage, high costs, low grade ore, etc., on October 26, 1917; exploration of adjoining land was going on early in 1919.

There are 5 shafts, No. 5 being 1,520′ deep, and vertical was started 1909 and is 6x16′ inside measurement, with two 6′ hosting compartments and a 4x6′ compartment for ladders and pipes. It is about 1,500′ south of No. 3 shaft, is lined with concrete for a depth of 50′ from the collar, and is solidly timbered from surface. The shaft cuts No. 1 Adventure lode at depth of 894′, and is expected to cut No. 2 lode at about 2,200′ depth, and No. 3 at about 2,600′ depth. The No. 1 lode, opened by an 80′ crosscut on the 1,021′ level has been drifted upon for a distance of about 200′ and discloses very little copper. A 1,150′ exploratory crosscut south and west on the 1,500′ level intercepts 3 beds, designated as Nos. 2, 3 and 4, cutting the first at a distance of 634′, the second at 880′ and the third at 1,015′ from the shaft. These lodes, opened by drifts out from the crosscut,

are practically without promise so far as opened, the No. 2 lode, 29′ wide, and opened for a distance of 145′, carrying much copper in the first 7′ with the remainder practically barren; No. three, 32′ wide, and opened 547′, showing varying amounts and generally poor, and No. 4, 65′ wide, carrying practically no copper in the 34′ drift run along the footwall of the lode, A fifth lode, No. 1½, first encountered in shaft sinking, is opened for a distance of about 130′ at a depth of 1,190′ in the shaft, and had a fair showing. Work was suspended June, 1913, resumed in May, 1916 and suspended again October, 1917. No. 3 shaft had been unwatered to the 8th level and ore was mined from 3rd-8th levels.

The new Mass lode, so-called, lying about 120′ S. E. of the Evergreen bed, was opened by test pitting, May, 1909, and some crosscutting was done from the Evergreen bed, down to the 6th level of No. 2 shaft, but only a few feet of drifting was done. This bed shows a width of 8 to 12′, but carries flaky copper, with considerable epidote.

The Adventure mine equipment includes a 38x59′ steel boiler house with three 500 h. p. boilers; a 59x59′ steel engine house having duplex double-cone drum direct-acting hoist with 42x60″ cylinders, capable of raising a 12-ton load from a depth of 5,000′ on an incline of 45° at a speed of 2,000′ per minute, and a 38x65′ steel compressor house having a 60-drill air compressor. There is a complete electric light and power plant and protection from fire is furnished by water mains. The principal mine buildings are sheathed with steel and painted, and the property is served by a spur of the Copper Range railroad.

Production has been as follows: 23,572 lbs. in 1900; 29,361 lbs. in 1901; 606,211 lbs. in 1902; 2,182,608 lbs. in 1903; 1,380,480 lbs. in 1904; 1,606,208 lbs. in 1905; 1,552,628 lbs. in 1906; 1,244,874 lbs. in 1907; 16,500 lbs. in 1916, and 652,977 lbs. in 1917. Shipments to the Winona mill recommenced in November, 1916, and gradually increased up to May, 1917, when about 300 tons per day were sent out.

AHMEEK MINING CO. **MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **Mine office:** Kearsarge, Keweenaw county, Mich.

Officers: Rodolphe L. Agassiz, pres.; Jas. MacNaughton, v. p. and gen. mgr.; with Wm. A. Hodgson, Thomas L. Chadbourne, Jr., John T. Burnett, and John F. Perkins, directors; Clarence H. Bissell, sec.-treas.; G. L. Osgood, asst. sec.-treas.; S. Russell Smith, supt.; Thos. Rapson, mgr. cap.; J. T. Reeder, purch. agt.; A. L. Burgan, mill supt.

Inc. March 22, 1880, in Michigan and charter extended, 1910, for 30 years. **Cap.,** $5,000,000; shares $25 par; full paid, all issued; increased June 8, 1915, from a capitalization of $1,250,000, par $25, paid in $17. In the change four new shares were given for each old share issued. Last assessment $5, paid February 5, 1905. American Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Listed on Boston Stock Exchange. Annual meeting, second Tuesday in April.

Dividends: in 1911, $5; 1912, $22; 1913, $17; 1914, $4; 1915, $13, on old capitalization and $5 on new; 1916, $14; 1917, $14; 1918, $8; 1919, $3; making a total of $11,850,000 paid by company.

Is controlled by Calumet & Hecla Mining Co., through ownership of 99,168 shares out of a total issue of 200,000 shares.

Balance of Assets, years ended December 31:

1918	1917	1916	1915	1914
$2,006,908	$1,505,444	$2,233,364	$1,583,654	$968,772

Income Account, years ended December 31:

	Gross Inc.	Construction	Net Inc.	Real Est. Purch'd.	Taxes	Dividends	Balance
1918....	$3,124,625	$57,242	$3,117,383	$375	$1,640,000	$1,600,000	$122,992(a)
1917.....	3,389,146	231,252	3,157,889	38,173	1,047,635	2,800,000	727,920(a)

(a) Deficit. In 1918, the increase in reserves for depreciation and depletion totaled $624,456, making a surplus balance of $501,464.

Net income for 1918 was $3,117,383; $3,157,889 in 1917; $3,349,710 in 1916; $2,180,000 in 1915; $463,000 in 1914; $207,420 in 1913, and $1,465,397 in 1912.

Property: 931 acres, lying between the Mohawk and Allouez mines, set off, 1880, by the Seneca Mining Co., to work the Kearsarge or Houghton conglomerate. Under the management of Capt. John Daniell, 2 shafts were sunk on this bed, which averages about 70′ width, with 3 paystreaks of 2 to 3′, aggregating 7′ width, each carrying copper in good quantities, but bed not payable as a whole, owing to great width of partly or wholly barren rock. Boundary lines were rectified, by exchange of 11.18 acres with Allouez, July, 1903, and by a similar exchange of 20 acres, with Mohawk, 1909, giving straight boundary lines on the dip of the bed, permitting easier development by all mines concerned. Work on the present mine was started 1902, after work at the Mohawk had disclosed the position and trend of the Kearsarge lode.

The Kearsarge bed, on which the present mine is opened, varies from 14 to 18′ in width, with but little poor ground in the entire mine. Openings are considerably ahead of stoping requirements, and blocking out is almost entirely by drift stopes, which are carried about 9′ wide and 14′ high, to the boundary limits, where extraction is begun and brought backward to the shafts, thus reducing timber requirements to a minimum. The mine keeps 3,000,000 to 3,500,000 tons of stamp rock blocked out for stoping. All levels below the first are 125′ apart. A Richmond electric bell signal system connects all underground workings with the engine rooms, and underground stations are connected with surface by telephone. Concrete is substituted for timber in the construction of the shafts, and in other places where practicable, rendering the shafts as nearly fireproof as possible. Mules are used in tramming rock underground.

On July 15, 1918, a fire broke out in No. 3 shaft which necessitated closing the north end of the mine and sealing shafts No. 3 and 4. About 200′ of concrete sets and 180′ of timber were destroyed. Hoisting was resumed in January, 1919.

Development: the mine has 4 shafts, numbered from south to north, planned to develop the entire tract. Nos. 1 and 2 shafts, 1,445′ apart, sunk at 42°, are each 8x17′ 4″ in size, with 2 hoisting compartments and a ladderway. These shafts were 2,799′ and 3,379′ deep respectively at end of 1918. Each shaft has, between the 9th and 10th levels, a 400-ton rock bin, equipped with a measuring hopper holding exactly one 7-ton skip load, loaded in 20 seconds by one man, this system saving much time, and confining hoisting of all rock mined down to 10th level to one point in the shaft. No. 1 shaft is 43′ below 22nd level, in a shattered area, requiring close timbering, and makes further sinking costly. The 20th level, has been holed through to corresponding level of No. 2 shaft, through which rock mined below the 22nd is hoisted. No. 2 shaft can be sunk much deeper before lode crosses into Allouez ground.

The No. 1 shaft workings all show ore of average quality, save the stopes on No. 10, 11, 14, and 16 levels south, beyond the disturbed area. The 10th and 16th levels south have reached property boundaries.

During 1916 and up to April, 1917, exploration was continued in the Kearsarge comglomerate, when work was temporarily suspended owing to labor shortage. The Kearsarge conglomerate was cut in 1916, on level No. 10, shaft No. 2, when a drift was driven at right angles to general strike of the lode and continued as a crosscut, 1,352′ W. of the Kearsarge lode. The body is 36′ wide, and carries a little copper in streaks.

During 1917 and 1918, extensions on Level No. 2 and all levels from the 15th to the 25th N. and on No. 20, 21, 23, 25, N. and S. were in average grade ore. No. 2, 15, 16, 17, 18 and 19 levels north, reached company's

boundaries during 1917 and 1918. Two electric pumps were installed, one on the 11th and one on 21st level. These are handling the water formerly pumped by 8 air pumps.

The northern end of the mine is developed by two shafts known as Nos. 3 and 4, which have a common collar, being only 6′ apart at surface, but diverging north and south, from the surface, at an angle of 42°. These shafts are sunk through 70′ of overburden, and are concreted into the solid rock ledge for depth of 95′ from surface. The outcrop of the Kearsarge lode being owned by the Mohawk, Ahmeek having only the underlay at its northern end, shafts 3 and 4 are sunk in the hanging, at an angle of 80° on a plane corresponding longitudinally to the strike of the bedded formation, and bend at depth of 980′, in a curve with a radius of about 400′, bringing the shafts to 34°, to correspond with the rather flat dip at the Kearsarge bed, both shafts entering the bed at depth of 1,275′. Concrete sets and stringers have been used in these shafts wherever ground would permit. Each shaft has 3 compartments, with two 8x8′ skipways and a 4x8′ ladderway. The upper portion of the bed was worked by crosscuts, beginning at 1,020′ in No. 4 shaft which is the 1st level in Nos. 3 and 4 shafts, though there are 3 stations above the point where the bed intersects, from which crosscuts will be run to the Kearsarge bed, to the Mohawk line. No. 3 shaft was 2,938′ and No. 4 was 2,773′ deep at end of 1918.

During 1917 and 1918 a commercial grade of "rock" showed in all the openings of shafts No. 3 and 4. In shaft No. 3, the 17, 18 and 19 levels south, reached the Mohawk boundary and levels N. 16 to 19 north correspond with those of No. 4 shaft.

New openings totaled 13,528′ in 1918; 17,049′ in 1917; 13,654′ in 1916, and 8,769′ in 1915.

Equipment: the main power house is in 2 parts, of brick and steel, with composition roof. Equipment of No. 1 power house includes 60-drill and 50-drill Nordberg cross-compound 2-stage air compressors, and a 32x72″ cylinder Nordberg hoist. The electrical plant consists of a 13x26″ Nordberg hoist. The electrical plant consists of a 13x26″ Nordberg tandem-compound engine, direct-connected to a 200 k. w. 250-volt Northern Electric generator. Condenser pumps and reheaters are located in the basement. No. 2 engine house is a duplicate of No. 1, containing a similar hoist with double conical drums with maximum diameter of 18′-6″, capable of hoisting 10-ton skips in counterbalance from 1 mile depth. Nos. 1 and 2 engine houses are connected to a steel-frame boiler house, having six 200 h. p. boilers, with room for 8 equipped with feed pumps, ash sluices, coal trestles, etc. The boiler house has a self-supporting steel smokestack, 150′ high and 7′-6″ in diameter, on a sandstone-faced concrete base. A 1,360 cu. ft. Sullivan compressor was installed early in 1917.

Shafts 3 and 4 are equipped with two 32x72″ cylinder Nordberg hoists, a triple-expansion Nordberg compressor, and turbo-generator, housed in a brick structure 65′ wide by 146′ long, with corrugated-iron roof; a steel boiler house 57′ wide and 84′ long with corrugated-iron roof, housing eight 200 h. p. boilers, and a steel self-supporting brick-lined smokestack, 7′ diameter and 140′ high. There is also a change house of brick construction, 39x139′. One shaft rock house serves both shafts. Storage battery locomotives to be used for tramming were installed 1917-1918 as follows: 4 in shaft No. 2; 2 in shaft No. 3 and 5 in shaft No. 4.

The central crushing plant, of brick, is 800′ north of No. 1 shaft, and 624′ south of No. 2 with which the plant is connected by a temporary frame trestle 37′ high and 14′ wide, carrying a double track for 7-ton tram cars, which are dumped by means of cradles, and rock directed by grizzlies and chutes to the crusher, below which is a hopper, feeding directly into a shaker driven by a 7½ h. p. electric motor, crushed ore being fed automatically into a link-belt conveyor driven by a 35 h. p. motor, going to the rock bin. The crusher building, of steel, contains 3 Farrell crushers,

driven by a 12x24" Nordberg engine, and tram cars are actuated by two 35 h. p. motors, located in the 2nd story of the building. Crushed ore goes to a 1,600-ton cylindrical steel rock bin, 32' in diameter and 48' high, set on concrete piers, with tunnel and railway track beneath, permitting the filling of cars by gravity, 1 man loading a 40-ton car in 10 seconds.

Mine buildings include office building, machine shop, warehouse, connecting with railway tracks; an office for mining captains and timekeepers, smithy, cold-storage shed, and about 100 dwellings. The locality is protected by a water system having 6,000' of 6" mains with 16 Ludlow hydrants. Water is taken from an 8' dam across the outlet of Seneca lake. A large water supply could be developed from Ahmeek lands near the Allouez boundary, and an inexhaustible supply is available from Lake Superior, 4 miles distant, but about 600' lower. The fire-protection system connects with that of the Calumet & Hecla.

The Mineral Range and Keweenaw Central railway lines run to the mine, the former connecting mine and mill over a steel trestle 100' high.

The stamp mill, at Hubbell, on Torch lake, has 8 heads, each stamp breaking about 500 tons of rock daily. The mill site has a frontage on Torch lake, of about 2,000' with a maximum water depth of 90', providing for tailing sands for many years.

The mill is steel and concrete throughout. Stamps rest on concrete piers, each standing on a concrete slab 4'6" thick that rests directly upon a hard pan of closely-cemented gravel. Each slab holds about a mile of wire cable, interlaced upward on its surface and reaching into the pier above, which is 40x40' at the base, pyramidal in form and 38' high, giving the stamps an elevation of about 50' above lake level. There are four 1,000-ton rock bins. The mill has double-deck floors, the jigs being located on the upper or roughing floor, and sands overflowing to Wilfley concentrators on the ground floor. The jigs and tables are run by electricity.

The mill power house has six 200 h. p. boilers, and a low pressure steam turbine. The plant has a 300 k. w. generator, and a pump of 40,000,000-gal. daily capacity, capable of supplying water for 8 heads, connected with Torch lake by a 600' pipe intake.

Production:

Year	Tons Ore Treated	Lb. Mineral Produced	Lb. Cu. per Ton Ore Stpd.	Cost(a) per Ton	Lb. Copper Produced	Tot. Cost per Lb. Cts.	Rec'd. per Lb. Cts.
1919...	.....	.....	...	...	17,023,111	....	....
1918...	1,196,541	.....	20.8	$2.18	24,851,235	13.43(c)	24.30
1917...	1,271,275	.....	22.0	1.74	27,919,812	9.42	17.42
1916...	1,164,010	.....	20.7	1.46	24,142,158	11.47	25.72
1915...	948,874	32,292,325	23.0	1.26	21,800,492	7.96	18.28
1914...	590,519	20,333,000	23.1	1.55	13,634,605	9.71	13.08
1913...	383,749	13,742,140	24.0	1.77	9,220,874	13.30	15.42
1912...	652,260	23,945,315	25.2	1.39	16,455,769	7.85	16.61
1911...	598,549	21,917,925	25.4	1.42	15,196,127	7.17	12.85
1910...	530,365	16,758,521	22.3	1.42	11,844,954	11.05	12.94
1909...	406,045	.....	22.7	....	9,198,110	15.48(b)	13.39
1908...	298,178	.....	21.1	....	6,280,241	12.66	13.36

(a) Includes mining, transportation, stamping and taxes. (b) Due to unusually heavy construction costs. (c) This includes a charge for depreciation and depletion amounted to 2.52 cents per pound.

Copper production is marketed through the United Metals Selling Co. Reserves not officially given are maintained at about 5,000,000 tons, and the life of the mine is estimated at 18 years, with present output.

ALGOMAH MINING CO **MICHIGAN**

Office: 60 Congress St., Boston, Mass. **Mine office:** Lake Mine, Ontonagon county, Mich.

Officers: R. M. Edwards, pres. and gen. mgr.; S. L. Powers, v. p.; Albert L. Wyman, sec.; Henry Tolman, treas.; R. M. Edwards, J. H. Rice, Henry Tolman, S. L. Powers and Arthur C. Paine, directors; Thos. Bennetts, supt.; Wm. Wearne, mg. capt.

Inc. June, 1910, in Michigan. **Cap.,** $2,500,000; shares $25 par; issued 70,000 shares; paid in $13. Last assessment, May 18, 1916, $1. Of the capitalization, 60,000 shares were given land owners in full payment for property and 10,000 shares were sold to public at $10 per share. Annual meeting, third Tuesday in April. American Trust Co., Boston, transfer agent; Federal Trust Co., Boston, registrar. Stock is listed on the Boston Stock Exchange.

The treasurer's statement, December 31, 1918, showed: surplus of $10,331 compared with $16,868 in 1917; excess assets $26,470 in 1916, excess liabilities $18,133 in 1915; $14,597 surplus assets, 1914 and $27,707 in 1913.

Property: 480 acres, adjoining the Lake mine in Ontonagon county, Michigan, being the N. ½ and S. W. ¼ of Sec. 3, T. 50 N. R. 30 W. Property was formerly owned by a company of the same name, which began work in 1852, and did a little prospecting with negative results, expending about $65,000.

Development: an 8x12′ exploratory shaft, started in an amygdaloidal bed, without definte data as to pitch, was over 560′ deep at end of 1916. For the first 95′ the shaft continued in vein material, passing into the hanging wall at about 95′ from surface. The first level, opened at 104′, has about 2,350′ of drifts, and a 90′ crosscut to the eastern sandstone. The second level, 212′ from surface, has a crosscut northwest across the formation which, for more than 1,000′, exposes almost solid trap, a small amygdaloid, 560′ from the shaft, showing some native copper in about 680′ of drifts. The Algomah bed, in which the shaft is sunk, apparently has a dip of about 80° and a width ranging from about 40′ at the first level to about 60′ at a depth of 470′, indicated by diamond-drill borings.

The Algomah bed is peculiar in both strike and contents, strike apparently being nearly north and south, in line with the strike at the Lake mine, next north, and the bed carrying copper oxide instead of native copper, as is the case with all of the other copper mines of the Lake Superior district opened on the bedded formation of the Keweenawan series. Ore is mainly black oxide, or melaconite, carrying traces of native copper, and chrysocolla of 16 to 19% assay tenor was found in a test pit near the shaft. Assays made of a small quantity of selected ore, removed in the course of shaft sinking, gave a copper value of 24.1%, this selected ore representing one-eighth of the entire body of material taken from the shaft.

Considerable diamond-drilling has been done in the area west of the orebody, and to great depth, but results are conflicting and nothing definite is known concerning either the dip, strike or value of the several copper-bearing formations there encountered. No mining work was done on the property during 1914, but one shipment of selected ore was made, which yielded 5.005 lb. copper and sold for $1,695. A few shipments of ore, taken from above the 40′ level, were made in 1915, the first assaying 14% copper. Shaft sinking, resumed in the summer of 1915. It is expected that in depth the shaft will encounter some of the lodes worked in the Lake and South Lake mines, as they flatten downward and dip toward the Algomah ground. During 1917 and 1918, the shaft sinking and all mining operations were discontinued due to high costs and adverse labor situation.

Equipment: includes a steam hoist, with capacity to lift a 3-ton load from a depth of about 500′, and an air-compressor. Buildings include a power plant, office and boarding houses. Property considered promising and management good.

ALLOUEZ MINING CO. **MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **Mine office:** Allouez, Keweenaw county, Mich.

Officers: Rodolphe L. Agassiz, pres.; Jas. MacNaughton, v. p. and gen. mgr.; with Harry F. Fay, D. S. Dean, E. B. Dane, Geo. S. Mumford, D. L. Pickman and Alex. Whiteside, directors; Geo. G. Endicott, sec.-treas.; H. L. Bennett, asst sec.-asst treas.; F. W. Ridley, supt.; J. J. Gibbens, mining captain.

Inc. Sept., 1859, in Michigan. **Cap.**, $2,500,000; shares $25 par; paid in $22.25; last assessment, $3 a share, levied 1904. Capital was increased in 1889, from $500,000, shares $25 par. At that time, company was reorganized and reincorporated. Annual meeting, second Wednesday in April. Old Colony Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Listed on Boston Stock Exchange. Owns a half interest in the Lake Milling, Smelting & Refining Co. Is controlled through ownership of 41,000 shares, by Calumet & Hecla Mining Co.

Dividends: initial dividend, $1 per share, July 31, 1915; $7 in 1916; $12 in 1917; $7.50 in 1918, and $1 in March, 1919, totaling $28.50 per share or $2,850,000.

Balance Sheet, December 31, shows:

	Cash	Other Quick Assets	Accts. Payable	Reserve for Taxes	Bal. of Qu'k Assets
1918.....	$363,401	$873,373	$115,450	$228,765	$892,560
1917.....	715,567	960,159	273,230	244,793	1,157,703

Income Account:

	Receipts	Costs	Constr.	Taxes	Divs.	Def. (a)
1918.....	$1,819,148	$1,386,882	$4,652	$242,782	$600,000	$464,070
1917.....	2,101,303	1,015,666	24,503	273,092	1,050,000	388,110
1916.....	2,633,679	1,086,847	22,321	.....	900,000	582,003(b)

(a) Includes deduction of assessments, levied by The Lake Milling, Smelting and Refining Co., which totaled $48,902 in 1918; $126,152 in 1917 and $42,508 in 1916. (b) Surplus.

In 1918, company added $198,927 as increase in reserves for depreciation and depletion, which made decrease in current assets $265,143 instead of $464,070.

Property: 3,400 acres, including mineral ground 640 acres, adjoining the Ahmeek Mining Co., which contains the Kearsarge amygdaloid at great depth.

The old mine, opened 1859, is on the Allouez conglomerate, a bed underlying the greenstone. The conglomerate, 30′ wide in many places, with strike of N. 39° E., and dip of 39°, average 0.7 to 1% copper, and is very refractory under the stamps. Mining was begun actively in 1869, and stopped in 1877, with an exhausted treasury. The mine was then leased to Watson & Walls, who made money from it, after paying a royalty of one-eighth on gross production. In 1880 the company resumed control, to quit once more, financially exhausted, in 1885. Watson & Walls took the mine again, and once more did well; the company resumed work on its own account for the third time, and again lost money, stopping all work in 1892. The old mine had been idle for some years, except for exploratory and development work in 1898 to 1900, when a shaft was sunk 1,200′ on the Osceola lode, and nearly 4,000′ of openings secured thereon, with indifferent results. The old Allouez made 26,051,528 lb. fine copper, 1869 to 1892.

Development: the Allouez mine is on the Kearsarge amygdaloidal bed, which does not outcrop on Allouez lands, though underlying the entire 640-acre tract, hence was reopened on the underlay. The mine had but one producing shaft, until late 1909. Shafts Nos. 1 and 2 are connected by crosscuts and drifts, on several levels. The Kearsarge bed, above the 14th level, is opened by crosscuts, uppermost being at the 6th level, below which plats have been cut in the shafts at the 8th, 10th and 12th levels, for crosscuts to be run to the bed. The Kearsarge bed averages about 16′ width in the Allouez mine.

Underground openings totaled 2,759′ in 1918; 2,838′ in 1917; 3,504′ in 1916; 4,458′ in 1915; 3,526′ in 1914; 4,400′ in 1913; 8,517′ in 1912.

No. 1 shaft, at the extreme southeastern corner of the tract, with 3 compartments, started May, 1903, and 3,978′ deep, leaves surface at an angle of 75°, but at slight depth takes an angle of 80°, continuing thereon to about 1,435′

depth, when a curve of 60′ brings the shaft to an angle of 38° 30′, which is the dip of the bed. At the change of angle, on reaching the bed, a single idler with a very wide flange cares for the cables passing at either end. Owing to the steep pitch of the shaft, back rails of 6x10″ timber are set so close to the wheels of the skips that their flanges cannot leave the steel rails, the wooden timbers serving as guides. The first level is opened at depth of 1,264′. In order to save pumping charges on surface water, a gutter, cut entirely around the shaft, leads to an incline 36′ long, used as a sump. This shaft showed very fine ground in its upper levels, but deeper openings are not so good. Equipment at No. 1 shaft includes a 42x62′ steel shaft rock house having two 18x34″ crushers. The floor was re-modeled during 1916.

Development in 1917 and 1918 brought the shaft 72′ below the 22nd level, but in bad ground. Openings were made on the 19, 20, 21 and 22 levels while stoping was on the 17, 18, and 19 levels. The 19th level south reached the Kearsarge boundary. The 20th level was holed to shaft No. 2. Storage battery locomotives were installed on the 19th and 20th levels.

No. 2 shaft, 1,500′ northeast of No. 1, is similar to No. 1 in general design, but changes pitch when entering the bed at 2,307′ from surface, from 80 to 42°. The bed above the point of intersection will be reached, to the boundary, by crosscuts. This shaft is sunk further in the hanging than No. 1, owing to the proximity of a lake. The collar of No. 2 shaft is of concrete. Washington fir and 16x24″ steel I beams, with 14x14″ square timber wall plats and 4″ planks are used. The interior, from collar to solid rock ledge, is lined with 22″ of concrete, dividers having their ends bedded in concrete, this giving an impregnable shaft, sunk through 52′ of treacherous quicksand overburden. Both shafts can be sunk to about 9,400′ before reaching the western boundary line. No. 2 shaft is 3,408′ deep.

At No. 2 shaft during 1917 and 1918, No. 21 level reached shaft No. 1. Six electric locomotives have been installed.

Equipment: includes a hoist with 32x72′ duplex cylinders and 18″ double-conical drum for No. 1 shaft, and No. 2 has a 20x30″ engine good for depth of 5,000′. No. 1 engine house, of mine rock, with redstone trimmings, has 12-drill and 18-drill air compressors, and No. 2 engine house has a 60-drill air compressor. The stone boiler house has five 125-h. p. boilers and a 120′ self-supporting steel smokestack. Buildings include a redstone machine shop and smithy, and a large warehouse. There is a very considerable mine location, with numerous dwellings, some remaining from 40 years ago, and some new. The mine is reached by a spur of the Mineral Range railroad.

At No. 1 mill, Point mills, Hardinge conical mills replaced Chilean mills Nos. 4, 5 and 6. At No. 2 mill, Hubbell, the 4th stamp, was put into commission in 1918. A pumping plant to dump tailings farther out into Torch lake, was put in commission in spring of 1919.

Production:

	Tons ore Treated	Lb. Min Produced	Lb. Cu. per Ton Ore Stpd.	Mine Cost per Ton (a)	Lb. Cu. Produced	Total Cost per Lb. Cts.	Rec'd. per lb. Cts.
1919..	.....	.....	.....	.....	3,749,984	.....	.....
1918...	514,888	.....	13.73	$2.119	7,071,218	19.09(b)	24.49
1917...	566,674	.....	15.69	1.869	8,892,915	13.84	27.95
1916..	566,960	.....	18.02	1.589	10,219,290	10.47	25.305
1915...	534,705	10,043,459	18.78	1.365	10,043,459	9.31	18.166
1914...	354,457	9,408,470	17.09	1.583	6,056,548	11.18	12.853
1913...	236,663	6,640,000	17.29	1.687	4,091,129	12.09	15.672
1812...	333,618	8,787,120	16.56	1.613	5,525,455	13.52	16.668
1911...	288,610	7,532,490	16.56	1.668	4,780,494	13.30	.....
1910...	247,119	8,406,970	18.84	1.769	4,655,702	11.57	.....

(a) Includes mining, transportation, stamping and taxes.

(b) Includes a charge for depreciation and depletion amounting to 2.81 cents per pound.

The Allouez, a considerable disappointment in earlier years, earned a net

profit of $171,264 in 1912, turning a deficit of $77,700 of former years into balance of assets of $93,564 over all liabilities, and in 1914 net profits were $114,530. Net surplus of cash and quick assets on Dec. 31, 1918, totaled $892,560.

ARCADIAN CONSOLIDATED MINING CO. MICHIGAN

An amalgamation of the New Arcadian and New Baltic Copper Companies, effected Oct. 7, 1919. **Office:** Houghton, Mich.

Officers: Robert H. Shields, pres.; S. T. Everett, v. p.; W. F. Miller, sec.-treas., with W. B. Anderson, J. C. and J. W. Shields, L. W. Killmar, H. W. Fesing, and A. F. Rees, directors.

Inc. Oct., 1919, in Michigan. **Cap.**, $6,250,000; $25 par; 237,000 issued; assessable. Of the 250,000 shares, 150,000 go to New Arcadia and 44,042 to New Baltic.

The company's capitalization is equal to that of the two companies combined. Shares of the new company were issued, share for share to holders of New Baltic and New Arcadian, 24,000 shares of the new company going to the New Arcadian, because it owned 24,000 shares of New Baltic; New Baltic's 18,958 shares becoming treasury stock of new company. The shares issued, as well as all treasury stock are on a basis of $13.50 per share paid-in.

Transfer office, American Trust Co., Boston; and registrar, Boston Safe Deposit & Trust Co. Listed on Boston Stock Exchange.

New Arcadian Property: 3,500 acres, includes five old mines worked at various periods in the past. The Arcadian Copper Co., operated the property with great vigor, 1898-1901, and equipped it with machinery, and a 3-stamp mill at Grosse Point. Operations on the Isle Royale bed proving unsatisfactory, all work was suspended, 1903; the hoist, machinery and shaft-houses were sold to the Trimountain Mining Co., the stamp-mill to the Centennial Copper Mining Co., and the property dismantled. The floating debt of the old company was liquidated by the sale of 800 acres of land, for $750,000, to the Quincy Mining Co. The old mine and equipment were fully described in Vols. I and II of the Copper Handbook.

Development: exploratory work was resumed Oct., 1905, by the Arcadian company, on an amygdaloidal bed about one-fourth mile east of the Isle Royale amygdaloid previously worked, and crosscutting from the 200′ level of the exploratory shaft disclosed 5 cupriferous beds in a distance of 110′. Work was suspended March, 1908, until organization, and was resumed August, 1909, by diamond-drill boring from the bottom of the 200′ exploratory shaft, which is in the S. W. ¼ of Sec. 29. Exploratory work, 1910-13, included considerable trenching and test pitting, but was devoted mainly to securing 3 cross-sections, nearly 1 mile apart, by diamond drilling, and 26 holes, aggregating over 26,000′, have been drilled. Drill-hole No. 22 cut a promising amygdaloid lode, in the north area. A shaft started June, 1912, on this lode, was 1,860′ deep in April, 1919, and is to be sunk to a depth of 2,500 to 3,000′.

Crosscutting was done on the 750′ level to explore the 2 copper-bearing amygdaloid beds disclosed by diamond drilling, one 300′ east, the other 150′ west of the shaft. On this level an amygdaloid vein of great promise was opened up 150′ east of the shaft. Crosscuts and drifts have also been driven on the 250′, 600′, 900′ and 1,050′ levels and disclosed good copper contents.

The Old Arcadian vein was exposed in 1918, in the west extension of the 1,500′ level crosscut. The No. 8 conglomerate, which was well mineralized on the 900′ level, was encountered on the 1,700′ level east crosscut at 520′ from shaft. It is 26′ wide, with some fine copper, but not of commercial value. The New Arcadain vein is exposed 47′ from shaft on both the 1,700′ and the 1,850′ levels; it is 18′ thick and heavily charged with copper.

During 1918, development work totaled 5,762′ of drifting and 4,028′ of crosscutting, which compares with 988′ of drifting and 645′ of crosscutting in 1917.

Equipment: includes a steam plant, a hoist good for 2,500′, 15-drill air-compressor, necessary mine buildings, and a fully equipped ore-house with an 18 by 24″ crusher.

Production: in 1916, 1,391 tons yielded 23 lb. of copper per ton; in 1917,

from stock-pile, 4,900 tons yielded 10.87 lb.; in 1918, 10,195 tons yielded 16.16 lb. copper.

Owing to its immense acreage on the mineral belt, the property is considered promising.

New Baltic Property: 800 acres, Sec. 16, T. 55 N., R. 33 W., with mineral rights to N. W. ¼ of the N. W. ¼ reserved by the New Arcadian. Exploration, begun June 10, 1909, included extensive trenching in the horizon of No. 3 conglomerate, supplemented by boreholes put down by a Calyx shot-drill, cutting a 3½″ core, considerable trouble having been experienced in getting down stand-pipes. No. 3 borehole, at a depth of 330′, cut 2′ of exceptionally good copper-bearing rock, with 6″ of heavy copper, and a drill core fairly charged with copper was taken, Sept., 1909, from what was thought to be the western Baltic bed, at depth of 300′. In Nov., 1909, a drill-hole pitched at an angle of 60°, cut an amygdaloidal bed estimated to pitch at 60° in opposition, giving cores of 105′ aggregate depth, showing copper at various points, the final 7′ being well charged with fine stamp copper and a considerable amount of very coarse stamp copper. The drilling also disclosed an unidentified amygdaloidal bed of about 75′ width, carrying considerable copper in masses approaching barrel-work size. Deepest hole bored was 1,200′.

Ground was broken June, 1910, for an exploratory shaft, which was started about 35′ in the footwall trap, and sunk to a depth of 500′. Although the shaft was started in the foot, the formation rolls so that the bed was cut at 3 points in the depth of 310′. At 200′ the shaft cut the footwall of the amygdaloidal bed, carrying much calcite but devoid of copper. At depth of 310′ the bed was cut again, carrying extremely heavy copper of a grade materially better than the average of the payable mines of the district. Drifts on the 350′ and 500′ levels disclosed exceedingly bunchy ground, with occasional pockets of rich copper, and a crosscut on the 500′ level showed further copper ground in an unidentified amygdaloidal bed underlying No. 4 conglomerate bed, distant about 1,500′ from the shaft. This crosscut was continued to a point over 1,900′ from the shaft. Facts concerning this vein were obtained from work done on it by the New Arcadian, the adjoining property.

The drilling campaign ended with No. 7 hole at a depth of 1,235′ in 1916. No. 8 conglomerate was 41′ thick at depth of 1,192′. Hole passed through good-looking amygdaloid veins, with copper in beds at 329′, 493′, 652′, 792′, and 1,192′. The New Arcadian vein was probably that cut at 792′. A shaft was started to cut the N. extension of this vein, and was down 500′ in August, 1918. At 60′, 250′ and 400′, where the vein was cut, it was well charged with copper. Company reported an exceptionally good showing on the 400′ level.

Development in feet:

	Sinking	Drifting	Crosscutting	Total
1918.....	170	100	185	455
1917.....	180	185	105	770

Work was suspended in Sept., 1918, due to abnormal labor and supply conditions.

Equipment: includes a hoist, compressor, boiler-house, etc.

The new company has good management and a property that offers great possibilities of profitable and long continued mine operations.

ARNOLD MINING CO. **MICHIGAN**

Office: 78 Devonshire St., Boston, Mass. **Mine office:** Copper Falls, Keweenaw county, Mich.

Officers: Francis L. Maguire, pres.; John Brooks, sec.-treas.; Capt. Wesley Clark, supt., with Edward F. Newton and John E. Fitzgerald, directors. Annual meeting, second Tuesday in May.

Inc. 1864, in Michigan. **Cap.,** $2,500,000; $25 par; issued, $1,550,000. Listed on Boston Stock Exchange.

Property: 3,323 acres, in T. 58 N., R. 31 W., in 2 tracts, including the Old Copper Falls mine and the Arnold mine proper, with frontage of about 3 miles on Lake Superior. The Copper Falls mine, worked 1850, until Aug., 1893, made 25,686,429 lb. fine copper, mainly from the Owl Creek fissure, and paid

dividends of $100,000. The Arnold mine proper developed on the Arnold ashbed, was opened 1863, reopened 1897, and closed 1901. Ore stamped averaged under 0.8% copper. Has a stamp-mill and 2½-mile narrow-gauge railroad, known as Arnold & Eagle Harbor, rolling stock of which has been sold. No. 1 shaft of the Arnold is about 1,000′ deep, sunk at an angle of 26° with the horizon. Total production, 1899 to 1911, inclusive, was 2,065,817 lb. fine copper.

Idle for several years.

ASHBED MINING CO. **MICHIGAN**

Office: 78 Devonshire St., Boston, Mass. **Mine office:** Copper Falls, Keweenaw county, Mich.

Officers: Francis L. Maguire, pres.; John Brooks, sec.-treas.; Capt. Wesley Clark, supt., with Edward F. Newton, directors.

Inc. 1880, in Michigan. **Cap.,** $1,000,000; $25 par. Listed on Boston Stock Exchange. Annual meeting, second Tuesday in March.

Property: 1,143 acres, Petherick mine, in vicinity of Copper Falls, adjoining the Arnold mine. The last mining work was done 1905-1906. Described in Vol. II of the Copper Handbook.

BALTIC MINING CO. **MICHIGAN**

Dissolved. Property now owned by Copper Range Co., which see.

BOHEMIA MINING CO. **MICHIGAN**

Office: 85 Devonshire St., Boston, Mass. **Mine office:** Lake Mine, Ontonagon county, Mich. **Operating office:** Dee Bldg., Houghton, Mich.

Officers: Wm. A. Payne, pres.; Chas. A. Snow, v. p.; Robt. H. Gross, sec.-treas., with John H. Rice, Thos. S. Dee, Richard M. Edwards and F. Ward Paine, directors.

Inc. Jan. 29, 1910, in Michigan. **Cap.,** $2,500,000; $25 par; assessable; paid in, $8; issued, $1,875,000. Of the 75,000 shares issued, 30,000 were given for lands, and 45,000 were sold to the public at $8. Boston Safe Deposit & Trust Co., transfer agent. Registrar, State Street Trust Co., Boston. Annual meeting, third Wednesday in April. Shares listed on Boston Curb.

Annual report, Feb., 1918, shows cash in bank, $132,059, compared with $131,088 in Feb., 1017. As soon as sufficiently important developments are made on adjoining properties, development work will be resumed.

Property: 960 acres, originally known as the Piscataqua, and later as the Henwood, is traversed by the cupriferous amygdaloidal bed of the Lake Copper Co. Diamond-drilling was done 1910. Drill-holes have yielded a number of cores, from various amygdaloidal beds, with copper in fair quantities, but with nothing remarkably promising or that would justify sinking a shaft. Suspended operations March, 1911.

BOSTON & LAKE SUPERIOR MINERAL LAND CO. **MICHIGAN**

Office: Leopold Bldg., Houghton, Mich. Fred W. Nichols, resident agent. Property is mineral land in the Lake Superior copper district. No mining work ever done.

CALUMET AND HECLA MINING CO. **MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **Mine office:** Calumet, Mich.

Officers: Rodolphe L. Agassiz, pres.; Jas. MacNaughton, v. p. and gen. mgr.; Robt. F. Herrick and W. Hunnewell, directors; John F. Perkins, sec.-treas.; Chas. A. Hall, asst. treas.; A. J. Garceau, asst. sec.; W. M. Gibson, asst. supt.; E. S. Grierson, chief engr.; John Knox, chief mg. capt.; Ocha Potter, chief efficiency engr.; J. G. Bennett, chief clerk. **Mill office:** Lake Linden, Mich. Henry Fisher, supt.; C. H. Benedict, mill metallurgist. **Smelter offices:** Hubbell, Mich. H. D. Conant, supt.; L. C. Graton, geologist.

Inc. 1871, in Michigan. **Cap.,** $2,500,000; shares $25 par; paid in, $12. Charter renewed, 1900, for 30 years, and amended, 1905, under the new laws of Michigan, making the corporation a securities-holding company, as well as a mining and smelting company. Was organized as a consolidation of the Hecla, Calumet, Portland and Scott mining companies. Stock is listed on the Boston Stock Exchange, and traded in on the unlisted department of the New York Stock Exchange. Annual meeting, second Thursday in April. Old Colony

Trust Co., Boston, transfer office: American Trust Co., Boston, registrar of stock.

The company controls the following subsidiaries, each described under its respective title.

Ahmeek, Allouez, Centennial, Cliff, Gratiot, Isle Royale, La Salle, Lake Superior Sm., Laurium, Osceola, Superior, Tamarack and White Pine C. Co.

At end of 1919, company had about 28,000,000 lbs. of unsold copper on hand, which is approximately three months' output. Curtailed mine operations averaged 70% of normal, coupled with a policy of retaining as many skilled miners as possible, ran up copper costs to 18c.

Balance sheet, years ended Dec. 31 (as filed with Massachusetts Secretary of State):

Assets.

	1918	1917
Real estate	$21,243,589	$21,267,179
Machinery and equipment	35,746,443	34,599,849
Mdse., mat., stock in process	6,261,253	5,483,600
Cash and bills receivable	5,421,698	6,607,821
Patent debts	65,013	84,972
Investments	20,862,064	17,855,581
Totals	$89,600,060	$85,899,002

Liabilities.

	1918	1917
Capital stock	$1,200,000	$1,200,000
Accounts payable	3,519,925	2,634,937
Depreciation reserve	14,973,364	12,444,286
Depletion reserve	5,259,674	3,821,878
Mine land surplus	14,094,684	14,094,694
Surplus	50,552,413	51,703,217
Totals	$89,600,060	$85,899,002

Dividends (100,000 shares outstanding):

1919	$10	1912	$42	1906	$70
1918	55	1911	24	1905	50
1917	85	1910	29	1904	40
1916	75	1909	27	1903	35
1915	50	1908	20	1902	25
1914	10	1907	65	1871-1901	830
1913	32				

Dividends received from other mining companies amounted to $3,011,205 in 1917, and $1,800,747 in 1918.

Since the change in charter, 1905, permitting the acquisition of stock in other corporations, the Calumet & Hecla has secured control of various other mines and mineral tracts, by organizing subsidiary corporations and also by acquiring stock in companies previously organized. In 1905 the company bought the following stocks, at a cost of $8,592,129.99 in cash and notes; 9,600 shares of Osceola; 19,400 shares of Tamarack; 24,796 shares of Ahmeek; 27,507 shares of Isle Royale; 10,316 shares of Seneca; 25,000 shares of Laurium. The attempt to secure physical control of the Osceola Consolidated Mining Co., at the annual meeting, March, 1917, was met by determined opposition, which took the fight into the Michigan legislature and the Federal courts. After nearly 2 years of strenuous litigation, the Calumet & Hecla assumed control of the Osceola and other Lake Superior mining companies formerly under the management of A. S. Bigelow, through a bargain with Mr. Bigelow, by which his entire stock interests were sold to the Calumet & Hecla.

Securities Owned on December 31, 1918.

	Shares Owned	Shares Issued
Ahmeek Mining Co..	99,168	200,000
Allouez Mining Co..	41,000	100,000
Centennial Cop. Mg. Co.	41,500	90,000
Cliff Mg. Co.....	28,785	60,000
Gratiot Mg. Co.....	50,100	100,000
Isle Royale Cop. Co..	33,187	150,000
La Salle Cop. Co.....152,979		302,977
Osceola Cons. Mg. Co.	33,560	96,150
Superior Copper Co..	50,100	100,000
White Pine Co.(Common) .....)	42,602	85,320
White Pine Co.(Pfd.)	10,000	10,000
Calumet Transp. Co..	3,482	.....
Great Lakes Transit Corp (Pfd.).....	1,000	.....
Great Lakes Transit Corp. (Com.).....	1,000	.....

The Frontenac Laurium, Manitou, Dana, St. Louis, and Tamarack companies have been completely absorbed.

On Dec. 23, 1916, the company sold its 11,207 shares of Seneca Mining Co. to the Seneca Copper Corporation, receiving $60 per share, a total of $672,420.

In June, 1919, it was reported that the company had sold its holdings of 50,100 shares of a total capitalization of 100,000 shares of the Gratiot Mining Co. to the Seneca Copper Corp. The financing was said to call for a payment of $25,000, with additional payments extending over a period of years.

Property: the mine and landed holdings of the Calumet & Hecla, including property owned outright, property controlled through subsidiary corporations, mining lands under options, and timber and miscellaneous lands, in Houghton, Keweenaw and Ontonagon counties, Michigan, amounts to approximately 165,000 acres, of which 102,804 acres are in Keweenaw county. The company, with its subsidiaries, has a water-front of more than 34 miles, on the shores of Lake Superior, Lac La Belle and Torch Lake, and approximately 60,000 people are supported by the operations of the company and its allied interests.

The Calumet & Hecla mine proper, about 2,750 acres, lies in a compact tract in Secs. 11, 13, 14, 15, 22, 23 and 24, T. 56 N., R. 33 W., in addition to which the company owns extensive tracts, all west of the Tamarack mine, carrying the underlay of the Calumet conglomerate at such stupendous depth that opening would require a 2-mile vertical shaft, and it is very doubtful whether these lands ever will become available for mining on the Calumet conglomerate. The lands west of the Tamarack were explored in 1904 by diamond-drill, in search of a supposed cupriferous conglomerate, but nothing of promise was found.

The original **Calumet & Hecla** mine is opened on the Calumet conglomerate bed, and a parallel mine has been developed on the Osceola amygdaloid, while a third parallel mine has been partly developed on the Kearsarge amygdaloidal bed.

The Calumet conglomerate proved unprofitable both to the north and south of the Calumet & Hecla, though workable at the Tamarack mine, which has developed the underlay by vertical shafts. The conglomerate has an average strike of N. 33° 30′ E., with average dip of 37° 30′ with the horizon. The bed is of 5′ to 26′ maximum width, with an average of 13′, giving about 2,400 fathoms of stoping ground, or about 43,200 tons of stamp rock per acre. As a rule, the richer portions of the conglomerate are in the central part of the Calumet & Hecla tract. The walls of the conglomerate carry considerable copper, especially the amygdaloidal footwall, and much of the adhering trap rock formerly rejected is now milled. Pillars of 75′ and even up to 150′ width, left on either side of every conglomerate shaft, contain stamp rock equivalent to about 18% of the stoping ground available before the robbing of the pillars.

About 18,000,000′ of timber, board measure, is used in the mine annually, and to the end of 1918, over 935,000,000′ of timber had gone underground. Iron pillars are used as supports, in crosscuts connecting the Red Jacket shaft with drifts on the bed, and in various incline shafts to support the hanging wall. Iron, mainly scrap material, such as worn out skip rails, cut to 10′ lengths and placed above I-beams, is used for lagging, to some extent. The conglomerate bed in the lower workings is not up to its average value above, being wide, but

low in copper. It has decreased in average copper contents with depth, but output averaged in 1915, 3.36 lb.; in 1916, 3.59 lb.; in 1917, 2.40 lb.; and in 1918, 1.62 lb. more than in 1914, partly because old pillars, etc., were robbed.

During 1918, there were 81 drills at work removing shaft-pillars, cleaning up arches and backs of stopes. This yielded 477,541 tons of ore.

The Calumet & Hecla has suffered severely from underground fires. The ore carrying native metal cannot burn, like sulphide ore, but the old timbering eventually becomes nearly as inflammable as tinder.

Development: the Conglomerate Property of the Calumet & Hecla is worked as 2 separate mines, known as the Hecla and Calumet branches, the South Hecla being a southerly continuation of the Hecla branch, and the Red Jacket vertical shaft a part of the Calumet mine. The Calumet to the north, the Hecla in the center, and the South Hecla at the south, form one continuous mine, developing the Calumet conglomerate by incline shafts, the Red Jacket shaft opening the same bed vertically. The conglomerate, opened for 2 miles along the outcrop, has 11 shafts, 8 being single compartment shafts, two being double compartment, and one vertical, with 6 compartments. Also opened by a blind shaft and the Tamarack property adds 3 shafts.

No. 11 Hecla, 2,400′ deep, showed poor ground at the bottom. All pillars were removed and shaft abandoned in 1918.

No. 12 Hecla shaft, at the company's southern line, is 5,643′ deep, bottomed in poor ground, disclosing a formation nearly barren of copper at depth. This shaft is to be extended to connect with the 81st level haulage system, and also for ventilation, supplies, and safety.

The 4,900′ Red Jacket vertical shaft, of 1,800 tons daily capacity cuts the bed at 3,287′. Rock temperature was 87° F., reduced to about 70° by connection with No. 4 Calumet shaft, exhaust air from the power drills aiding in cooling the mine. The Red Jacket shaft is 14′ 6″x24′ 6″ within timbers, and is built of brick and cement from collar to the solid rock, and timbered below with Georgia pine. There are 6 compartments, 2 used for hoisting, 2 for water, and 2 for men and supplies. The 2 hoisting compartments, at the eastern end, have cages with 9-ton Kimberly self-dumping skips swing under. The 2 western compartments have double-deck cages for men and material, and the 2 middle compartments have large cylindrical steel bailers, for raising water. Timber for the Red Jacket shaft is lowered through No. 4 Calumet, with which the Red Jacket is connected by a crosscut. The Red Jacket shaft hoists rock from all of the northern shafts below the 56th level, at which point the conglomerate is intersected. There are 9-ton steel storage bins at the various productive levels, which aid in maintaining the uninterrupted hoisting service that is absolutely essential in a shaft of a mile depth. The shaft ore-house of the Red Jacket is 100 by 100′ on the ground, and 110′ high with 4 crushers, 1 for poor ore. During 1916-1918, shaft pillars and arches were being removed from the 58th to the 63rd levels.

Sinking has been discontinued at shafts No. 6 and 7 Hecla and No. 9 and 10 South Hecla, due to excessive cost of maintenance, but in order to reach the lower ground at this end of the mine, a haulage-level (at elevation of the 80th level) was commenced in 1918, to connect this area with the Red Jacket shaft. This haulage-level is driven in an amygdaloid lode, 180′ under the Conglomerate, and will be 7,800′ long when completed. From this main haulage level sub-shafts will be sunk, and the lower part of the conglomerate mined. The ore mined will be trammed by electric-power to the Red Jacket shaft. This project will be completed in 1920.

Tamarack No. 3 is 30′ below the 18th level, or 5,253′ from surface. Tamarack No. 3 (inclined), 8′ below the 24′ level or 5,869′ below the surface. Tamarack No. 5, 147′ below the 40′ level, or 5,309′ from surface.

The "Five Forties" is a tract of 200 acres, a quarter-mile wide and 1¼ miles long, lying between the Tamarack and Tamarack Junior mines, carrying the underlay of the conglomerate at great depth and, to obviate sinking a deep and costly vertical shaft, this tract is opened by a blind shaft 1,588′ deep, starting from the 57th level, 2,750′ N. E. of the Red Jacket ver-

tical shaft. The blind shaft is sunk 40′ under the footwall, at the same angle as the dip of the conglomerate, thus assuring solidity of walls while saving long and expensive crosscuts to the bed on each level. A footwall lateral on the 57th level parallels the regular drift, at a distance of 40′ in the footwall between the Red Jacket vertical shaft and the blind shaft, offering an avenue for operations that obviates the confusion certain to result were the regular mine drifts given double duty. The blind shaft starts in the footwall drift, under and parallel with the 57th level, and eventually will be about 1 mile in depth, opening four of the five 40-acre tracts, leaving the 5th and last to be opened by a sub-shaft from the blind shaft, which doubtless will be sunk on the same system. The necessity for this peculiar method of development arose from the fact that the boundary lines of the property run north and south, while the strike of the bed is N. 33° 30′ E., giving a plane of dip of N. 56°-30′ W. Owing to the incline shafts being sunk on the dip of the bed, while the blind shaft must follow the section lines, the latter descends diagonally on the dip of the bed, giving the blind shaft an average dip of about 22° only, although the bed dips at 37° 30′. This unusually flat incline permits the hoisting of rock in tram cars, by an electric hoist on the 57th level, cars being hauled through the blind drift and dumped into the steel bins of the Red Jacket shaft for hoisting, thus saving a transfer at the mouth of the blind shaft. The workings of the "Five Forties" show the conglomerate bed to average about 14′, with about 10′ carrying milling ore, the bed as a whole being very lean at this great depth. The abandoned workings of the Tamarack Junior mine of the Osceola Consolidated, which adjoins the "Five Forties" are drained by holes bored by diamond-drill from the boundary stopes.

A drainage drift is driven, at depth of about 5,000′, measured on the incline, 250′ from the conglomerate, with a length of 5,100′, extending from No. 10 South Hecla shaft to No. 7 Hecla and from Tamarack boundary to Nos. 5 and 6 Calumet. This drift drains water to shafts Nos. 7, 5 and 6, from which it is lifted to surface by centrifugal electric pumps.

The shaft ore (or "rock" of Lake Superior usage) houses are all of uniform pattern and accommodate 40-ton railroad cars. Rock is hoisted to the top of each shaft house, passing thence over grizzlies that allow the finer rock to fall through, the larger masses being reduced in 24x36″ crushers . Crushed ore falls by gravity into storage bins, whence it is dumped into cars that take it to the mills, railroad tracks running underneath each rock house. The standard equipment includes a 50-h. p. induction motor at each shaft, for driving crushers.

Work on the Conglomerate lode totaled 10,841′ in 1918, compared with 2,942′ in 1917; 5,142′ in 1916, and 5,522′ in 1915.

The Amygdaloid Mine of the Calumet & Hecla is opened on the Osceola amygdaloidal bed, which outcrops 730′ east of the Calumet conglomerate, with parallel strike and average dip of about 38°, underlying the entire main tract of the Calumet & Hecla mine. There are 6 shafts in the Amygdaloid mine, Nos. 13 to 18 inclusive, numbered from south to north. Shafts are duplicate in size, each having 3 compartments, of which 2 are used for hoisting and 1 for pipes and ladder-ways. The Amygdaloid mine has over 35 miles of workings and has frequent connections with the conglomerate by crosscuts. The Amygdaloid mine was closed 1901, and reopened 1904. In this mine the Osceola bed runs about 35′ in width, with principal values along the foot and hanging, the middle third being lean, as a rule. Laterals in the Osceola workings are carried as drift stopes of 12′ height along the hanging wall. The Calumet & Hecla owns, on its main tract, about 11,000′ of the strike of the Osceola bed. The Osceola bed has been found to carry fair copper content, at a vertical depth of nearly 1 mile, in the Tamarack property:

Depths of Shafts Jan. 1, 1919		Distance between Shafts	
No. 13	3,232′	13 to 14	2,780′
No. 14	2,958′	14 to 15	2,400′
No. 15	3,002′	15 to 16	2,100′
No. 16	3,274′	16 to 17	1,800′
No. 17	2,279′	17 to 18	1,600′
No. 18	1,460′		

During 1918, 14 storage-battery locomotives were installed, for tramming in the Osceola lode.

Openings on the Osceola lode covered 10,192′ in 1918, compared with 16,690′ in 1917.

The Kearsarge Amygdaloid bed outcrops about 2,200′ east of the Osceola amygdaloid and 2,900′ east of the Calumet conglomerate, with parallel strike and dip of about 38°, underlying the entire main tract. Development was begun August, 1903, and there are 3 shafts, numbered from north to south, each having 3 compartments and being practically duplicates of those on the Osceola amygdaloid. The shafts above the ledge are "timbered" with steel, brick and concrete, the hanging wall being lined with 3 arches of brick, laid in 3 to 5 courses, thickness being increased with depth, supported by 2 rows of I-beams, which serve also as dividers for the shaft. The Kearsarge bed, as opened by these shafts, is erratic, though showing stretches of ground that probably will yield 18 to 22 lb. fine copper per ton, with reasonable selection. No work has been done on this lode since the beginning of the strike, July 23, 1913.

No. 19 shaft, about 1,000′ south of the Centennial boundary line is 1,350′ deep, and was closed down December, 1907. No. 20 shaft, next south of No. 19, is about 1,350′ in depth, and idle also.

No. 21, the southernmost shaft on the Kearsarge bed, is 8,000′ south of No. 20, and, at shallow depth, showed well in copper, but deeper workings were not so promising, the rock yielding only about 12 lbs. of copper per ton of rock mined. The shaft is 2,291′ deep; not working since July, 1913.

The Laurium property carries about 1½ miles of the strike of the Kearsarge bed, with 280 acres of underlay. The Laurium shaft, started August 7, 1909, as a result of previous diamond-drill borings, is about 2,200′ from the S. W. corner of Sec. 26, and about one-half mile N. of No. 1 Tecumseh shaft. The shaft is 1,661′ deep, with about 7,000′ of workings. The mine was closed in 1913, at the time of labor strike. When operations were suspended, workings on the 12th, 14th and 15th levels were in poor ground, showing little copper. Equipment included a boiler-house, engine-house with a large hoist and air-compressor, and a change-house.

The Calumet amygdaloid, lying between the conglomerate and the Osceola amygdaloid, has been little opened, but might prove payable, as it shows some good ground in a crosscut on the 900′ level.

Equipment: on surface at the Calumet & Hecla is probably the most complete installation to be found in the world. With few exceptions everything is duplicated, to prevent possible delay or suspension, by reason of fire or accident.

The power-plants at the main mine, on the Calumet conglomerate, include 4 large boiler plants and 6 hoisting plants. The hoists of the conglomerate mine are very powerful, ranging in capacity from 1,000 to 5,600 h. p. each. Miners are carried to and from work, in the incline shafts, by man cars, these being long trucks having tiers of circus seats, replacing skips when needed, being shifted quickly on or off the skip tracks by large cranes. This method has proven the safest, quickest and cheapest for moving men in and out of deep incline shafts.

At No. 4 Calumet shaft there is a group of the most powerful mining machinery in existence. Engine house contains the 2,500-h p. Corliss engine "Superior," with 40″ cylinders and 72″ stroke; the auxiliary engines "Baraga" and "Rockland," of 1,000 h. p. and 600 h. p., respectively; 2 Rand

air compressors, of 25 and 40-drill capacity, and the engine "Mackinac," a 4,000-h. p. quadruple-cylinder triple-expansion steel giant, operating 4 Nordberg air compressors with a combined capacity of 500 drills. There also are four 35-drill auxiliary compressors. In the old Riedler compressor, water was injected into the compression cylinders, while the Nordberg machines deliver the compressed and greatly heated air to a cylindrical steel cooler, 12′ in diameter and 30′ high, into which water is sprayed from above and drawn off at the bottom, this cooling the air to 80° F. Power is supplied by batteries of boilers in 2 boiler houses adjoining. Locomotives haul the coal into the boiler-houses, where it is fed to the grates by stokers.

The Hecla engine-house, flanked by a large boiler-house, contains the 1,200-h. p. compound hoisting engine "Frontenac" and 2 auxiliary engines, of 600 h. p. each, also a 30-drill Rand air compressor and a pair of water-plunger air compressors, with combined capacity of 144 drills, being the largest machines of this type ever constructed.

South of the Hecla plant is the "G. H. & S." engine house, having the "Houghton" and "Seneca" engines, of 1,300 h. p. each. The Hecla boiler house has 5 large boilers and a 200′ smokestack, of 9′ 6″ internal diameter.

The engine house operating Hecla shafts Nos. 7 and 9 contains the engines "Hancock" and "Pewabic," each of 1,400 h. p., which operates 25′ drums by spur gearing, and two 600 h. p. vertical compound engines for man cars. Boiler-house has 5 boilers and a 250′ smokestack of 12′ 6″ internal diameter.

The South Hecla engine-house at shaft No. 11 has a 1,000-h. p. Lidgerwood hoist.

The Red Jacket shaft has two 2,850-h. p. triple expansion hoists, and in an adjoining building are five 300-h. p. boilers. In raising 10-ton loads perpendicularly from a depth of 1 mile, the weight of the cage and steel cable nearly equals that of the cargo of rock, but with the aid of counterbalance the engines can hoist 10-ton loads at a speed of 40 miles per hour, the regular hoisting time being about 90 seconds for the vertical distance of nearly a mile, including time taken for starting and stopping, an achievement no locomotive could duplicate on a horizontal plane. The engine operates on a system devised by S. B. Whiting, formerly manager of the company. To overcome the dangerous strain caused by unequal wearing, Walker differential rings are placed on the sheaves, the cables taking 4 complete turns around the driving sheaves.

Equipment at the Amygdaloid shafts on the Osceola bed is practically the same at shafts 13, 14, 15 and 16, the new shaft No. 18, having a combined engine and boiler house, with a small Lidgerwood hoist. Shafts 13 and 16 have Nordberg first-motion double conical-drum hoists, operating 7½-ton skips in balance, good for 5,000′ depth each. No. 14 and 15 have Corliss hoists with 25′ cylindrical drums, good for 5,000′ depth. Shafts No. 17 and 18 are equipped with small Lake Shore and Lidgerwood hoists and single 5 and 2½-ton skips. All the shafts have permanent shaft rock-houses, similar to those of the conglomerate workings. All engine-houses have air connections with the main compressor-plants at the old mine.

The machine-shop has an equipment excelled by only a few of the largest shops in the country, including a 25-ton electric traveling crane and mammoth planers, with electric power throughout. These shops are capable of handling anything and everything in the line of repair work, and also have complete manufacturing facilities for the making of mining, milling and smelting machinery, and have turned out hundreds of Wilfley tables, and other special machinery, under agreement with the owners of the patents.

The foundry has 2 iron cupolas and a brass foundry, with a 20-ton electric traveling crane. The pattern shop has 2 departments, one for the shop proper and one for storing patterns.

The carpenter shop is equipped with as complete a line of labor-saving machinery as can be found in any general woodworking establishment.

The blacksmith shops are as large as those of the largest manufacturers of machinery, and are fully equipped. The Calumet shop alone sharpens upwards of 50 tons of steel drills daily. The Hecla shop does blacksmithing and forging for the entire mine. The various shops employ upwards of 150 blacksmiths.

The main electric plant of 12,000 h. p. capacity is at the mills, in Lake Linden, with a substation at the mine.

The office building is a large and handsome stone structure, housing the various executive departments and the engineering force of the mine. The company's private telephone system has an exchange with about 220 instruments, including a number of deep underground stations, with local and long-distance connections.

The Calumet & Hecla public library had 45,000 volumes in 1917; ranks third in point of circulation in the State of Michigan, with an attendance in reading rooms of 88,040 in 1917. In addition to books in English, there are works in German, French, Italian, Swedish, Norwegian, Slavonian, Polish, Hungarian, Finnish and Croatian, with periodicals and newspapers in a score of languages, about 30 different nationalities being represented on the company's payroll. There also is a branch library and reading room at Lake Linden, for employees of the stamp-mill and smelters.

The company maintains a hospital, for employees solely, with complete surgical and laboratory apparatus and a dozen physicians.

The company owns about 1,200 dwellings, furnished to employees at an average rental of 6% on actual cost, plus cost of maintenance, and upwards of 1,200 dwellings are owned by employees on lands leased from the company at low yearly rentals. This low rent is equivalent to an increased wage, compared with Western mines.

There are 15 school houses on the lands of the Calumet & Hecla, most of which were built by the company, including a fine manual training school, and a truly magnificent high school building at Calumet.

On Calumet & Hecla lands there are upwards of 30 churches, of a dozen different denominations. All of these sites were donated by the company, and in most cases substantial aid has been given in their erection and maintenance, entirely regardless of creed.

The company built a $50,000 bath-house containing tubs, showers and a 26 by 40′ swimming pool. A charge of 2½ cts. per bath is made, except in the women's department, which is free to women and children. The charge covers merely the cost of washing the towels and in no way compensates for the operation of the bath-house proper.

In October, 1919, C. & H. and its subsidiaries announced that it had taken out a blanket life insurance policy covering the life of each of its employees in sums ranging from $1,000 to $1,500, without cost to the insured. The contract amounted to $10,000,000.

The company maintains 4 distinct systems of waterworks, one at the mines in Calumet, one at the mills in Lake Linden, and two on the shore of Lake Superior, 4 miles N. W. of Calumet. The Lake Superior plants pump water for domestic uses at Calumet against a head of 733′, with an electric centrifugal pump of 3,000,000 gals. daily capacity and also furnish water to the mill and smelter boilers, on Torch lake. At the Calumet dam and mine there are 7 pumps, having a combined daily capacity of upwards of 45,000,000 gallons.

The company maintains a fire department, affording protection to the mine buildings and locations, and responding to calls from Red Jacket, Laurium and the other towns that go to make up the mining camp of Calumet, with 40,000 population.

The Hecla & Torch Lake standard gauge railroad, owned by the company, connects the mines, mills, smelter and shops by upwards of 20 miles of main tracks, spurs and sidings. Equipped with 250 forty-ton steel rock cars and several locomotives.

The 2 stamp mills, known as Hecla and Calumet, are at Lake Linden, 4 miles from the mine, on a tract of 998 acres, having several miles of frontage on Torch Lake.

The mills have steel frames, with concrete foundations, spaced 20″ apart, with 2 and 3 tiers driven to bed-rock, and topped with 6x12″ square timber, capped by a 4″x6″ bed of concrete. The mills have 27 Leavitt heads and 1 Nordberg steeple-compound head; 17 heads treating conglomerate ore and 11 crushing amygdaloid rock. Stamps are actuated by steam power, but the other milling machinery is operated electrically. The Leavitt heads have a daily capacity of about 350 tons of conglomerate, and 500 tons of Osceola amygdaloid.

The mill equipment below the stamps, includes Woodbury-Benedict jigs, Dorr thickeners, and flotation machines, which in 1918 replaced round tables and Wilfley tables; Chilean and Hardinge mills for regrinding.

As the mills stand on the flat western shore of Torch lake, but little above water level, tailings speedily filled the shallow lake for some distance off shore, and to deposit the sand it became necessary to secure a considerable initial elevation, which is gained by sand wheels. The material entering the mills as conglomerate rock leaves as coarse sand to the extent of fully 6,000 tons daily. The sludge is washed through launders to the sand-houses, where it is scooped up by the buckets of the wheels and dumped, high above, into launders running on trestles far out into the lake, these spouting forth miniature brick-red Niagaras. There are two wheel-houses, one for each mill. The Calumet wheel house has sand wheels of 50′ diameter, and the Hecla 50′ and 64′ diameter. The sand wheel is to all appearances a gigantic bicycle wheel, fitted with spur gearing where the rubber tire should be. The complete wheel weighs 500 tons, and is mounted upon massive concrete masonry. Four 25-ton iron bed plates support the pillars carrying the 21-ton Krupp forged steel axle, which is 27′ long and 32″ in diameter with a hollow core of 26″ diameter. Radiating from axle to rim are 2″ steel spokes 32′ long. The completed wheel is 10′ wide and 64′ in diameter, driven by gear and pinion, power being furnished by a 700-h. p. motor, and has a capacity of 55,000 gal. per revolution. Nearly 2 years were required to build and adjust this great wheel.

Flotation tests in the laboratory having been encouraging, two 50-ton Mineral Separation machines were installed in 1916. In 1917, two 600-ton units were ordered with all the necessary auxiliary machinery, including Dorr thickeners and Oliver filters. A plant of 2,000 tons daily capacity was in commission in 1918, and second plant of like capacity was put in commission in 1919. The six units of the Hecla mill were remodeled 1918 and 11 units of the Calumet mill remodeled during 1919. All ore will be subject either to flotation or leaching as a final treatment. Company will pay Minerals Separation 1c royalty per lb. of copper recovered.

The No. 1 regrinding plant, built 1908--09, and in full commission January, 1910, occupies a 195 by 340′ building. The frame is of structural steel, resting on concrete foundations, the floor being of stamp sand, with a concrete capping, no wood entering into the construction of the building. Power is furnished by eight 250-h. p. induction motors, giving about 100% excess capacity, to provide against delays through overhauling and repairing.

Equipment: includes 24 large Hardinge mills (8′ diameter by 72″ cylindrical length), which replaced in 1918 the 48 Chilean mills formerly used.

There are 200 Wilfley tables, each section of the plant having 6 grinders, 18 tables for roughing, 4 tables for middlings, and 12 tables for slimes. Product from each set of 2 grinders goes to a settling tank, from whence the roughings go to the first 3 tables, and the slimes to 2 other tables, the middlings from each 15 tables going to 2 additional tables. The coarse sands from the Calumet mill go to sand wheel No. 2, and waste sands to wheel No. 1, the coarse sand elevated by wheel No. 2 running to the re-

grinding plant, where the amount going to each mill is regulated by feed gates, an overflow tank at the end of the launder caring for the surplus, in case of stoppage of the mill. A Hardinge conical tube-mill, crushing coarse tailings, is 8′ in diameter at the larger end, the pulverizing of sands being accomplished by the use of Danish pebbles on a lining of hard brick. Re-modeling of No. 1 plant was completed in 1918.

The regrinding mill has traveling cranes, and every piece of machinery is duplicated, so that breakages can be repaired quickly. The mill is fed with coarse sand carrying up to 12 lb. copper p. t. No slime goes to the regrinding plant, which treats exclusively coarse gravel and sand from the jigs and tables. The product is clean mineral, of good average tenor, which is pumped into bins, and thence loaded into cars for shipment to the smelter. Labor costs are low, the plant being automatic throughout, and the force is only 12 men and boys per shift.

No. 2 regrinding plant, started in 1914, is practically a duplicate of No. 1. It contains classifiers, 64 Hardinge conical mills, and tables. It is fed by tailings reclaimed from Torch lake, recovered by a suction dredge, known as the reclamation plant.

An ammonia leaching plant of 4,000 tons daily capacity, using ammonia in solution, treats tailings from the regrinding plants.

Details of the work of the regrinding, reclamation, and leaching plants are as follows, for 1918:

	Tons treated	Assay headings	Assay tailings	Copper lb.	Lb. Cu. per ton	Cost per lb. (a)
Regrinding plant:						
From mine.....	530,657	0.599%	0.414%	2,243,022	4.23	6.75c
From old sand...	715,007	0.868	0.568	4,776,302	6.68	4.33
Reclamation Plant:						
1918	715,007	0.868	0.244	9,245,383	12.93	7.20
Since starting....	2,173,009	0.928	0.364	25,316,296	11.65	5.99
Leaching Plant:						
	1,005,015	0.535	0.126	8,035,156	8.00	7.71

(a) exclusive of smelting and selling charges.

Water for the mills is supplied by 4 pumps, of which the "Michigan" is the most powerful in the world, having a daily capacity of 60,000,000 gals. Auxiliary pumps are the "Huron" and "Ontario" of 20,000,000 gal. capacity each, and an I. P. Morris pump of 22,000,000 gal. daily capacity.

The electrification of the Calumet & Hecla was begun in 1904, and eventually will be completed, at mines, mills and smelters, except for some of the big compound hoists and air compressors at the mine, where a change from steam to electricity would be doubtful economy, as well as necessitating enormous initial outlays.

Machinery at the power plant includes a 10,000 kilowatt mixed flow turbine, and a Leavitt engine of 3,000 h. p., built originally for hoisting purposes, direct-connected to a 2,000-k. w. generator. A second turbine of 10,000 k. w. capacity was put in commission in 1918, giving the power-house a total capacity at maximum load of 22,500 k. w. The electric equipment of the mills includes 15 motors, of 20 to 250 h. p. each.

The boiler house has twenty 500-h. p. Babcock-Wilcox tubular boilers. There are coal crushers, feeding an endless link-belt system with 308 steel link buckets, of 60 tons hourly capacity, taking coal to overhead bins, whence it is fed to the grates by Roney automatic stokers. Water requirements at the boiler plant are about 750,000 gals. daily, obtained from a 750,000-gal. reservoir, fed from Lake Superior via the Calumet pipe-line.

The Torch Lake smelter is at Hubbell, about a mile south of the mills, on a 30-acre site having ample frontage on Torch lake, with deep water

in front and 3 railways at the rear. The smelter has 4-stone furnace buildings, and a 50x70′ furnace building, both blast-furnaces and reverberatories having been rebuilt within the past few years. There are 18 reverberatories, which are top-charged, having platforms above on which the mineral is thoroughly dried before charging. The blast furnace is 40x128″ at the tuyeres its comparatively small size being due to the use of reverberatory furnaces for the bulk of the smelting work. A new steel-frame smelter building houses three 150-ton reverberatory-furnaces, of so-called Jumbo pattern, modeled after the furnaces of the Lake Superior Smelting & Refining Co. The practice of the smelting plant is fully abreast of the times, in all essentials. In November, 1916, another furnace was blown-in. The smelting works have an assay-office, a laboratory, and a large warehouse for supplies.

The electrolytic plant, 155x270′, at Hubbell, has superseded the Buffalo reduction plant, which has been abandoned. It is built of steel and brick, contains four 7½-ton traveling cranes and 512 lead-lined wooden tanks, 3′x11′x3′ 9″ deep, in 4 sets of 128 tanks. Each set is arranged in 4 sections of 32 tanks, and each section in two tiers. The electric current is furnished by four 125-volt direct current generators driven by alternating current motors operating on current transmitted at 13,000 volts from the power plant at Lake Linden, transformed to 2,300 volts. There is a continuous circulation through the deposition tanks of the electrolyte which contain about 3 to 4% copper and 10 to 12% sulphuric acid. The plant has a capacity of 65,000,000 lb. copper per year. Company market its own copper. This plant also recovers several hundred thousand ounces of silver yearly.

There is 1 concentrate or mineral house, with a storage capacity of 18,000 tons, at Hubbell. Calumet & Hecla concentrate, locally called mineral, carries less than 60% copper.

The power plant at the smelter has three 125-h. p. boilers, and each of the two large reverberatory furnaces has a 300-h. p. boiler attached through which the waste gases pass.

The dock system of the Calumet & Hecla is extensive, including a series of very large coal sheds at Lake Linden and a series of docks at the mills and smelters on Torch lake. An electrically operated coal bridge capable of handling, from vessels, 10,000 tons per 24 hours was commissioned in spring of 1918. This bridge will unload all coal formerly handled at No. 1 and 2 docks.

The Calumet & Hecla owns and operates the ship canal connecting Torch lake with the government waterways on Portage lake, this canal being 21′ deep and accommodating the largest vessels plying the Great Lakes. Tolls, ranging from 10 cts. on soft coal to 50 cts. per ton on package freight, are charged by the company on independent cargoes entering Torch lake through this canal.

The company owns extensive tracts of pine, hemlock and hardwood timber along the southern shore of Lake Superior, this land carrying between 400,000,000′ and 500,000,000′ of standing timber. The company also has a long term timber contract with the Keweenaw Association, Ltd., and buys extensively of jobbers, the requirements for underground timbering alone being 18,000,000′ annually, in addition to the many million feet of timber and lumber used on surface at the mines, mills and smelters.

Construction: in 1918 cost $1,179,588, which compared with $2,274,901 in 1917.

Net returns: the conglomerate from the old Calumet & Hecla workings has shown a strongly declining tendency in metal content for many years past. Net returns were almost 5%, or 100 lb. of fine copper per ton in 1873; 4.75%, or 95 lb. fine copper per ton, in 1880; 3.012%, or 60.24 lb. per ton, in 1889, 2,99% or 59.93 lb. in 1900; 2.62% or 52.44 lb. in 1902.

Recent Net Returns.

	Cu. per ton			Cu. per ton	
	%	Lb.		%	Lb.
1907	1.98	39.68	1913	1.39	27.85
1908	1.80	35.96	1914	1.32	26.38
1909	1.66	33.14	1915	1.49	29.74
1910	1.51	30.12	1916	1.50	29.97
1911	1.52	30.38	1917	1.44	28.78
1912	1.49	29.73	1918	1.40	28.00

Ore from Osceola Amygdaloid Returned:

	Lb. of Ore per ton		Lb. of Ore per ton		Lb. of Ore per ton
1907	18.45	1911	15.89	1915	13.31
1908	17.67	1912	15.08	1916	13.60
1909	16.40	1913	14.31	1917	12.79
1910	15.82	1914	13.62	1918	11.58

Production: has shown a steady decline since 1906, in which year the high mark of 100,023,420 lb. fine copper was reached, and in 1913 was only 45,016,890 lb. copper, climbing to 53,691,562 lb. in 1914 and 71,030,518 lb. in 1915. Production in 1913 and 1914 was seriously affected by the labor strike. called by the Western Federation of Miners on July 23, 1913, and declared off on April 12, 1914, and by the extraordinary conditions prevailing in the copper market in 1914, due to the European war. The mine was operated on a ¾-time basis from September 1, 1914, until February 1, 1915, when work was resumed on full time.

Production and costs since 1910:

	Tons Ore Treated	Lb. Cu. per Ton Ore	Mine Cost per Ton Exc. Cons.	Copper Production Lb. *	Cost per Lb. for Cons. Cents	Net Cost per Lb. Cents	Rec'd. per Lb. Cents
1918	2,876,392	20.42	$3.07	18,419,826	....	19.29	24.28
1917	3,159,570	21.65	2.52	58,722,969	....	13.01	28.39
1916	3,166,274	22.53	2.03	71,349,591	0.60	11.03	25.48
1915	3,188,583	22.28	1.71	71,030,518	0.47	9.33	18.11
1914	2,592,462	20.70	1.85	53,691,562	1.00	11.35	14.01
1913	2,035,625	22.11	2.38	45,016,890	1.54	14.25	15.77
1912	2,806,610	24.18	1.91	67,856,429	0.80	9.86	16.65
1911	2,909,972	25.47	1.84	74,130,977	0.27	8.52	12.82
Conglomerate Lode:							
1918	1,547,603	28.00	4.09	43,329,816	....	.....	.....
1917	1,751,621	28.78	3.26	50,415,860	....	.....	.....
1916	1,727,794	29.97	2.63	51,785,016	....	10.75	.....
1915	1,739,984	29.74	2.13	51,738,588	....	8.69	.....
1914	1,439,986	26.38	2.37	37,996,045	....	10.42	.....
1913	1,175,259	27.85	2.99	32,731,768	....	12.67	.....
1912	1,746,960	29.73	2.23	51,935,245	....	8.86	.....
1911	1,924,480	30.38	2.07	58,469,399	....	8.25	.....

Osceola Lode, Amygdaloid:

	Tons Treated	Lbs. Cu. per Ton	Cost p. t. Excl. Cons.	Copper Lbs.*		Net Cost per Ton	
1918.....	1,328,789	11.58	1.88	15,393,153	....	.....	.....
1917.....	1,407,949	12.79	1.60	18,003,966	....	.....	.....
1916.....	1,438,480	13.60	1.32	19,564,575	....	11.84	.....
1915.....	1,448,599	13.32	1.07	19,291,930	....	9.71	.....
1914.....	1,152,476	13.62	1.19	15,695,517	....	10.20	.....
1913.....	842,162	14.31	1.53	12,051,238	....	12.62	.....
1912.....	1,040,600	15.08	1.36	15,692,199	....	10.36	.....
1911.....	985,492	15.89	1.34	15,661,578	....	9.95	.....

* Plus copper recovered from Torch lake which totaled 9,245,388 lb. in 1918, 9,075,457 lb. in 1917 and 5,412,649 lb. in 1916.

Production for 1919 was 53,859,146 lb.

Kearsarge Lode, Amygdaloid:

1913.....	18,203	.....	....	233,915	....	.....	.....
1912.....	19,050	.....	....	228,985	....	.....	.....

In 1904 the Calumet & Hecla Mining Co. started a pension fund. Certain employees who had attained the age of sixty years or more and who had been in the company's employ twenty years or more, were retired on a pension proportionate to their length of service and their wages. These pensions have run from $9 per month to $38 per month.

On July 15, 1916, the C. & H. celebrated its 50th anniversary. Long-service medals were given to 1,371 employees; of these, 169 were for men who had worked over 40 years, 380 for between 30 and 40 years, the remainder for between 20 and 30 years.

Reviewing the 53 years' career of this company, several features deserve attention. To the investor, the total dividends, $155,750,000 paid on an investment of $1,200,000 is not only remarkable for its amount but because dividends have been continuous.

To the technical man this record is particularly noteworthy, when the mining record is considered. Beginning in 1866, with a small production from the rich native copper ore of the Calumet conglomerate, the company's present daily production is 10,000 tons, mined by 17 shafts, several of them a mile deep. The yearly production of copper is from 65 to 75 million pounds, with a record amount, 100 million, in 1906.

This production comes from very low-grade ore—lower, in fact, than that of the Utah Copper or other great porphyry deposits. The ore originally mined, carried nearly 5% or 100 lb. of copper per ton, but the grade of ore decreased from year to year as depth was gained until it is now only 1.4% or 28 lb. copper per ton of ore. The maintenance of dividends, despite this decrease in metal content is due to the ability of the management in keeping down costs, so that a pound of copper is now produced as cheaply from the lean ore as it was from the richest ore. The company is also saving over 9,000,000 lb. of copper annually by retreating the old waste or tailings made many years ago at its mills and dumped into the lake, and has installed a leaching plant which gives a new youth to the entire district, by its treatment of ore carrying flake copper.

In 1906 the company, realizing that the Calumet conglomerate lode, on which the company was started, would eventually be exhausted, began the purchase of other properties and of shares in other Lake Superior companies. Controlling interest in six companies, bought for $8,592,000 by issue of company notes (all paid-off by February, 1917), has proved very profitable, these stocks returning $10,968,076 in dividends, and meanwhile increasing in market value. With its White Pine property and its leaching plant, it looks as if the future will be one of good dividends.

CASS COPPER CO. **MICHIGAN**

Address: Houghton, Mich.

Officers: Fred Smith, pres.; John T. Reeder, v. p.; John W. Black, sec.-treas., with John H. Rice and Jas. P. Corgan, directors; A. H. Meuche, supt.

Inc. 1916, in Michigan, to take over the Norwich mine, owned by the Copper Crown Mining Co. **Cap.,** $3,750,000; shares $25 par; 40,000 shares were paid for the property and 20,000 issued to the public at $3 per share, to pay for diamond-drill campaign. Annual meeting, last Monday in June.

Property: 1,980 acres, in Ontonagon county, T. 49 N. R. 41 W., near the Mineral Range R. R., has several well-known lodes crossing the ground.

Development: by 9,550′ of diamond-drilling, which discovered an unidentified lode of shot and mass copper. This will probably be developed by an old 1,000′ tunnel. Work stopped August, 1917, until materials and labor are available at reasonable prices.

CENTENNIAL COPPER MINING CO. **MICHIGAN**

Subsidiary of Calumet and Hecla Mining Co.

Office: 12 Ashburton Place, Boston, Mass. **Mine office:** Calumet, Houghton County, Mich.

Officers: Rodolphe L. Agassiz, pres.; Jas. MacNaughton, v. p.-gen., mgr. with H. F. Fay, Dudley S. Dean, E. B. Dane, and J. T. Burnett, directors. C. H. Bissell, sec.-treas.; G. L. Osgood, Jr., asst. sec.-treas.; J. H. Chynoweth, mg. capt.

Inc. 1896, in Michigan, as successor of Centennial Mining Co. **Cap.,** $2,500,000, shares $25 par; issued, $2,250,000; paid in, $19.50. Last assessment, 1905, was $4. Calumet and Hecla owns 41,500, or 46%, of the 90,000 shares outstanding. Company owns 16,164 shares of the 100,000 shares of the Lake Milling, Smelting and Ref. Co. American Trust Co., Boston, transfer agent; Old Colony Trust Co., Boston, registrar. Annual meeting, first Tuesday in April. Listed on Boston Stock Exchange.

Dividends: Sept., 1916, $1 per share; 1917, $1; 1918, $2, amounting to $360,000.

Profits were $6,046 net in 1911, $50,511 net in 1912, $31,397 in 1913, $3,213 deficit in 1914; $142,440 in 1915, $276,546 in 1916, $145,399 in 1917 and $128,295 in 1918.

Balance Sheet, December 31:

	Current Assets			Current Liabilities		Excess of Assets
	Cash, etc.	Supplies	Total	Acct's. Pay	Reserve	
1918.....	$433,467	$45,637	$479,104	$33,387	$15,000	$430,717
1917.....	408,333	66,389	474,722	34,230	4,384	436,108
1916.....	454,858	30,344	485,204	36,835	.....	448,368

During 1916 the Centennial and Wolverine companies exchanged rights to mine on about 1 acre of ground each.

Property: 670 acres, Sec. 12, T. 56 N., R. 33 W., and a triangular patch of about 30 acres, at the S. E. corner of the main tract, bought to secure the outcrop of the Kearsarge lode, and including about 10 acres, bought 1905, of the Old Colony, for the surface plant. The first work was done, 1863, by the Schoolcraft Mining Co., which failed to open a paying mine, and was reorganized, 1876, as the Centennial Mining Co., and again reorganized, 1896, with present title. Expenditures of upwards of $1,500,000 were made by the old company in unsuccessful efforts to open a payable mine on the northern extension of Calumet conglomerate. Seven shafts, 3 of considerable depth, were sunk on this bed, No. 3, the deepest, being bottomed at 3,200′. The Centennial lands are in the great mining area of Calumet, and are available for building purposes. Two additions have been platted and surface rights sold at good prices, mineral rights being reserved

The present company did a little work, 1897, on the old conglomerate shaft, then turned attention to the Osceola bed, deepening 2 shallow shafts

to 1,050′ and 1,150′ depth, respectively. The Osceola bed, where opened on the Centennial tract, averages about 15′ in width, but is lean.

Work on the Kearsarge bed was begun September, 1899. Owing to the outcrop of the Kearsarge occurring on the 30-acre tract bought of the Osceola, with only a 100′ right-of-way connecting it with the main tract, it was necessary to open the mine on the Kearsarge bed in a peculiar manner, by 2 shafts. These are but 90′ apart, on surface, and continue parallel, on the dip of the bed, until the 13th level, when the main tract is reached, after which No. 2 shaft diverges from No. 1 at an angle of 15° on the plane of the bed, 300′ being taken by the curve. This method of opening gives short drifts until the shafts enter the main Centennial tract. Each shaft is 17x18′ inside of timbers, with 3 compartments, sunk at an angle of 39° with the horizon, through an overburden of about 100′ depth. The Kearsarge bed averages about 16′ in width, and showed fair copper values in the upper levels, followed by a comparatively barren zone until the 14th level, when there came a gradual improvement, which unfortunately has not been maintained, the mine as a whole proving disappointing.

Development: new openings made during 1918, amounted to 742′ which compares with 1,409′ in 1917 and 2,208′ in 1916. No. 1 shaft is 4,000′ deep and has a steel shaft ore-house with 3,000-ton bins and a 32x72″ duplex hoist, with double conical drum, good for depth of 6,000′, operating 5-ton skips. Shaft is used for haudling men and supplies.

No. 2 shaft, 4,537′ deep, shows fair ground from the 18th to the 31st levels, inclusive, but poor ground to within 50′ of the South Kearsarge boundary, where drifts were stopped. The South Kearsarge drifts are in rich ground up to the boundary, which seems strange.

During 1917 and 1918, openings were extended in the 37, 38 and 39 levels, which disclosed ground below the average. Stoping was carried on in levels No. 22, 23, 28, 30, 31, 33, 34, 35 and 36 where ore of average quality was opened.

Equipment: at shaft No. 2 includes a cylindrical steel shaft rock-house, with 1,000-ton bins, and a 32x60″ duplex straight-face hoist, with 2 drums of 14′ diameter and 15′ 6″ winding face, grooved for 1⅜″ cable. The hoist is fitted with devices to prevent overwinding, and is calculated to raise 5-ton skips at the rate of 4,000′ per minute, operating under 150-lb. steam pressure.

To overcome a labor shortage in 1917 a rope-haulage system was installed on No. 37 level. This handles ore sent from the 4 levels above.

The mine is served by the Copper and Mineral Range railroads, and has a private line connecting the shops and shafts.

Rock is stamped by the No. 2 mill of the Lake Milling, Smelting & Refining Co., at Hubbell, which is separately described.

Production:

Year	Tons Ore Treated	Lb. Min. Produced	Lb. Cu. P.T.Ore Stpd.	Mine Cost per Ton(a)	Lbs. Cu. Produced	Total Cost per lb.,c	Rec'd perlb.,c
1918....	159,040	.....	15.67	$2.275	2,492,857	19.11	24.61
1917....	148,332	.....	13.50	2.331	2,002,857	18.67	26.96
1916....	150,617	.....	15.72	1.916	2,367,400	13.44	25.02
1915....	150,191	3,029,880	15.63	1.753	2,347,500	12.45	18.14
1914....	138,136	3,311,780	16.56	1.838	2,287,130	12.56	12.11
1913....	85.443	2,324,040	18.87	2,179	1,612,262	13.38	15.36
1912....	106,517	2.567,385	16.36	1,920	1,742,338	13.46	16.98
1911....	86,543	2,321,200	17.26	1.869	1,493,834	12.69	12.92
1910....	102,133	2,380,820	15.40	1.948	1,572.566	14.48	12.62
1909....	196,525	.....	14.15	.....	2,583,793	15.61	13.28
1908....	169,693	.....	12.94	.....	2,196,377	18.49	13.39

Production for 1919 was 765,196 lb.

(a) Includes mining, transportation, stamping and taxes.

CHAMPION COPPER CO. **MICHIGAN**

Office: 82 Devonshire, St., Boston, Mass. **Mine office:** Painesdale, Houghton county, Mich. **Mill office:** Redridge, Houghton county, Mich.

Officers: Wm. A. Paine, pres.; Chas. J. Paine, Jr., v. p.; F. W. Paine, sec.-treas.; with Frederick W. Denton, Geo. P. Gardner, W. Cameron Forbes, and R. M. Morse, directors; H. Schacht, general manager; John Jolly, underground supt.; Edw. Koepel, mill supt.; M. L. Cunningham, asst. mill supt.; H. F. Mercer, chief engr.; E. W. Kruka, chief clerk; W. J. Richards, master mechanic.

Inc. Dec., 1899, in Michigan. **Cap.,** $2,500,000; shares $25 par, all issued, full paid in. Is controlled jointly by Copper Range Consolidated Co. and St. Mary's Mineral Land Co., through equal ownership of stock, and owns $110,000 stock in the Michigan Smelting Co.

Balance sheet of December 31, 1918, showed a net profit of $2,791,800, and a surplus of $2,079,762, which compares with $5,050,152 net profit and $2,242,105 surplus in 1917.

Dividends: $3 in 1903; $2 in 1904; $10 in 1905; $12 in 1906; $10 in 1907; $5 in 1908; $8 in 1909; $9 in 1910; $5 in 1911; $11 in 1912; $9 in 1913; $31 in 1915; $60.14 in 1916; $44.80 in 1917; $19.75 in 1918; $12.80 in 1919, making a total of $252.49 per share or $25,250,261. The dividends in 1918 totaled $1,280,000 to which was added a disbursement of depletion charged against 1917 production amounting to $695,720.

Property: 1,240 acres, being the S. ½ of Sec. 30, W. ½ and N. ½ of N. E. ¼ and S. W. ¼ of N. E. ¼ of Sec. 31, T. 54 N., R. 35 W., practically all on the mineral belt. Neighbors are the Copper Range and Trimountain on the north, lands of St. Mary's Co. and Hussey, Howe & Co. on the east; Hussey-Howe lands and the Globe tract on the south, and Copper Range lands on the west. The tract carries 9,047′ on the strike of the bed, and, at the present angle of dip, the deepest shaft could go down to the impossible depth of 18,950′ before reaching the western boundary.

Geology: development started in 1899, under direction of Dr. L. L. Hubbard, and 3 parallel amygdaloidal beds were uncovered by trenching, one of which, the Baltic, showed phenomenal copper content. The 2 amygdaloids paralleling the Baltic bed showed copper in sufficient quantities to render their future exploration advisable. A fourth amygdaloidal bed, about 15′ wide, discovered 1901, east of the Baltic bed, carries heavy copper to an encouraging extent, and there also is a fissure vein of arsenical ore, apparently algodonite (copper arsenide) near "C" shaft. The width of this vein at surface is slight, and mineral contents variable, but on the second level the fissure is 2′ wide, and well mineralized.

The dip of the Baltic bed at the Champion is about 70° and strike same as at the Trimountain, not the easterly trend of the Baltic mine. The bed runs 13 to 45′ and averages 24′ width, carrying more epidote than at the Trimountain and Baltic. The surface of the tract is hilly, but the overburden is less than is found either to the northward or southward. The stretches of lean ground in the mine are few, and the bed carries heavy copper in profusion, mostly in barrel size, but running up to masses of 10 tons in weight. Only about 60% of the rock broken is hoisted, waste rock being sorted out and used for dry walling, packing itself.

All shafts are connected on numerous levels and about 2 miles of new workings are made yearly. The bed shows so little poor ground that nearly every level will be opened from end to end of the mine, eventually giving the longest average drifts of any Lake Superior property. The only really poor ground found in the mine was shown in "E" shaft, between the 3d and 4th levels, and the mine shows some stopes of phenomenal width and richness. The ground opened 1918, was of average value.

Development: by 4 shafts, named from north to south: "B" shaft, the northernmost, 1,835′ south of the Trimountain boundary, is 2,514′ deep; "C" shaft, 1,050′ south of "B," is 2,463′ deep; "D" shaft, 1,300′ south of "C," is

2,339′ deep; "E" shaft, 1,300′ south of "B" and 3,900′ north of the Globe boundary, is 2,388′ deep. The third level of "E" shaft has been driven 3,000′ toward the Globe boundary. "F" shaft, started 1,300′ south of "B," was abandoned on account of treacherous overburden, but the Baltic bed was located, 1907, by diamond drill at a new site, 1,800′ south of "E," and 2,100′ north of the Globe boundary.

New work in 1918 was 3,348′ of drifting, 35′ of cross-cutting, 1,022′ of raising and 95′ of shaft sinking.

Equipment: the shafts are practically duplicates in all essential particulars, having 40x50′ shaft rock houses, with 90-ton ore bins. Equipment at each rock house includes a steam hammer for heavy copper, and one 12x15″ rock crusher, taking everything hoisted from the mine direct from chutes. The shafts have duplicate first-motion hoists with 24x60″ duplex cylinders and double conical drums of 14′ diameter, with capacity for two 3,000′ cables each, hoisting 6-ton skips. The boiler houses have Bradley and Burt boilers, with coal trestles connecting. Water for boilers is furnished from a 12,000,000-gal. dam.

Extensive use is made of electric power on surface, and there are some underground electric pumps. The electric plant at "F" shaft has a 250-k. w. generator, direct connected to a cross-compound vertical engine.

The main steel compressor building at "F" shaft has a 100-drill Nordberg quadruple expansion 2-stage air compressor, with capacity to compress 9,120 cu. ft. of free air per minute to a pressure of 70 lbs. per inch. The compressor operates at a steam pressure of 280 lbs., and has a regenerative feed-water system. Power is furnished by three 250-h. p. water-tube boilers. At "B" shaft there is a 40-drill cross-compound 2-stage air compressor with vertical receiver inter-cooler. The electric plant, with a 100-k. w. generator, is in the main compressor building.

Buildings at the mine include a change house, dwellings and machine shop, with traveling crane and trolley rail for its entire length, with a 30-h. p. electric motor.

The stamp-mill is at Freda, on Lake Superior, 2 miles west of Redridge. Low-pressure turbine and acccessories were installed in 1915. The mill has 6 stamps, there being 4 compound stamps, with 15½″ cylinders, each treating about 700 tons daily, and 2 simple stamps, with 28″ cylinders, of about 660 tons daily capacity each, giving the mill a total capacity of fully 4,000 tons daily.

The concentration department was remodeled, 1908, and given additional tables and larger settling tanks. The wash for the heads has Hodge graduated adjustable-speed jigs, with plungers working simultaneously or alternately, in pairs, jigs and concentrating tables. Raggings are reground by crushing rolls having 1 roll fixed and the other in a spring bearing. The preliminary discharge from the stamp heads is treated on very large jigs, having 30x48″ sieves, of punched steel, with one-eighth inch openings, installed in connection with the head. Each head has a V-shaped settling tank, 40′ long, 9′ deep, 12′ wide at the top and 6″ wide at the bottom, slimes being drawn from spigots at the bottom. The flow of water through the settling tanks does not exceed 6′ per minute.

The boiler house has four 200-h. p. Stirling and 5 Scotch marine boilers. In 1916 a 235′ concrete stack, 100″ dia. at top, was constructed, and a new boiler installed. Coal is brought to the boilers by tram, and reduced to uniform size by a grinder before feeding to the grates, and ashes are washed into the lake through a launder. Exhaust steam passes through dry condensers, thence to a hot well, from which water is fed to the boilers. Power for the mill is supplied by a 500-h. p. cross-compound engine and a turbine, with a 180-h. p. engine in reserve.

The steel pump house, with truss roof and traveling crane, has a 20,000,000-gal. triple-expansion pump. Water for the mill and boilers comes from the lake through a 1,020′ tunnel, the shore end having a well with bottom 8′ lower than the lake level, this being the longest tunnel ever driven under Lake Superior.

The intake crib has an area of 45 sq. ft. and, with a second crib, the tunnel could furnish water for 10 stamps. Water cost was less than 1½ cents per ton of ore stamped. Screens have been installed in the tunnel, obviating the trouble formerly caused by sand and wood pulp in the water. A sand loading plant was erected in 1915.

Production:

Year	Ore Stamped Tons	Copper Produced Pounds	Yield per Ton Pounds	Cost per Pound	Price Received	Net Profits
1919.....	.....	19,886,917	....	....	....	.....
1918.....	594,235	21,748,514	36.59	12.03c	24.75c	$2,791,800.38
1917.....	776,036	27,550,343	35.50	10.40c	28.73c	5,050,171.57
1916.....	936,656	33,601,136	35.87	07.80c	25.28c	5,870,606.26
1915.....	923,743	33,407,599	36.17	06.30c	17.40c	3,709,049.02
1914.....	614,854	15,807,206	25.71	09.21c	13.38c	658,175.99
1913.....	421,849	12,080,594	28.64	10.71c	14.89c	504,767.61
1912.....	765,306	17,225,508	22.51	08.88c	16.16c	1,251,619.40
1911.....	734,392	15,639,426	21.29	09.63c	12.54c	454,588.61
1910.....	722,051	19,224,174	26.62	07.85c	12.74c	939,205,03
1909.....	753,908	18,005,071	23.88	08.45c	13.00c	816,637.55
1908.....	794,703	17,786,763	22.38	09.01c	13.39c	777,480.14
1907.....	708,685	16,489,436	23.26	11.76c	17.28c	909,383.88
1906.....	671,785	16,954,986	25.24	09.30c	10.06c	1,654,435.23

The Champion is one of the largest and richest of Lake Superior mines and has been admirably managed.

CHEROKEE COPPER CO. MICHIGAN

Address: J. A. Thomas, supt., Houghton, Mich. **Mine office:** Winona, Houghton county, Mich.

Officers: W. A. Hodgson, pres.; Linus Stannard, 1st v. p.; Deen L. Robinson, 2nd v. p.; Wm. D. Calverly, sec.-treas.; with J. H. Rice, B. F. Sparks and F. W. Nichols, directors.

Inc. April, 1910, in Michigan. **Cap.,** $2,500,000; $25 par; issued, $1,750,000, of which 49,000 shares were given for lands, 5,000 shares went to the promoters, and 16,000 shares were sold to the public at $5. Paid in $5.50 per share; last assessment of 50c. paid March 26, 1917. Boston Safe Deposit and Trust Co., transfer agent; International Trust Co., Boston, registrar. Listed on Boston Curb. Annual meeting second Tuesday in April.

Statement for December 31, 1917, shows receipts of $22,227; previous surplus, $17,326. Expenditures was $27,066, of which $25,264 was spent for mining, leaving cash on hand $12,486. In August, 1919, there was $20,000 in the treasury.

Property: 880 acres, Sec. 2 and S. E. ¼ of Sec. 31, T. 51 N. R. 37 W., lying between the Bohemia and King Philip, 1 to 2 miles S. W. of the latter, formerly were owned by the Penn Mining Co., and later by the ill-starred Belt Mines Co., Ltd. Land, entirely on the mineral belt, formerly included what is now the Lake mine of the Lake Copper Co., and carries upwards of a mile of the copper-bearing formation, presumably carrying the Evergreen belt. Diamond-drilling began in 1913. No. 6 drill-hole cut a cupriferous amygdaloidal bed of 32′ width, of which 5′ carried good copper.

The vein is amygdaloid to epidotal amygdaloid in character with general N. E. strike and dip of 62°, having barrel and shot copper in surface workings, and a width of 30′ to 45′.

Development: by shaft, down 450′, with openings at 110′, 220′, 320′ and 420′ levels, with drifts following the vein (N. E.-S. W.), from each station driven in 1917, for 653′. A fault-plane crosses shaft at No. 3 station; it dips 45° E.; the extent of disturbed ground is unknown.

Equipment: hoist, compressor, pumps, etc. Work suspended Dec., 1917, but expected to-start in 1920.

CLARK MINE **MICHIGAN**

Office: care Dr. Leon Estivant, owner, 47 Ave. de l'Alma, Paris, France. **Mine office:** Copper Falls, Keweenaw county, Mich. Fred W. Nichols, agt.

Property: 2,433 acres, includes mine formerly known as the Clark, Bell and Montreal, about 3 miles south of Copper Harbor, between Lake Fannie Hooe on the north and Breakfast on the south, including Lake Manganese. Mine, opened 1858, for copper, also carries a promising 2′ of pyrolusite, average of assays, 1900, by Duparc, of Geneva, giving 55.73% manganese and 1.36% copper. Was tested, 1905, and again, 1910, by diamond-drills. Shipped about 1,200 tons of high-grade manganese ore. Was under option, 1910, to United States Smelting, Refining & Mining Co. Fully described Vol. II.

Idle for years.

CLIFF MINING CO. **MICHIGAN**

Subsidiary of Calumet and Hecla Mining Co.

Office: 12 Ashburton Place, Boston, Mass. **Operating office:** Calumet, Mich. **Mine office:** Phoenix, Keweenaw county, Mich.

Officers: Rodolphe L. Agassiz, pres.; Jas. MacNaughton, v. p. and gen. mgr., with Geo. A. Flagg, R. C. Grew, W. E. L. Dillaway and Walter Hunnewell, directors; C. H. Bissell, sec.-treas.; Geo. L. Osgood, Jr., asst. sec.-treas.

Inc. Jan., 1910, in Michigan. **Cap.,** $2,500,000; shares $25 par; issued, $1,500,000, $13 paid in. Is controlled through ownership 28,785 shares, by Calumet & Hecla Mining Co. State Street Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Listed on Boston Stock Exchange. Annual meeting, first Wednesday in April.

Assets and Liabilities:

	Current Assets				
	Cash & Accts. Rec.	U. S. Cert.	Supplies	Accounts Pay.	Surplus
1918.....	$16,209	$10,000	...	$137	$17,071
1917.....	19,854	.....	$495	1,731	18,618
1916.....	20.954	.....	492	110	21,335

Property: includes the Cliff mine proper, and the South Cliff, connected underground on the third level. The Cliff mine, 2 miles N. E. of the Ojibway, is the oldest mine in the Lake Superior district, opened 1846, closed 1870, again reopened 1872, and abandoned 1878, paying dividends, 1849-79, of $2,518,620. The old mine was opened on a fissure vein crossing the bedded formation at practically right angles, and was pretty thoroughly worked out before the property was abandoned. The main fissure vein had several feeders, and a number of independent fissure veins, including the West vein, which was rich in copper near surface, and the East Cliff vein, about an eighth of a mile east of the main vein. The Cliff was notably rich in native silver.

The Cliff carries the Kearsarge amygdaloidal bed for about 2 miles, and for practically unlimited depth, the shaft being a trifle less than 2 miles from the most northerly shaft of the Ojibway, which is the nearest opening on the Kearsarge lode. The Tamarack Mining Co., which owned the Cliff until 1910, secured a complete geological cross-section of the tract, by diamond drilling, 1903-'07, the location of the Kearsarge bed being proven by 12 drill-holes, the majority of which were said to show commercial values, and, in addition, the property carries about 20 other amygdaloidal beds, east of the greenstone bluff, which is such a prominent feature of the landscape, rising to a height of several hundred feet. A 217′ vertical shaft was sunk, 1910, entering the bed where the ground is considerably disturbed. Work in this shaft was abandoned, 1913, as the Kearsarge vein at this place proved narrow, dry and barren.

Five diamond-drill holes were put down during 1914 and 1915 to explore the beds eastward in the hope of finding a profitable vein towards the Eastern sandstone. The cross-section crossed the horizon of the Old Colony, Mayflower and St. Louis amygdaloid lodes and the Bohemia and St. Louis conglomerate lodes, but very little copper was disclosed by this work.

The Cliff was the first mine ever opened for native copper, and production, 1845, was 19,903 lb., which was the first commercial output of copper from Lake Superior. Total production, 1845-'82, was 38,054,340 lb. fine copper.

In October, 1919, company sold a mill-site of 346 acres on the northerly side of Keeweenaw Point to the Seneca Corporation.

Equipment: includes a power house, with boilers, duplex hoist, and a 5-drill air-compressor. Buildings include a smithy, changing house, combination office and warehouse, boarding house and a number of dwellings. The mine is reached by the Keeweenaw Central railway.

Owing to the unsatisfactory assays of the drill cores, property has been idle since 1915.

CONTACT COPPER CO. **MICHIGAN**

Office: 70 State St., Boston, Mass. **Mine office:** Houghton, Mich.

Officers: Harry F. Fay, pres.; C. J. Morrisey, sec.-treas.; with W. A. Mosman, W. S. B. Cram and John G. Stone, directors. G. S. Goodale, supt.

Inc. May, 1910, in Michigan. **Cap.,** $2,500,000; $25 par; paid in $2.50. By vote of stockholders, March 21, 1918, the capital stock was reduced from $5,000,000 to $2,500,000 by redemption of 100,000 shares in treasury. Annual meeting, third Thursday in March. American Trust Co., Boston, transfer agent. Old Colony Trust Co., Boston, registrar. Listed on Boston Curb.

Company is a reorganization of the Elm River Copper Co., whose shareholders were given the privilege of exchanging their stock for shares in the Contact Copper Co. on the basis of share for share, on condition that they subscribed for additional shares at $2 each, to the extent of 50% of their holdings in Elm river. Practically 75% of Elm River stock was exchanged and the Contact Co. acquired title to all the real estate and personal property of the former company, which has been dissolved.

Report January 1, 1919, showed cash on hand, $4,450.

Property: 2,360 acres, in one continuous tract, within the limits of the copper-bearing formations in Houghton county, Mich. Within these limits the property has a maximum distance along the strike of 16,900′, a width of cross-section of 11,600′ and embraces the horizons of all the copper-bearing beds of the Keweenaw formation, between the Eastern Sandstone and the upper part of the Ashbed series.

Development: nearly a complete cross-section has been secured by upwards of 11,600′ of diamond-drill holes, despite the heavy overburden on nearly all of the tract. Cores show copper in a number of different beds, but not in commercial quantities. On July 1, 1915, drilling was resumed in the S. E. ¼ of Sec. 11, to investigate the horizon believed to contain the so-called No. 8 Amigdaloid opened on the neighboring Wyandot property and correlated with the Baltic lode on which all the mines of the Copper Range Co. are located. Up to March, 1916, about 5,271′ of drilling had been done and the lode definitely located at depths of 450′ and 950′, respectively, from the outcrop. In hole No. 20, 2,518′ of drilling was accomplished between March 1 and June 29, 1916. In hole No. 20 the lode was located between 1,878′ and 1,958′; in No. 21 between 641′ and 671′. In these 4 holes, a formation has been indicated of about 35′ average thickness showing a uniformly favorable character of rock.

Equipment: includes a duplex hoist good for 1,000′, 2 Burt marine boilers and a 4-drill air-compressor. Water is taken from a dam by a Blake pump. Buildings include a carpenter shop, two-story warehouse, boarding house with accommodations for 100 men, school house and a number of dwellings.

In order to protect the company's cash, work was suspended in 1916 and no active mining exploration has been carried on awaiting the result of active diamond drill work on the ground north and south of the company holdings.

COPPER CROWN MINING CO. **MICHIGAN**

Inc. July 18, 1902, in Michigan. **Cap.,** $2,500,000; increased about 1911, to $3,000,000; $25 par; issued, 66,200 shares. Company in July, 1916, sold its property to the Cass Copper Co., for 40,000 shares of latter company's stock, which see.

COPPER RANGE COMPANY — MICHIGAN

Office: 82 Devonshire St., Boston, Mass. **Mine office:** Painesdale, Houghton county, Mich. Sales Dept.: 32 Broadway, New York.

Officers: Wm. A. Paine, pres.; F. W. Denton, v. p.; F. W. Paine, sec.-treas., with L. P. Yandell and R. H. Gross, directors; William H. Schlacht, gen. mgr. W. Parsons Todd, sales mgr., New York; John M. Wagner, purch. agent, Houghton, Mich. American Trust Co., Boston, transfer agent; State Street Trust Co., Boston, registrar. Annual meeting, first Wednesday in May.

Inc. 1899, in Michigan. **Cap.**, $10,000,000; increased 1915 from $2,500,000; shares $25 par; 394,309 shares issued December 31, 1918; reserved for exchange of 691 shares treasury stock, 5,000 shares. The company is the successor of the Copper Range Consolidated, which December, 1901, took over 99,699 shares of that company's stock. On October 18, 1915, this holding company was formally dissolved and the shares exchanged for those of the Copper Range Co. Listed on Boston Stock Exchange.

Dividends: $1,536,086 in 1905; $2,304,810 in 1906; $2,304,810 in 1907; $1,536,740 in 1908; $1,536,930 in 1909; $1,537,340 in 1910; $1,357,104 in 1911; $788,428 in 1912; $1,084,498 in 1913; $1,182,003 in 1915; $3,941,648, or $10 per share, in 1916; $3,943,912, or $10 per share in 1917; $2,366,390, or $6 per share, in 1918; $3.50 per share in 1919; 50 cents in March, 1920; total, $26,617,858.

Balance Sheet for years ending December 31:

Assets—

	1918	1917	1916
Cash at Boston	$1,020,575	$608,958	$2,647,943
Cash and supplies at mine	931,076	1,100,541	813,945
U. S. Bonds and Cert. of Indebt.	2,700,000	3,167,500	.....
Copper on hand	470,329	1,717,653	2,053,759
Copper delivered, not paid for	675,843	.....	.....
Employees unpaid Lib. Loan and subscriptions	49,945	.....	.....
Michigan Smelting Co. stock	340,000	340,000	340,000
Balance due from U. S. Government as compensation for Co. Range R. R. Co.	108,781	.....	.....
Copper Range R. R. Co. bonds	870,000	870,000	870,000
Accounts receivable	280,425	33,101	89,917
	$7,446,974	$7,837,753	$6,815,564

Liabilities:

	1918	1917	1916
Mine indebtedness	$355,000	$210,640	$194,319
Accounts payable	44,565	287,968	226,817
One-half Champion	1,039,881	1,121,053	835,966
Excess of assets	1,007,528	6,218,092	5,558,460
	$7,446,974	$7,837,753	$6,815,564

At close of 1919, company had about $5,000,000 in net quick assets, exclusive of copper metal stocks. Exclusive of taxes and reservations, costs amounted to 15c a pound, for the 33,000,000 lb. output.

Net income for 1918 from operations of all the subsidiary companies before deducting dividends was $2,895,615, which compared with $4,966,825 in 1917, and $6,078,189 in 1916. Federal income and excess profit tax, paid in 1918 for 1917 operations amounted to $711,905, taken out of the surplus carried from 1917 account. Taxes as due 1919 are taken from previous years' surplus account.

Holdings consist of the entire assets of the Copper Range Consol. Co. Company's treasury holds: 50,000 shares of Champion Copper Co., or one-half the total issue; 97,001 shares Atlantic Mining Co.; 99,690 shares Trimountain Mining Co., and 42,443 shares Copper Range Railroad Co.

The Baltic Mining Co., absorbed by the Copper Range Co., has been dissolved and the mine operated as the Baltic mine of the Copper Range Co.

The Trimountain Mining Co. was ordered dissolved by Houghton County Circuit Court in January, 1917. On appeal of dissenting stockholders, the decision was reversed in March, 1918, and company will continue to operate as a separate corporation.

Property: 23,517 acres, mainly in Houghton county. Mining companies controlled own an additional 12,240 acres. In 1916 company secured an option on 3,500 acres lying to the south from the St. Mary's Mineral Land Co. and bought for $50,000 scattered lands to the extent of 5,000 acres in Houghton and Ontonagon counties, from the South Range Mining Co. During 1917, company purchased 5,050 acres, surface and mineral rights, also the mineral rights on 2,000 acres. The price paid was approximately $50,000.

The company's original tract of 9,360 acres mineral and 441 acres non-mineral land, lies between the Baltic mine (800 acres) on the south and the Trimountain (1,351 acres) on the north. The Champion lies between the Baltic and the St. Mary's Mineral Land property. The Atlantic mine has been idle since the mine was wrecked by air blasts in 1911. The Baltic mines a highly mineralized amygdaloid bed 15′-60′ wide, through three shafts more than 2,500′ deep. The Champion works three separate amygdaloid beds mined by four shafts, all over 2,000 deep. The Trimountain output comes from the Baltic bed mined by 3 shafts, one 3,225′ deep.

The company is the second largest producer of the Lake Superior district.

In 1918 the total production of copper from the Baltic, Trimountain and one-half that of the Champion mine was 26,623,940 lb., as compared with 32,368,103 lb. in 1917, and 37,946,930 lb. in 1916. The average yield in 1918 was 34.42 lb. of copper per ton from 1,089,269 tons stamped, compared with 32.97 lb. per ton from 1,366,033 tons stamped in 1917.

Costs and Profits, 1918.

	Production, lb.		Cost p. lb.		Price Rec'd.	
	1917	1918	1917	1918	1917	1918
Baltic	11,214,861	10,406,097	13.769c	15.07c	28.735c	24.757c
Trimountain	6,278,097	5,343,586	15.223c	18.42c	28.735c	24.757c
Champion (½)	13,775,172	10,874,257	10.404c	11.92c	28.735c	24.757c
	31,268,130	26,623,940	12.579c	14.46c	28.735c	24.757c

Copper Range Co.

	Production, Lb.	Cost Per Lb.	Profits	Price Rec'd., c.
1919	22,082,499	.....	.....	.....
1918	26,623,940	14.46c	$2,741,468(a)	24.757
1917	31,268,130	12.58c	5,051,650	28.735
1916	37,946,930	9.56c	5,964,020	25.28c
1915	37,035,642	8.06c	3,459,236.44	17.4c
1914	19,953,854	10.66c	541,961.06	13.38c
1913	18,767,359	11.71c	595,958.01	14.89c
1912	28,967,428	10.51c	1,631.676.10	16.16c
1911	29,310,579	9.74c	817,879.86	12.54c

(a) Approximately; exclusive of depreciation and depletion, which amounted to 3.4c per lb. of copper produced in 1918; 3.2c in 1917 and 3.1c in 1916.

Production fell off in 1917 and 1918 due to scarcity and inefficiency of labor.

Development: new work in 1918 totaled 25,536′ compared with 37,766′ in 1917; in addition, raises in 1918 totaled 2,526′ compared with 4,184′ in 1917. During 1917, $57,364 was expended diamond-drilling the lands under option from the St. Mary's Mineral Land Co., but no important discoveries were made.

The company's output was sold in 1917 for the highest average price ever received by any copper company, namely, 28.735c per lb. In 1918, despite the fact that much copper was sold at prices established by the Government, the

high price received of 24.757 cents was due to fact that company books its sales well forward. Copper Range is an assured success, and worthy of all the praise that has been given it.

Copper Range Consolidated Co.

Company dissolved October 18, 1915, shareholders receiving an equal number of Copper Range Co. stock in exchange.

Copper Range Railroad Co.

Office: 82 Devonshire St., Boston, Mass. **Operating office:** Houghton, Mich.

Officers: Wm. A. Paine, pres.; F. W. Paine, v. p. and sec-treas.; with John H. Rice, Frederick W. Denton, Thos. S. Dee, Wm. D. Calverley and J. R. Stanton, directors.

Inc. 1899, in Michigan. Cap., $5,000,000; shares $100 par; issued, $4,244,300. Debentures outstanding, $2,280,000 first-mortgage 5% bonds. Company is authorized to issue bonds to extent of $20,000 per mile of completed main line, and $15,000 per mile of completed branch lines and side-tracks. Is controlled by Copper Range Company. Balance sheet of December 31, 1918, gave cost of road at $6,249,264, with equipment inventoried at $954,620. This compares with 1917 cost of road, $6,235,621; equipment, $931,628. Earnings were $930,606 gross and $324,131 net in 1916; $960,275 gross and $228,852 net in 1917; in 1918, road was taken over by United States Railroad Administration. The amount due from Government as standard return would be $222,781, subject to certain adjustments of contracts made in 1917. The gross revenue resulting from Government operation was $1,171,804; the net, $100,880. Credit balance for 1918 was $799,096. About 75% of the gross income is derived from transportation of ore, mineral and freight.

The railroad has upwards of 100 miles of track, the 65-mile main line running from Calumet to McKeever, and connecting with the Keweenaw Central at Calumet; the Duluth, South Shore & Atlantic, Hancock & Calumet and Mineral Range railways at Hancock and Houghton, and the Chicago, Milwaukee & St. Paul railway at McKeever. The company also has track rights over 19 miles of the Chicago, Milwaukee & St. Paul railway, between McKeever and Ontonagon, with additional trackage rights of 73 miles over the same line, over which fast freights are operated between Calumet and Channing, Mich. Track rights have been given the Chicago, Milwaukee & St. Paul over the Copper Range between McKeever and Houghton, and a direct passenger service, with exceptionally good equipment, is operated jointly by the Chicago, Milwaukee & St. Paul and Copper Range lines, between Chicago and Houghton. Spurs connect the main lines with all of the principal mines along the right-of-way.

The company owns a half-interest in a bridge crossing Portage lake, between Houghton and Hancock; also extensive water frontage on Portage lake, in the western part of Houghton, with general office building, shops, roundhouse, warehouses and wharves for merchandise and coal. The coal wharf is equipped with modern unloading machinery, and has deep water alongside, capable of accommodating the largest freighters plying the Great Lakes. The Copper Range railway is a model small road.

Baltic Mine.

Property: 800 acres, near the eastern limit of the Michigan copper belt, about 75 acres being on the eastern sandstone and non-mineralized. Holdings comprise all of Sec. 21 except the S. E. ¼, and W. ½ of Sec. 20, T. 54 N., R. 34 W. Lands are bounded on the north by the Wheal Kate and Sec. 16 of the Atlantic; on the east by St. Mary's Mineral Land Co.; on the south by St. Mary's lands, lands of Hussey, Howe & Co., and the Trimountain mine; on the west by the Trimountain. Exchanged 39 acres, 1905, with the Atlantic mine, which will enable the Baltic to sink No. 5 shaft to much greater depth than otherwise possible. To the southward the Trimountain and Champion mines are opened on the same bed, which has a strike of N. 63° E., from Baltic shafts 2 to 5, and to the northward is the Superior mine, on the same bed. The dip of the bed aver-

ages about 73°, being the sharpest of any developed cupriferous bed in the Lake district.

The Baltic amygdaloidal bed is exceptionally strong, ranging 15 to 60′ in width, and so well mineralized that at most points it can be more or less thoroughly stoped from wall to wall. The great width of the stopes has brought about the use of a walling system, by which waste rock is built into dry walls along the drifts, thus saving timbering, while giving stronger walls than any timber could supply, and saving the cost of hoisting lean rock. The walling system of the Baltic has proven a success under actual test, and is now in general use in the Lake district, the credit being due Mr. Denton. A little melaconite is found in narrow fissures crossing the lode, these being too small to follow, but the black oxide ore mined in the stopes is saved in milling, with 35 to 40% copper as dressed, and smelts readily with the native copper mineral. The native copper of the Baltic is arsenical, and it is probable that some copper arsenides are mined and milled, as narrow arsenical fissure veins occur occasionally in the district south of Portage lake. While the finished copper is arsenical, it makes wire of great tensile strength.

Development: in 1918, amounted to 13,693′ of new openings and 178′ of shaft sinking, which compares with 14,121′ of new openings and 398′ of shaft sinking in 1917.

Shafts are numbered from South to North.

No. 1, the discovery shaft, located between Nos. 2 and 3, was sunk at a wrong angle, and was abandoned at depth of 219′.

No. 2, the southernmost shaft, 2,839′ deep, began production 1906 and furnished most of the 1918 production. The surface plant at No. 2 includes a boiler house with two 250 h. p. boilers, and an engine house with an air-compressor reducing 4,000′ of free air per minute to a pressure of 70 lb. per square inch, and a hoist with double-conical drum. The shaft rock house has a crusher operated electrically, and the shaft has concrete stringers.

No. 3 shaft, 1,170′ northeast of No. 2 and 3,498′ deep, has a steel shaft rock house of the circular type, with 1,200-ton bins, equipment including a 16x18″ engine, two 18x24″ crushers and a large crusher operated electrically.

No. 4 shaft, 900′ northeast of No. 3 and 2,982′ deep, has a frame shaft rock house sheathed with steel, 36x71′, with 17x31′ wing, 88′ high, with 1,400-ton rock bins and two 18x24″ crushers.

No. 5 shaft, the northernmost, 885′ N. E. of No. 4 and 1,624′ deep, has a rock house duplicating that at No. 4. Stoping was done on the 9th and 14th levels, inclusive, and drifts run to the Atlantic boundary. The ground was considerably disturbed in the upper levels, but is growing more settled at the bottom, and good showings are reported on the West lode. Hoist is a duplex Nordberg, good for 1,500′ depth. Shaft has been abandoned and ground tributary thereto is mined and ore hoisted through the No. 4 shaft.

Equipment: hand power cranes for handling mass copper have been installed at all shafts, and the mine has electric pumps. In 1915 installation of additional generator for underground haulage and construction of transformer house for new transmission line from stamp-mill was completed.

The compressor house, between shafts Nos. 3 and 4, is 36x58′ in size, with concrete foundations, stone walls and steel roof, housing a compressor with capacity to reduce 4,000′ cu. ft. of free air per minute to a pressure of 70 lbs. per inch. Adjoining is a boiler house of similar material, 49x76′, with wing 12x62′, having four 250-h. p. boilers and a 140′ self-supported steel smokestack. This boiler plant supplies steam for shafts 3 and 4. A new boiler plant was constructed in 1916. Adjoining the boiler house is a 360′ coal trestle, of 5,000 tons capacity, underneath being a 5x8′ concrete tunnel, through which coal is hauled in tram cars, on a down grade, by endless cable. The mine has a complete electric light plant. A considerable town has grown up about the mine with well-built dwellings for employees, on lands owned by the company. The property is served by the Painesdale branch of the Copper Range railroad.

The mill, on Lake Superior, one-half mile west of the Atlantic mill, went into commission, 1901, and was enlarged, 1907. The building is of structural

steel, on stone foundation, equipped with 4 Allis simple heads of 500 to 625 tons daily capacity each, and 2 Nordberg compound heads of about 800 tons daily capacity each, giving the mill a capacity of about 4,000 tons daily. Equipped with Wilfley tables, Woodbury jigs and Deister concentrating tables for treating the finer slimes. The mill has crushing rolls and a Huntington mill for regrinding, and a settling tank for slimes. Mineral carries about 60% fine copper. Power is furnished by a 500-h. p. 14x32″ Nordberg cross-compound engine, and a 180-h. p. auxiliary engine.

Adjoining the mill is a boiler house with five 250-h. p. boilers. Draft is secured by a set of duplex fans, driven by the mill engine, with a concrete smoke-stack 226′ high and 8′ in diameter. Behind the boiler house is a 25,000-ton coal storage yard, for the joint use of the Baltic and Atlantic mills, coal being brought to the boilers, through tunnels, by gravity. A 1,250-k. w. electrical plant, installed 1912, at the Baltic mill, supplied power for a number of regrinding mills at this and other stamp mills of the parent company.

Water for the Baltic and Atlantic mills is furnished by a $150,000 gravity dam across the mouth of Salmon Trout river. The entire steel structure is anchored to a 2″ steel base plate, at the bottom of the concrete, by a large number of 1½″, 2″, and 2½″ steel rods of 15 to 30′ length. Water is taken from the dam about 20′ below the crest by three 38″ riveted steel pipes, one on the Atlantic and two on the Baltic side. Surmounting this structure is a trestle of the Copper Range railroad.

Production:

	Ore Stamped Tons	Copper Produced Pounds	Yield per Ton, Lb.	Cost per Pound, c.	Price Received, c.
1908	764,117	17,724,854	23.19	08.28	13.39
1909	814,260	17,817,836	21.88	07.98	13.00
1910	781,419	17,549,762	22.46	08.32	12.74
1911	696,795	15,370,449	22.06	09.09	12.54
1912	652,433	13,373,961	20.50	10.94	16.16
1913	333,289	7,736,126	23.21	11.91	14.89
1914	324,433	7,001,945	21.58	11.17	13.38
1915	378,443	12,028,947	31.79	09.50	17.40
1916	369,287	12,425,804	33.65	10.85	25.28
1917	325,342	11,214,861	34.47	13.77	28.73
1918	.....	10,406,097	.....	.....	.....
1919	.....	7,864,653	.....	.....	.....
Total	5,439,818	150,515,295	24.31	09.79	16.30

The ultimate productive capacity of the mine cannot be predicted with safety, but the present milling capacity is equal to making nearly 25,000,000 lbs. fine copper yearly, and ultimately this output, or even a greater production, should be reached.

Trimountain Mining Co.

Company was ordered dissolved January, 1917, by Circuit Court, County of Houghton, but on appeal by dissenting stockholders the Supreme Court of Michigan reversed the dissolution order and company will continue to operate as a separate corporation.

Office: 82 Devonshire St., Boston, Mass. **Mine office:** Trimountain, Michigan.

Officers: W. A. Paine, pres.; F. W. Paine, sec.-treas.; J. A. Ackroyd, asst. sec.-treas., with J. R. Stanton, F. P. Son and F. W. Denton, directors. John Jolly, supt.; Edw. Koepel, mill supt.; H. T. Mercer, engr.; Benj. D. Noetzel, clerk; Richard Bowden, mng. capt.; Wm. J. Richards, master mechanic.

Inc. 1899, in Michigan. **Cap.,** $2,500,000; shares $25 par; paid in $20. . . Controlled by Copper Range Co., through ownership of 99,690 shares of stock. Company owns $110,000 worth of Michigan Smelter Co. stock.

Dividends: $3 in 1903, $5 in 1908, $1.50 in 1910, $3 in 1912, and $2 in 1913; $5 in 1918. Total dividends, $1,950,000.

Balance of assets, January 1, 1919, $3,224,325, including $1,696,831 cash and copper on hand amounting to $111,113, compared with January 1, 1918, assets $3,413,977, including $2,786,899 cash and copper on hand amounting to $57,572. Liabilities were $96,504 on January 1, 1919, leaving surplus of $3,127,821, compared with liabilities of $69,201 and surplus $3,344,776, January 1st, 1918.

Property: 1,120 acres, the E. ½ of Sec. 19, W. ½ of Sec. 20, N. ½ of Sec. 29, and N.-E. ¼ of Sec. 30, all in T. 54 N., R. 34 W. The Baltic mine lies to the N. and the Champion to the S., with undeveloped lands to the E. and W.

Owing to a very heavy sand overburden the mine was opened by drop-shafts sunk through alluvium, with raises to surface on the angle of the dip of the stratified formation. The Baltic bed runs 15 to 50′, with an average width of 25′, on the Trimountain property. Heavy copper is found near the walls, and masses upwards of a ton in weight have been found, but values occur mainly disseminated in stamp rock.

The Trimountain shafts enter lean streaks or shoots, sometimes 500′ in horizontal length, with flat northerly pitch or rake, underlain by copper ore. Lying parallel with and about 65′ W. from the Baltic bed, is a wide amygdaloid, carrying some heavy copper and considerable ore. This bed has not yet been worked, but may be made available for production at some time in the future. The great width of the lode has led to a dry-walling with waste rock, which is used also for building underground chutes, which are roughly circular, with inner diameter of about 5′ and are filled about with waste, as stopes are carried upward, three chutes being built at a sharp pitch, the wedging of the surrounding rock serving to hold the walls immovable. The saving in timbering brought about by dry-walling and building chutes of mine rock is large.

Development: No. 1 shaft, 210′ north of the Champion boundary line, is sunk at an angle of 68°, with first level opened 168′ below the collar, levels thereafter at 100′ intervals. The upper levels tributary to No. 1 shaft have been worked out, and the shaft abandoned at depth of 2,284′. It now serves as a waste sand chute.

No. 2 shaft, 1,023′ N. E. of No. 1, was 3,125′ deep in the end of 1918, and a considerable improvement has been noted in ground below the 14th level, with the bottom levels the best opened in this shaft. The shaft rock house, has 2,000-ton ore bins, and is equipped with an engine, steam hammer and two crushers. Ore is raised by a 2,500-h. p. direct-connected duplex hoist, with double-conical drum of 18′ maximum diameter, capable of raising 6-ton skips from 1 mile depth.

No. 3 shaft, 1,027′ N. E. of No. 2, sunk at an angle of 68° was 2,563′ deep at the end of 1918. Beneath 60′ of sand, the rock was found to be badly fractured and barren down to the 2nd level, only becoming solid and payable below the 14th level.

No. 4 shaft, the northernmost, 3,007′ deep at the end of 1918, is the best shaft of the mine.

During 1918, 7,405′ of openings were made and 313′ of shaft sinking was done. Tons of rock hoisted were 252,545, of which 51,112 tons were waste.

Equipment: the mine buildings near shafts Nos. 2 and 3, include machine and carpenter shops, smithy and warehouse. There is a 35-drill air-compressor at No. 2 shaft, with a condensing plant in a separate building. The power plant at No. 3 shaft includes a battery of water-tube boilers and a 4,500′ air-compressor. The mine has electric pumps and works about 60 drills. The property is served by the main line of the Copper Range railway, which reaches all the shafts and principal shops. Mine has underground electric haulage, on several of the levels.

The mine property has macadamized roads, a large boarding house, upwards of 100 dwellings, general store, hospital and a nurses' home.

Mill: the mill, at Beacon Hill, 2 miles west of Redridge, having been destroyed by fire, the mine output is treated in the Baltic mill.

The mill boiler house has six 250-h. p. and two 200-h. p. boilers, the later maintaining a steam pressure of 180 to 200 lb. per sq. inch.

The pump house at the mill has a 20,000,000-gal. pump, taking water from a well connected with a tunnel running 1,960′ to an intake crib in Lake Superior.

Production was begun January 4, 1902, with a leased head at the Arcadian mill, and with a return of 37 lbs. fine copper per ton, but fell off later to 27 lb., and still later production fell sharply to 18 lb. fine copper per ton.

Production:

	Ore Stamped, Tons	Copper Produced, Lb.	Yield per Ton, Lb.	Cost, c. per Lb.	Price, c. Rec.	Net Profits
1919.....	.....	5,274,387	.....	.....	.....	.....
1918.....	.....	5,543,586	.....	.....	.....	.....
1917.....	264,655	6,278,097	23.72	15.22	28.73	$848,241
1916.....	349,504	8,720,558	24.94	11.01	25.28	1,236,048
1915.....	349,684	8,302,896	23.75	09.53	17.40	654,746
1914.....	277,251	5,048,306	18.21	12.21	13.38	58,639
1913.....	229,149	4,990,938	21.78	12.62	14.89	113,363
1912.....	366,663	6,980,713	19.04	11.73	16.16	308,472
1911.....	347,885	6,120,417	17.59	11.55	12.54	60,370
1910.....	317,299	5,694,868	17.95	12.17	12.74	32,250
1909.....	323,408	5,282,404	16.33	13.89	13.00	(d) 47,841
1908.....	334,929	6,034,908	18.00	12.69	13.39	41,842
	3,160,427	74,272,078	20.08	12.10	17.31	$3,306,134

(d) Deficit.

Champion Copper Co.

Owned jointly by St. Mary's Mineral Land Co. and Copper Range company, is described under its own title.

Atlantic Mining Co.

Office: 82 Devonshire St., Boston, Mass. **Mine office:** Painesdale, Houghton county, Mich.

Officers: Wm. A. Paine, pres.; F. W. Paine, sec.-treas., with John R. Stanton, Frank P. Son, F. W. Denton and J. H. Blodget, directors.

Inc. Dec., 1872, in Michigan; reincorporated, 1901, for 30 years. **Cap.**, increased, 1902, to $2,500,000, shares $25 par; fully issued; paid in, $11.80. Last assessment was $2, October 11, 1909, the first in 30 years. Has paid dividends of $990,000, last in 1905. Owns $40,000 stock in Michigan Smelting Co. Boston Safe Deposit & Trust Co., registrar; American Loan & Trust Co., Boston, transfer agent. Annual meeting, second Tuesday in March. The Atlantic Co. is controlled by Copper Range Consolidated Co., through ownership of 96,920 shares of the capital stock. Balance sheet of December 31, 1918, shows a surplus of $337,577, compared with $286,887 in 1917.

Property: 8,217 acres, including 1,351 acres of mineral lands, 4,760 acres of timber lands, and 2,106 acres miscellaneous lands, latter including the mill site, and a valuable frontage on Portage Lake. Mineral lands are S. ½ of Sec. 4, except S. E. ¼ of S. E. ¼; N. ½ of Sec. 9; N. W. ¼ of Sec. 10 and Sec. 16, all in T. 54 N. R. 34 W. Principal holdings are the old Atlantic mine, 640 acres, including the mines known before 1872 as the South Pewabic and Adams, located about 2 miles south of Portage Lake and 4 miles southwest of Houghton, and the Sec. 16 tract of 640 acres. The mines, idle since 1911, are fully described, Vol. X of the Copper Handbook.

DOUGLAS COPPER CO. MICHIGAN

Office: 705 Sears Bldg., Boston, Mass. Property north of Allouez and west of Ahmeek holdings in Allouez township, Keweenaw county, Mich.

Officers: Charles J. Paine, pres.; George P. Gardner, v. p.; with R. S. Sheldon, C. C. Douglass, W. A. S. Chrimes and A. S. Knight, directors. J. F. Dolloff, sec.-treas.

Inc. 1912, in Michigan. **Cap.**, $2,500,000; shares $25 par; assessable; 50,000 shares given for land, making $10 paid in value.

Property: 440 acres in a compact tract, being E. ½ of Sec. 30 and W. ½ of Sec. 29, embracing eleven 40-acre tracts formerly owned by the Sheldon Douglas and the Northey estates, and the St. Mary's Mineral Land Co. This tract covers the underlay, or deep extension of the Kearsarge lode into which the rich ore-shoot now worked in the Ahmeek, pitches. To open this ground a 3,300′ vertical shaft must be sunk.

Management planned selling treasury stock to raise necessary funds for development work.

EVERGREEN BLUFF MINING CO. **MICHIGAN**

Dissolved. Property owned by Mass Consolidated Copper Co.

FEDERAL SYNDICATE COPPER CO. **MICHIGAN**

Office: Hosking Blk., Calumet, Mich.

Officers: A. C. Stielow, pres.; H. E. Murray, v. p.; Harry Olson, 2nd v.p.; Dr. P. D. MacNaughton, sec.-treas.; John D. Kerr, asst. sec., with P. L. de Voist and John R. Ryan, directors; Mortimer North, engr.

Inc. Oct. 12, 1916, in South Dakota. **Cap.**, $1,000,000; shares $1 par; 152,272 issued on organization. The initial offering of stock May, 1917, was at 50c., changed June, 1917, to $1 a share.

Property: approximately 360 acres in T. 57 and 58, N. R. 31 W., being the Salem tract, formerly owned by the Federal Copper Co., south of the Phoenix shaft of the Keweenaw Copper Co. Lands cover a 1½ mile stretch across the strike of the copper lode and near the Phoenix, St. Clair and Eagle River properties of the Keweenaw Copper Co., with Ojibway lands on west and east. Lands are crossed by Kearsarge amygdaloid which dips 30° N. W., giving 292 acres underlain by this lode, whose copper content in this part of the range is as yet unprospected.

It was reported in 1917, that company, acting under name of Bear Lake Extension, had secured option on 2,000 acres, S. W. of Calumet, in T. 55, 56 R. 34, and in 1918, the Longyear-Michigan options in T. 56 R. 34 aggregating 1,240 acres, were said to have been absorbed by Federal. The Bear Lake Pool options on 1,360 acres in T. 56 R. 34, were later reported acquired by the Federal.

Equipment: includes compressor with 2 drills, and 1,000′ hoist. During 1917-1918, six diamond-drill holes were opened and four said to show commercial ore. Shaft down about 40′.

FRANKLIN MINING CO. **MICHIGAN**

Office: 60 Congress St., Boston, Mass. **Mine office:** Demmon, Houghton county, Mich. **Mill office:** Point Mills, Houghton county, Mich.

Officers: R. M. Edwards, pres.-gen. mgr.; Henry D. Forbes, v. p.; Henry Tolman, treas., with C. F. Moore, C. A. Hight, Sidney J. Jennings and Harry M. Howard, directors. Albert L. Wyman, sec. Enoch Henderson, supt.

Inc. April 3, 1857, in Michigan; re-incorporated in 1887 for 30 years, and incorporation renewed in 1917. **Cap.**, $500,000; increased, 1899, to $2,500,000, and again increased, Nov., 1908, to $5,000,000; shares $25 par; issued, 166,519; paid in $17.20. Last assessment of $1 per share levied on June 3, 1919. Assessment total $1,919,519.

Unissued stock has been set aside for the purpose of acquiring the total capital or 100,000 shares of the Rhode Island Copper Co. Has paid dividends of $1,240,000. Federal Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Annual meeting, third Wednesday in April. Listed on Boston Stock Exchange.

Company is controlled by U. S. Smelting Co., through a majority of directors.

Balance sheet of December 31, 1918, showed a deficit of $109,123, as compared with surplus of $286,198 in 1917. The revenue in 1918 totaled $697,672 and in 1917 revenue was $1,048,303. Cash on hand early in 1920 was about $178,000.

Property: 3,280 acres of mineral property, and a 217-acre mill-site, with 1 mile of frontage on Portage lake. The old Franklin mine (described Vol. VIII), 160 acres, was sold, July, 1908, to the Quincy Mining Co., for $170,000, and Sec. 6, T. 55 N., R. 33 W., 640 acres, lying directly north of the Franklin

Junior and west of the Rhode Island,was bought from St. Mary's Mineral Land Co., 1909, for 33,333 shares.

Property carries 2 miles of the strike of the Pewabic amygdaloid and other cupriferous beds of the Keweenawan series. In addition to the main tract, there are 3 other tracts of mineral lands, of 160, 480 and 640 acres. The company also controls, and is absorbing, the Rhode Island Copper Co., which has 800 acres immediately north of the Franklin Junior mine.

Development: early work was on the Franklin Junior property, where two parallel lodes, the Allouez conglomerate and the Pewabic amygdaloid, 500′ apart, have been worked. The amygdaloid worked prior to 1902, gave but 9.65 lb. copper per ton, and was abandoned in favor of the conglomerate until the latter, decreasing in width and value on the 2,000′ to 2,400′ levels, was abandoned and work resumed on the Pewabic in the Franklin, Jr., shaft (No. 1), sunk about 20′ in the footwall. The copper content being extremely low, mining was stopped, and only exploratory work done. In 1913, a crosscut was started eastward from the shaft at 3,200′ level to explore the entire eastern part of the company's holdings. At 550′ from the amygdaloid this crosscut entered entered payable ore in the Allouez conglomerate and drifts were started to prove the extent and copper content of the orebody. Work continued until August, 1914, and was resumed in July, 1915, the orebody being developed for 1,100′ on the 32nd level. It is opened for stoping on each level from the 27th down to the 36th, an average of 900′ on each level, or about 9,000′ of drifting, with a continuous raise, used as an ore-chute from the 2,700′ to the 3,700′ level, where ore is gathered by electric motor trains and carried to the shaft. Besides this main raise there is another for men and supplies, the new raises in 1918, aggregating 121′. The shaft is down to the 39th level, and shows considerable improvement below a depth of 2,000′. Shaft is equipped with a steel circular ore-house (Edwards design), formerly used at No. 2 conglomerate shaft. On the 28th level a crosscut driven in 1915 connects the lode with the shaft, and a similar crosscut has been driven on the 37th level. The conglomerate shaft, bottomed at 2,400′ on the incline, has not been connected.

An extension of No. 27 and 22 levels S. from No. 1 shaft to a point under No. 2 shaft was completed in 1916. The conglomerate was much richer and wider than the average. The ground above this up to No. 17 level was untouched. No. 2 shaft, which had caved, was re-opened and repaired from the 4th level to the bottom of the 17th level, but work here was stopped in 1918 for lack of miners.

Mechanical haulage installed on No. 29, 30 and 31 levels greatly reduced costs.

A long crosscut on No. 32 level driven through the Kearsarge lode, stopped on the footwall side of the Wolverine sandstone, 4,542′ from the Pewabic amygdaloid.

This crosscut passed through a thickness of 25′ of Calumet conglomerate at 2,150′, the 10′ Osceola amygdaloid at 2,820′ and the Kearsarge conglomerate, 40′ wide, at 3,380′ from the shaft, but all three lodes were devoid of any copperr. Twenty-two other amygdaloids were also cut, 9 of them copper-bearing, but only 2 rich enough to warrant exploratory drifts and raises; the remaining 13 were barren. Ore of sufficiently good grade to warrant further exploration was found on the footwall side of the Kearsarge amygdaloid.

During 1917, the 30th level was carried forward 540′, to a total of 1,460′ north of No. 1 shaft (on the Pewabic), and the best copper seen in the amygdaloid was opened. This level was driven 115′ farther in 1918, all with same copper content. Management believes this same condition will be found in the extension of north drifts on lower levels.

Production in 1917 came almost entirely from the Allouez Conglomerate and No. 1 shaft; in 1918, 24.6% of the output came from the Pewabic lode and 75.4% from the Allouez lode. Total 1918 development amounted to 21,149′ of work, compared with 1,916′ in 1917.

Ore extraction was stopped May, 1919, company announcing that development work only would be carried on until conditions improved and copper could be sold at a profit.

Equipment: includes a hoist with a 10-ton skip at No. 1 shaft, and has special air-compression cylinders, storing up energy, otherwise wasted, in compressed air, the compressed air being mixed with steam, in the cylinders, as a prime motive force.

The mill is reached by the Mineral Range railroad. Equipment includes 5 Allis-Chalmers 2-way heads, with 20x24" cylinders, each capable of crushing 350 tons of conglomerate or 500 tons of amygdaloid rock daily. Each stamp is fed from a 1,000-ton ore bin, and equipped with hydraulic separators, which remove considerable heavy copper. The washing plant includes 8 classifiers, 20 roughing jigs, 15 finishing jigs, 32 Wilfley and 10 Overstrom tables. The jigs are of the Hodge eccentric type, with centershield copper discharges, obviating skimming.

All stamp mortars are on concrete foundations. In 1918, an experimental regrinding plant, consisting of one 8'x48" Hardinge mill, one 75-h. p. motor and 6 Wilfley tables, were set up.

Power for the mill is furnished by a 16x32" engine, and steam is supplied by two 500 h. p. boilers. The boiler house has a self-supporting, brick-lined smokestack of 7' diameter, 165' high, on a 52' brick foundation. Water is furnished by a 15,000,000-gal. vertical compound pump, having 12x42" high-pressure and 42x42" low-pressure cylinders, with 47" stroke and plungers of 37½" diameter. Water is drawn through a 36" pipe line, running 200' under the rock to a crib protected by quarter-inch screens. The mill has a 5x12" duplex fire pump, with fire hose, and electric light. There is a 267' wharf at the mill site, equipped with coal hoist and sheds, with 18' of clear water alongside. The mill site has about 20 dwellings for employees.

Production: in 1903 the recovery of copper was 15.25 lb. per ton of ore stamped and in 1907 was only 11.48 lbs., falling, 1909, to 9.47 lbs. per ton of ore stamped. The largest production ever secured by the mine was 5,259,140 lb. fine copper in 1902. Recent production has been 4,206,085 lb. in 1905; 4,228,650 in 1906; 4,401,248 lb. in 1907; 3,703,421 lb. in 1908; 1,615,556 lb. in 1909; 966,353 lb. in 1910; 820,203 lb. in 1911; 1,710,651 lb. in 1912; 1,021,440 lb. in 1913; 93,283 lb. in 1914; 3,116,566 lb. in 1916; 3,155,574 lb. in 1917. 1918 production was 296,182 tons hoisted, 22,218 being discarded and balance, 273,964, stamped, yielding 2,827,313 lb. refined copper, equal to 10.3 lb. per ton.

Management excellent and mine on a basis to produce profitably in normal times. 40 men were employed in 1919, mostly sinking the shaft.

GRATIOT MINING CO. **MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **Operating office:** Calumet, Michigan.

Officers: Rodolphe L. Agassiz, v. p.; Geo. P. Flagg, sec.-treas.; Jas. MacNaughton, gen. mgr., and Walter Hunnewell, directors.

Inc. Feb. 16, 1906, in Maine. **Cap.,** $300,000; $3 par, fully paid. Is controlled, through ownership of 50,100 shares, by the Calumet & Hecla Mining Co. In June, 1919, it was reported that the Seneca Copper Corporation had purchased the property, paying $25,000 cash, with additional payments to extend over a number of years.

Property: 600 acres, the N. W. ¼ of Sec. 26, N. E. ¼ of Sec. 27, S. E. ¼ of Sec. 23, and S. E. ¼ of Sec. 22, except the N. W. ¼ of the N. W. ¼, T. 57 N., R. 32 W. Property lies S. and E. of the Seneca and N. and E. of the Mohawk, carrying the Kearsarge amygdaloidal bed under about 175 acres, to a maximum depth of about 2,700'. Extensive drill borings were made before the shafts were started. The Kearsarge bed averages about 12' in width, with strike of N. 42° E., and average dip of 33 to 36° with the horizon, and its copper contents are painfully low.

Development: by two 3-compartment shafts, exact duplicates, sunk at an angle of 36° on the Kearsarge bed. Levels are opened at 100' intervals.

No. 1 shaft, about 1,500' from the Seneca boundary, is 1,900' deep, having a bed up to 18' in maximum width. Drifting has been done on the alternate odd-numbered levels, from the 1st to 9th, inclusive.

No. 2 shaft, 1,475' S. W. of No. 1, and 1,800' N. of Mohawk No. 1, is 1,520'

deep, and drifting has been done on the 2nd, 3rd, 5th and 7th levels, the best showing being on the 5th.

Property is served by a 2¼-mile spur of the Mineral Range Railway, built north from the Mohawk mine.

Production: begun July, 1910, was 28,552 tons of ore yielding 265,869 lb. fine copper, and in 1911, was 1,347 tons ore, yielding 14,275 lb. fine copper, or about 9.3 lb. copper per ton ore milled. The mine was shut down on April 3, 1911. It is obvious that, owing to its comparatively small size and shallow depth, the Gratiot cannot work the Kearsarge bed profitably at the average price of copper, except on a very large scale, and can be operated much more advantageously in connection with the Seneca than alone.

GLOBE MINING CO. MICHIGAN

Office: 15 William St., New York.

Officers: L. P. Yandall, pres., with R. D. Rickard, J. R. Stanton, Gerrit Smith of New York and W. H. Leggett, of Detroit, directors. F. G. Heuman, sec.-treas.

Inc. May, 1911, in Michigan. **Cap.,** $78,250; $25 par; fully paid and issued.

Property: 3,200 acres, Secs. 1, 2, 3, 4 and 5, T. 53 N., R. 35 W., extending entirely across the Keweenawan trap formation, from the eastern to the western sandstone, lies next south of the Champion, and immediately north of the Challenge, carrying about 6,000′ of the strike of the Baltic and all parallel beds. Mine was developed by the Copper Range Consolidated Co., under option, but option was relinquished, February 1, 1909, after expenditure of upwards of $500,000.

Development: diamond-drill borings, to locate the Baltic bed, gave some cores with excellent values, but disclosed a heavy overburden of sand and boulders, rendering it necessary to reach the solid rock by a vertical shaft. Work was begun early 1905, but the first shaft was abandoned, owing to quicksand, and was replaced by a new vertical shaft, about 700′ south of the Champion boundary. The shaft is telescopic, inside measurements of timbers at the collar being 13′ 3″x23′ 3″, with a second section below of 9x19′ 6″, and a third section of smaller size.

The shaft is 1,040′ deep, with first level 356′ below surface, and plats were cut thereafter at 100 intervals. The Baltic amygdaloidal bed was tested by some diamond-drill boring, and about 900′ of drifting on the seventh level, which is about 1,000′ from surface, and showed a little copper, in patches, but on the whole was unpayable. Work was suspended January 31, 1909, and property has been idle since. Notwithstanding the unfavorable results secured by the work done so far, the property is by no means devoid of promise.

HANCOCK CONSOLIDATED MINING CO. MICHIGAN

Hancock, Mich.

Officers: John D. Cuddihy, pres.; Capt. Thos. Hoatson, v. p.; John H. Hicok, sec.-treas., with Allen F. Rees, W. R. Thompson, and Capt. Jas. Hoatson, directors; Clyde E. Weed, gen. mgr.; Richard Coombs, mg. capt.; Daniel Fisher, clerk; C. W. McDougall, engr.; Fred G. Schubert, master mechanic.

Inc. June 11, 1906, in Michigan. **Cap.,** $5,000,000; shares $25 par; issued, $2,500,000; fully pair with $3 assessment levied March, 1915, payable $1 each, in May and Sept., 1915, and Jan., 1916. Old Colony Trust Co., Boston, Mass., registrar; State Street Trust Co., Boston, transfer agent. Stock listed on Boston Exchange. Annual meeting, third Wednesday in June.

Company began business with $1,000,000 and paid $552,623 for its property.

Operations for years ended Dec. 31:

	Copper Sold	Ass'mt., Interest	Mining Exp. (a)	Int. and Taxes	Lake M., S., & Ref. Co., St'k	Net Profit
1918.....	$917,092	.....	$776,819	$59,044	$33,678	$47,551
1917.....	1,142,454	.....	1,056,541	54,421	.....	31,492
1916.....	755,946	$119,256	705,778	53,268	12,467	103,688

(a) Includes smelting, freight, marketing, etc.

Property: consists 725 acres of mineral territory, immediately west and south of the old Quincy mine, in T. 55 N., R. 34 W., including the original Hancock mine, 136 acres, set aside, 1859, by the Quincy Mining Co., which reserved the mineral rights to the Pewabic bed. The Pewabic bed, on lands other than the original Hancock tract of 136 acres, is owned by the Hancock Consolidated. Lands carry the Pewabic, Quincy, West and Hancock of Sumner copper-bearing beds.

Perhaps the best part of the Quincy mine is tributary to No. 7 shaft, which is immediately north of the Hancock boundary.

In June, 1916, approximately 75 acres were sold to the Quincy Mining Co. for $226,000. In part payment thereof the Hancock was granted the right to use Quincy No. 7 shaft and one stamp of the Quincy mill. Operations were carried on under this agreement during 1916, 1917, and part of 1918, but the tonnage hoisted from the shaft did not warrant the expense of its upkeep. In June, 1919, company sold 125 acres, which includes the shaft, to the Quincy Mining Co., for $235,000.

The old Hancock mine, opened 1859, was closed June 1, 1885, on account of the low price of the metal, after producing 5,709,384 lb. fine copper. The Hancock or Sumner amygdaloidal bed averaged about 12′ in width below the fifth level, to a depth of 1,052′, where the mine was bottomed.

The property carries the upper half of the Michigan series of cupriferous traps and conglomerates, and has 4 known copper-bearing beds, the Pewabic being the most important. The property also carries the underlay, but not the outcrop, of the 3 copper-bearing beds of the Quincy, these being the Quincy to the eastward, apparently of little value, followed by the Pewabic, which is the main bed of the Quincy and the so-called West lode of the Quincy. The known copper-bearing beds outcropping on the Hancock property are the Hancock or Sumner, mined in the old Hancock mine, and now known as No. 1 lode, lying about 1,100′ west of the Pewabic; the old West bed, now known as No. 2 lode, lying about 300′ west of No. 1, and the New West bed, now known as No. 3 lode, lying about 75′ west of No. 2. Company also owns lots 6 and 7, Sec. 28, for a mill site.

Development: No. 1 shaft is the old main 3-compartment shaft of the Hancock mine. It has a remodeled wooden shaft rock house, with a hoist good for 2,000′ depth.

The new and main 5-compartment working shaft known as No. 2 is 2,200′ N. W. of No. 1. It is vertical, with dimensions 9′6″x29′6″, being the second largest in the Lake Superior district, and is 4,360′ deep. This shaft intersects No. 3 bed at a depth of 2,038′, the bed here showing a pitch of 37°, compared with 47° in the upper workings, this flattening of 10°, at depth, corresponding to a similar flattening shown to the northeast in the No. 7 shaft of the Quincy. The No. 4 lode is intersected by the shaft at a depth of 3,105′; it is 17′ thick and carries payable ore. In 1917, 74%, and in 1918, 62% of the ore from this shaft came from this vein.

Ground below the 53rd level, 4,000′ below the surface, is reached by 2 subsidiary shafts sunk from the 49th level, connecting with the No. 2 shaft through chutes on the 53rd level and through drift connections on the 49th level.

In 1917, diamond-drilling disclosed some lodes to the south of the big fault which crosses the property and crosscuts were driven to these lodes on the 53rd and 49th levels. The 53rd level crosscut was advanced 611′ east in 1918, cutting 2 mineralized veins, the first one narrow, the second, called No. 3 east vein, showed good mineralization. The 49th level crosscut was advanced 428′ cutting 2 veins, called No. 1 and No. 2 east; both showed fair mineralization.

Considerable drifting has been done on both No. 2 and No. 3 beds, No. 3 being opened by a winze from the 10th to 18th levels, with drifts on the 9th to 18th levels, inclusive, several of which are more than 1,000′ long. No. 2 shaft has loading stations on the 13th, 18th, 23rd, 27th, 34th, 39th, 44th, 49th and 53rd levels, to which rock broken will be sent by chutes from the levels above.

No. 2 shaft has an ore-house that is the most modern in the Lake Superior district. The building has a total height of 128′, with working floor 60′ above the ground. The bins are of 1,000 tons capacity each.

Work in 1917 showed mineralization of average grade. Work stopped on No. 2 west vein due to narrowness and a poor hanging wall. Stoping on No. 4 vein was carried from 53rd to 38th levels. Development work in No. 2 shaft totaled 7,472′ in 1917, and 4,971′ in 1918. In No. 7 shaft work amounted to 2,489′ in 1917 and 611′ up to May, 1918, when shaft was closed.

Equipment: includes two 50-ton crushers and a smaller one for waste rock. The 2 large crushers are fed by 2 steel traveling-belt picking tables. Each machine has a 50-h. p. induction motor and each picking table has a 10-h. p. induction motor. Two men per shift are expected to do all work on the crushing floor.

The main engine-house at No. 2 shaft is equipped with 2 hoists, main engine being a Sullivan-Corliss direct-connected hoist, operating 2 skips in counterbalance, with capacity to hoist 8 tons of rock from a depth of 4,000′, at a steam pressure of 150 lbs.; There also is a Sullivan first-motion hoist.

The steel compressor house has an electric traveling crane, 13-drill and 16-drill air compressors and a new 35-drill tandem-compound air compressor. The boiler-house has 2 batteries of 4 return tubular boilers, each 72″ in diameter and 18′ long.

Buildings at No. 2 include a machine-shop, smithy, office, changing house and a number of dwellings. The main plant at No. 2 shaft is reached by a spur of the Mineral Range railway. Company employs about 200 men when running full time.

Electric haulage was installed in lower levels of No. 2 shaft, 1917.

Production:

	Ore Milled, Tons	Copper Produced, Lb.	Yield per Ton, lb.	Estimate cost per lb.	Received per lb.
1918....	227,049	3,041,514	13.40	25c	24.299c
1917....	302,725	4,005,882	13.223	26	28.229
1916....	203,112	2,824,934	13.9	20	28.093

The mine has been developed very extensively and given a thoroughly modern and complete equipment. The ground opened, while by no means as rich as some in the Lake Superior district, is of fair average value and with exceptionally good equipment and an able and experienced management, the Hancock promises to make a successful low-grade mine.

Mine suspended operations in Feb., 1919, but pumps were kept in commission so that work could be resumed in 30 days. By December there were 10 drills at work, and efforts were directed towards a daily output of 500 tons.

HOUGHTON COPPER CO. MICHIGAN

Office: 199 Washington St., Boston, Mass. **Mine office:** Houghton, Houghton county, Mich.

Officers: Chas. J. Paine, pres.; Geo. P. Gardner, v. p.; with W. Cameron Forbes, Jas. P. Edwards and Fredric W. Nichols, directors; J. F. Dolloff, sec-treas.

Inc. Jan., 1910, in Michigan. **Cap.,** $2,500,000; shares, $25 par; assessable; 67,000 issued; $8 paid. Is controlled by St. Mary's Mineral Land Co., through ownership of 37,222 shares of the 67,000 shares outstanding. Old Colony Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Listed on Boston Curb.

Annual report for year ending Dec. 31, 1918, shows balance of assets on hand at first of year, $3,894; receipts for year, $221, of which $5 was from assessments. Expenditures totaled $19,167, of which $14,080 was for drifting and exploring. Balance of liabilities, $15,050. This compares with receipts, $52,250; expenditures, $72,774, and balance of assets, $3,894, in 1917.

Property: 23 acres of surface rights, with mineral rights to 160 acres owned in fee, being the N. W. ¼ of Sec. 14, T. 54 N., R. 34 W., lying E. of the Isle Royale mine and adjoining the Superior mine. Diamond drilling was begun March, 1910, in the horizon of the Baltic-Superior bed, showing 2 cupriferous amygdaloidal beds, the Superior and East lodes, 17′ and 20′ wide respectively, with dip of 51°, separated by about 83′ of trap and conglomerate, the

lower bed overlying another conglomerate at a distance of about 150′, these strata corresponding exactly with the Baltic formation. Maximum operating depth is figured at 2,800′.

Development: by 620′ shaft, sunk about 60′ in the footwall, and a winze sunk 513′ below the 620′ level, disclosing rich copper rock in the Superior lode. The shaft has been lined with a concrete collar for depth of 300′. Winze cuts both the Superior vein at 1,133′; it is 40′ wide and shows good rock on both foot and hanging wall with about 10′ of poor rock between.

During 1917 a drift was extended 350′ into the property from the 19th level of the Superior mine. In 1918, 908′ of drifting and crosscutting was accomplished on the 19th level, encountering copper in both the Superior and West lodes, thus opening ground 700′ below the lowest previous development.

Equipment: includes a small power plant, and a 16-drill electric air-compressor. There are necessary buildings, including an office, change-house and warehouse, all of wood.

Due to the war the mine was closed down from September, 1914, to July, 1915. Operations were again suspended in September, 1917, but exploratory work continued to August, 1918.

Production:

	Tons Ore milled	Lb. Min. prod.	Lb. Min. p. t.	Lbs. Ref. Copper	Lbs. Cu. p. t. Rock
1917	15,628	291,500	18.6	179,012	11.45
1916	19,444	365,880	18.8	204,274	10.55
1915	14,656	258,900	19.5	156,766	10.69

Sale price for 1915 was 22.2c per lb.; for 1916, 29.21c; 1917, 28.14c.

The property, though small for the Lake Superior district, is considered promising and management good. Before sinking the shaft to the 18th level, management is awaiting developments in the adjacent Superior mine (31st level).

HULBERT MINING CO. **MICHIGAN**

Address: Albert S. Bigelow, pres., 199 Washington St., Boston, Mass. W. A. S. Chrimes, sec.-treas.; Fred W. Nichols, agt., Houghton, Mich.

Inc. about 1865, in Michigan. **Cap.,** $1,000,000; shares $25 par; all issued.

Property: 1,640 acres of mineral land, in Houghton and Keweenaw counties, Mich., undeveloped; part of the surface rights have been sold, but mineral rights reserved. No mining done since organization.

HUMBOLDT COPPER CO. **MICHIGAN**

Address: Copper Falls, Keweenaw county, Mich. Thos. Hoatson, pres.; C. A. Wright, sec., Calumet, Mich.

Inc. 1863, in Michigan. **Cap.,** $1,000,000; shares $25 par. Amount paid in, $252,814. Annual report of December 31, 1918 shows $165 cash on hand. Is controlled through ownership of 5/6 of the outstanding stock by the Keweenaw Copper Co. Annual meeting, fourth Tuesday in March. Listed on Boston Stock Exchange.

Property: Secs. 16 and 21, the former fractional, T. 58 N., R. 31 W., all on the mineral belt, about midway between the Arnold and Phoenix mines, lying north of the greenstone, with the Eagle River and Natick mines to the south. The mine, opened 1853, though never a producer, has a single shaft about 300′ deep, sunk on the ashbed, which shows the same characteristics as at the Arnold, carrying occasional bunches of rich ground.

In May, 1914, diamond-drill holes numbered 12, 13, and 15 were bored through a portion of the hanging wall and across the lode. Holes 12 and 13 intersected the copper bearing part of the lode at 489 feet and 364 feet, respectively, from the surface. No. 15 cut this same formation at 713′ from surface, and disclosed vein matter of good width with good values in both the upper and lower portions of the amygdaloidal flow in each of the holes.

Equipment: includes an engine house, compressor building, smithy, warehouse and 4 dwellings. Idle since 1915.

HUSSEY-HOWE MINING CO. **MICHIGAN**

Address: care C. A. Senecal, Lake Linden, Mich.

Officers: Wm. H. Rea, pres., with Geo. W. Howe, C. G. Hussey, F. B. Nimick and G. H. Childs, all of Pittsburgh, directors.

Inc. 1911, in Michigan. **Cap.,** 100,000 shares; $25 par; 54,000 shares issued, fully paid; 45,000 going to owners for property; 9,000 sold for development.

Property: 320 acres, bounded by Indiana and Bohemia ground, includes N. E. ¼ Sec. 22 and N. W. ¼ Sec. 23, T. 51, R. 37 W., in Ontonagon county. Property shows outcrop of the Eastern sandstone and 100′ west of it, an amygdaloid vein supposedly the Baltic lode of 2 veins. It shows copper carbonates and oxides over a width of over 100′ resembling the Baltic outcrop of Champion, 25 miles N. E. As the dip is 60 to 65°, the property contains a valuable area for workings.

Management planned to commence operations in the fall of 1919.

INDIANA MINING CO. **MICHIGAN**

Office: 60 Congress St., Boston, Mass. **Mine office:** Dee Bldg., Houghton, Mich.

Officers: R. M. Edwards, pres. and gen. mgr.; Sidney J. Jennings, v. p.; Henry Tolman, treas., with C. F. Moore and C. A. Hight, directors; Albert L. Wyman, sec.; Thomas Bennett, supt.

Inc. Aug. 11, 1909, in Michigan. **Cap.,** $2,500,000; $25 par; issued 80,000 shares; paid in $12.50. Last assessment March 1, 1917. Listed on Boston Stock Exchange. State Street Trust Co., Boston, transfer office; Federal Trust Co., Boston, registrar. Annual meeting, third Thursday in April. Company gave 60,000 shares to owners of land for property and offered 36,000 shares, August, 1909, for public subscription.

Receipts, 1918, were $2,779, from sale of equipment and interest; expenditures were $19,400; deficit, $12,209. Receipts, 1917, were $80,263, of which $80,000 was from assessment No. 4. Expenditures, including 1916 deficit of $30,237, totaled $75,852, leaving balance of $4,411.

Property: 1,200 acres bought 1909 from the Indiana Copper Co., the tract lying N. E. of the Lake and N. of the North Lake, in Secs. 21, 27 and 28, T. 50 N., R. 37 W. The property was worked on a small scale previous to the burning of the mill, 1864, but the old openings are inaccessible and no work has been done thereon by the present company. The lands are heavily timbered and can supply all mining timber for a considerable time. Ample water is available from the Fire Steel river. Transportation is furnished by a spur of the Copper Range railway, and the Mineral Range line is within a short distance.

Geology: the lands are traversed by the Evergreen belt of copper-bearing amygdaloidal beds and by a number of unidentified cupriferous beds lying between the Evergreen belt and the eastern sandstone. The southeastern part of the tract is in the hypothetical horizon of the Lake amygdaloidal bed. The Indiana is covered with a heavy overburden of sand, hampering drilling operations. The ground has been tested by extensive diamond-drill borings.

No. 2 drill hole disclosed phenomenally rich copper rock from a bed immediately under a 400′ conglomerate. The nature of this ore is a subject of dispute, it having been called sandstone, conglomerate and felsite, but there is little question that it is an altered felsite; the rock consists essentially of quartz and light-colored mica, with secondary infiltrations of calcite and small irregular grains of disseminated native copper. The even size of the quartz grains, with their interlocking texture, indicates an igneous origin. There are indications that the 40′ of rich felsite rock and a second zone of about 25′ width, are parts of a single bed of approximately 265′ width, the second zone of 25′ being near the center of the wide bed. No. 5 hole and No. 9 hole both cut felsite carrying heavy copper, apparently a continuation of the same orebody.

Development: ground was broken Jan., 1911, near No. 2, the discovery hole, for a vertical shaft, the overburden at this point being about 110′. The shaft is cylindrical, of 17′ outside diameter, lined with steel and concrete, with inner dimensions of 8x12′, and is 1,415′ deep. Development in 1916 on the 1,400′

level and on 1,150′ level could not locate No. 2 hole, but found No. 9, 100′ from its theoretical position. The conclusion was that the deposit cut by No. 2 hole was not of great size or had no regular trend.

In 1916, No. 2 shaft, an incline, was started in the S. W. quarter of Sec. 21 to cut one of the South Lake amygdaloid lodes. In 1917, this shaft was down 310′, and 1,496′ of exploratory work had been done on the 300′ level. This work was believed to be in the horizon of the main system of Ontonagon county lodes, but as no conglomerate was encountered the position of the crosscut had not been established. Some copper was found, worthy of exploration, but not of commercial value when opened. Due to rising costs, work was suspended in 1917.

ISLAND COPPER CO. **MICHIGAN**

Office: 120 Broadway, New York, N. Y. **Mine office:** Houghton, Mich.

Officers: Thos. F. Coyle, pres.; Henry P. Paull, v. p.; Frederick W. Nichols, sec.; F. R. Kennedy, treas., with Joseph B. Cotton, George G. Barnum, Geo. A. Tomlinson and Julius H. Barnes, directors.

Inc. March 8, 1909, in Michigan. **Cap.,** $1,000,000; $25 par; $7 paid in; issued 26,750 shares. Last assessment of $1 per share called August 1, 1918. Annual meeting, first Tuesday in June.

Balance sheet of January 1, 1919, showed assets totaling $195,124; including property, $146,783; cash, $479; accounts receivable, $12,085; investment and miscellaneous, $35,777. Liabilities included $7,874 bills payable.

Property: on Isle Royale, over 94,100 acres out of the 125,000 acres comprising the island, includes the former holdings of the Isle Royale Land Corporation, Ltd., and the Island Mining Co. Average cost of this property to the company was $1.56 per acre. Present company has never done any exploratory work for mineral. Property fully described in Vol. XI, Copper Handbook.

ISLE ROYALE COPPER CO. **MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **Mine office:** Houghton, Michigan.

Officers: E. V. R. Thayer, pres.; Rodolphe L. Agassiz, v. p.; E. B. Dane, Chas. O. Whitten, F. L. Whitcomb, E. C. Lewis, G. R. Whitten and G. H. Russell, directors; James MacNaughton, gen. mgr.; Clarence H. Bissell, sec.-treas.; G. L. Osgood, asst. sec.-treas.; Jas. E. Richards, mine supt.; A. G. Andrews, Jr., mill supt.; Harry E. Lukey, clerk; Edward Colenso, chief mg. capt.

Inc. March, 1899, in New Jersey, as a merger of the Isle Royale Cons. Mining Co. and Miners' Copper Co. **Cap.,** $3,750,000; shares $25 par. Is controlled through ownership of 33,187 shares of outstanding stock, by the Calumet & Hecla. Old Colony Trust Co., Boston, transfer agent; State Street Trust Co., Boston, registrar. Listed on Boston Stock Exchange. Company owns 18,836 shares of the Lake Superior Smelting Co. Annual meeting, first Wednesday in April, at 243 Washington St., Jersey City, N. J.

Balance Sheet, years ended Dec. 31:

Assets—

	Property	Const. & Equip.	Invest.	Cash	Other Cur. Ass.	Total
1918.....	$2,559,687	$3,982,311	$362,402	$180,326	$1,714,716	$7,265,514
1917.....	4,750,000	713,941	$1,306,689	270,760	2,377,906	8,419,296
1916.....	2,288,927	2,330,889	192,144	150,043	1,551,796	6,513,799

Liabilities—

	Stock	Current	Depr. & Depl. Reserve	Mine Land Surp.	P. & L.	Total
1918.....	$3,750,000	$760,710	.....	$270,760	$2,484,044	$7,265,514
1917.....	3,750,000	713,941	$1,306,689	270,760	2,377,906	8,419,296
1916.....	3,750,000	778,286	856,829	.....	1,128,683	6,513,799

Dividends: $1 per share was paid March 31, 1913; $5 in 1916; $4 in 1917; $2.50 in 1918, and $1 in 1919, a total of $13.50 a share or $2,025,000.

Property: 3,520 acres and an 80-acre millsite. Mineral lands include the old Isle Royale, Grand Portage and Huron mines, the Dodge and Frue prospects, the mineral rights in the Montezuma tract of about 200 acres purchased,

1913, for $100,000, and sundry undeveloped tracts. The Hussey-Howe tract of 280 acres, lying N. E. of the Superior, supposed to carry the extension of the Baltic bed, was bought, 1907, for $220,000. Lands include all of Secs. 1, 2 and 11, and parts of Secs. 3, 9, 10 and 15,, T. 54 N., R. 34 W.; also 160 acres in Sec. 6, T. 54 N., R. 33 W., 40 acres in Sec. 31, T. 55 N., R. 33 W., and 160 acres in Sec. 36, T. 55 N., R. 34 W., giving a compact tract carrying about 2½ miles of the strike of the system of copper-bearing bed.

Geology: the Isle Royale has 3 parallel amygdaloidal beds, with strike of N. 32° E. and average dip of 56°, of which 2, the Isle Royale and Portage beds, have been extensively opened, the latter lying approximately 200′ W. of the former. The shafts are on the Isle Royale, but the Portage bed is opened on many levels by crosscuts. East of the amygdaloids is the "Mabbs vein," lying near the Eastern sandstone, 4 to 7′ wide and rich in mass and barrel copper, but deficient in stamp rock. It was opened to a depth of about 250′ by John and Austin Mabbs, about 1875, and has been tested to some extent by the present owner. There also are unidentified and unexplored copper-bearing amygdaloids lying W. of the Portage bed and occasional narrow fissure veins carrying arsenical copper ores.

The 3 old mines included in the present Isle Royale tract produced 48,452,590 lb. fine copper, under primitive conditions, at a net aggregate loss of about $2,500,000. The old Isle Royale and Grand Portage mines were opened in 1853 and the Huron in 1855. The history of these 3 mines is given in detail in Vol. II.

Development: considerable diamond-drilling has been done. Underground openings were 19,106′ in 1912; 13,626′ in 1913; 9,694′ in 1914; 14,446′ in 1915; 17,455′ in 1916; 19,271′ in 1917 and 12,409′ in 1918.

No. 1 shaft, near the northern boundary, was completely gutted by fire, December, 1903, and was abandoned. About 2 miles of drifts had been opened on this shaft. In May, 1914, work was started to retimber the shaft, preparatory to sinking and exploring the Portage lode. In February, 1916, the work had been finished down to the 16th level and hoisting was being done from the upper levels. No sinking was done in 1917 or 1918, the company confining itself principally to locating water pockets and draining the mine. The drifts indicated that about 45% of the ground would be available for stoping.

No. 2 shaft, with 3 compartments, 2,280′ S. W. of No. 1, is 3,650′ deep, or 62′ below the 33rd level. Drifting in 1917-1918 was in the West lode, and showed that 55-60% of the ground may be available for stoping.

No. 2 shaft has a combination shaft ore-house, with Portage Lake crushers. The engine-house is equipped with a hoist capable of raising 6-ton skips from a depth of 6,000′.

No. 3 is merely a site for a shaft, to reopen the old Huron mine.

The new shafts, No. 4, 5, 6 and 7, are all on the Isle Royale bed, at the southern end of the property, and have several miles of workings showing considerable heavy copper. These shafts are unconnected with the former workings, in shafts No. 1 and 2, at the northern end of the property. No. 4, 5 and 6 are connected by drifts on the upper levels.

No. 4 shaft, about 3,100′ S. of No. 2, is 70′ below the 19th level, or 2,512′ deep, developing stamp rock of average grade. Equipment includes a duplex-cylinder hoist, good for 1 mile depth, a 35-drill air-compressor, both taken from No. 1 shaft, and a cylindrical steel shaft rock house having cylindrical ore bins 42′ in diameter and 32′ high. In 1917, electric pumps were mounted in levels No. 1 and 8, and in 1918, storage-battery locomotives were installed on No. 11, 12, 13 and 14 levels.

All north drifts from the 1st to the 11th level, inclusive, connect with the Huron workings. The Huron mine has been completely drained.

No. 5 shaft, about 5,100′ S. of No. 2, in Sec. 2, was started 1906, and was 84′ below the 16th level, or 2,118′ deep, 1919. The shaft is sunk in the footwall, and is equipped with a hoist, good for a depth of 3,000′. Hoisting in balance commenced, 1917. Electric pumps went into service in the 1st and 6th levels, and storage-battery locomotives were installed on levels No. 10, 11, 12 and 13.

No. 6 shaft, about 7,300′ S. W. of No. 2, near the center of Sec. 11, has

3 compartments and was bottomed in the vein, 38′ below the 19th level, or 2,304′ deep, December, 1918. The levels are opened at 100′ and 120′ intervals. On surface there is a circular steel shaft ore-house, similar to that at No. 4. The plant at No. 6 includes a brick engine house, with hoist and 45-drill air-compressor, a steel boiler house, electric pumps on the 1st, 3rd and 9th levels and storage-battery locomotives on levels No. 10, 12, 13 and 14.

No. 7 shaft, 2,400′ S. of No. 6, was started in 1913, but work was stopped on account of the strike and not resumed until late in 1915. It is bottomed in foot-trap, 66′ below the 9th level, and is 1,201′ deep. The north drifts down to level No. 7 have been holed to corresponding drifts from No. 6 shaft. The south drifts have been driven 1,200′, or midway to the point selected for No. 8 shaft.

"A" shaft, started September, 1908, on the Hussey-Howe tract, is 972′ deep, with the first plat cut at depth of 350′. A 205′ crosscut, at depth of 474′, discloses only the bed in which the shaft is sunk. On the 3rd level, at depth of 714′, a drift was run S. to within 50′ of the Houghton Copper Co. boundary, disclosing a fair amount of amygdaloidal rock, not carrying copper in promising quantities. "A" shaft is supposed to be sunk on the Baltic bed, but there is very great doubt as to whether the shaft really is opened on the northern extension of the Baltic, and failure to locate the twin Baltic bed, within a distance of 205′ in the crosscut on the 474′ level, accentuates this doubt.

The Sec. 12 shaft, begun October, 1905, and discontinued January, 1908, at depth of 812′, also was sunk in search of the Baltic bed and drifts and crosscuts were opened in 4 directions, without securing satisfactory results. The shaft was sunk in a badly disturbed amygdaloidal bed, practically barren of copper.

A shaft was started, 1904, on Sec. 10, but was discontinued because of the heavy overburden, and a diamond-drill substituted, the drill-cores showing an amygdaloidal bed of which about 5′ in width carried copper in fine grains.

Surface equipment: the main plant at No. 2 shaft, includes No. 2 engine house, a compressor house having a 35-drill 2-stage air-compressor; a 44x72′ boiler-house, with a 16x72′ coal-storage addition and a 3,000-ton coal trestle, having four 150 h. p. 84″ horizontal boilers, taking water from a dam 300x500x6′. The machine shop is of steel, on stone foundations. The company has a private telephone system. There are about 150 dwellings on the company's lands.

At No. 5 shaft a new collar was put in and a change-house erected in 1917. At No. 6 a change-house was erected and 2 boilers installed, making six. At No. 7, a timber frame ore-house, equipped with 24x48″ crusher and operated by a 100 h. p. motor, was put into commission.

The Isle Royale railway, owned by the company, connects the mine and mill with about 5 miles of main line, having easy grades. Equipment includes 35-ton, 55-ton and 60-ton locomotives, and forty 40-ton steel ore cars, equipped with airbrakes.

The mill-site, at the mouth of Pilgrim river, has nearly 1 mile of frontage on Portage lake. The old mill was burned, December 24, 1914. A new 2,000-ton mill, with 3 stamp heads was in operation, August, 1915. The mill cost $220,000 and has three 300-ton orebins and 3 stamps, having circular mortars and ⅝″ screen openings. The stamps rest on concrete bases, 20′ thick, and are fitted with steeple-compound steam cylinders. Each stamp has a maximum capacity of 700 to 750 tons daily. The dressing floor has 78 rough jigs, 6 finishing jigs and 55 Wilfley tables to treat slime. There are rolls with fixed bearings to regrind coarse gravel from the mortars.

The mill has a complete machine-shop on the second floor, power being furnished by a 600 k. w. mixed pressure turbo-generator, taking steam from five 200 h. p. boilers in a boiler house at the rear of the mill.

There is a 32x600′ wharf, with deep water alongside, at the mill site, with appliances for unloading coal and general freight and for the dispatch of mineral in scows to the Dollar Bay smelter, 2 miles across Portage lake.

Water is furnished the mill by a 16,000,000-gal. pump, especially designed to handle muddy water, having a triple discharge into a 30″ riveted steel water main, running 2,200′ from pump house to mill, the pump being located some distance from the mill, to obviate stamp sand clogging the intake. Three 100 h. p.

boilers furnish power for the pumps, fuel being taken from a large coal trestle at the rear of the pump house boiler rooms. A dam near the mill supplies feed water for the boilers.

Recent production: has been as follows—

Year	Tons Ore Treated	Lb. Min. Produced	Lbs. Cu. per Ton Ore Stpd.	Mine Cost per Ton (a)	Lb. Cu. Produced	Total Cost per Lb. Cents	Rec'd per Lb. Cents
1918.....	974,508	.....	15.9	$2.14	15,442,508	16.80	24.46
1917.....	922,160	.....	14.6	2.02	13,480,921	15.74	26.87
1916.....	925,419	.....	13.4	1.53	12,412,111	15.75	25.86
1915.....	680,270	13,727,832	13.7	1.45	9,342,106	14.94(b)	18.36
1914.....	474,349	9,451,115	13.9	1.49	6,601,235	13.05	13.16
1913.....	314,679	5,887,000	13.2	2.12	4,158,548	18.81	15.29
1912.....	531,105	11,461,410	15.4	1.54	8,186,957	11.89	16.66
1911.....	457,440	10.339,171	16.4	1.47	7,490,120	10.85	....
1910.....	520,860	10,433,060	14.5	1.42	7,567,399	11.84	....

Production for 1919 was 13,007,647 lb.

(a) Includes mining, transportation, stamping and taxes.

(b) Includes nearly 2c per lb. extraordinary expense of rebuilding stamp mill, re-opening No. 1 shaft, and No 7 shaft expense.

The Isle Royale is a low-grade mine, but shows itself capable of earning substantial profits. Profitable operations for many years to come are confidently anticipated. Company started a campaign in 1917 to develop more ground and to equip the plant with modern facilities; this has cost in the neighborhood of $600,000, but company is now in position to produce 20,000,000 lb. of copper annually and at a cost, low enough, in normal times, to make a good profit on its small capitalization.

KEWEENAW COPPER CO. MICHIGAN

Office: Calumet State Bank Bldg., Calumet, Mich. Mine near Mandan, Keweenaw county, Mich.

Office: Thos. F. Cole, pres.; Spencer R. Hill, v. p.; Capt. Thos. Hoatson, 2nd v. p. and mining director, with A. L. Warner, C. A. Wright, and G. G. Hartley, directors. F. W. Taylor, sec.-treas.

Inc. March 11, 1905, in Michigan. **Cap.**, $10,000,000; shares $25 par; issued 213,871 shares; $20 paid in. Last assessment of $1 per share levied July, 1917. Stock listed on Boston and Duluth Stock Exchanges. Controls, through stock ownership, the Phoenix Consolidated Copper Co., Meadow Mining Co., Humboldt Copper Co., Keweenaw Central Railroad Co. and Washington Copper Mining Co. Has about 2,300 shareholders. American Trust Co., Boston, registrar; Old Colony Trust Co., transfer agent. Annual meeting, second Monday in March.

General Balance Sheet, December 31:

Assets—	1918	1917	196
Real Estate	$1,405,275	$1,405,227	$1,405,227
Investments	1,702,611	1,791,021	1,545,391
Acct's Rec.	415,214	360,673	344,607
Dev. Exp., etc	725,364	716,955	706,818
Cash	27,236	3,351	63,254
Mat. & supp.	5,549	5,549	5,549
Total	$4,281,249	$4,282,776	$4,070,746
Liabilities—			
Capital stock	$4,277,420	$4,276,720	$4,062,884
Accts. Pay.	166	3,943	5,152
Interest	3,663	2,041	2,592
Misc. Rev.	.....	72	118
Total	$4,281,249	$4,282,776	$4,070,746

The Keweenaw Central Railroad Co. is a reconstruction of the old Lac La Belle & Calumet railway. The entire capital stock issue, $400,000, reduced from $730,000 in 1918, is owned by the Keweenaw Copper Co. The railway company has $500,000 bonds, not issued, and ended 1917 with accounts and bills payable of $393,322, owing mainly to the Keweenaw Copper Co. The railway, with about 20 miles of main line, spurs and branches, cost $692,346, and runs from Centennial, a northern suburb of Calumet, where connection is had with the Copper Range line, to the Phoenix shaft. The road consisted of about 40 miles of track, but in 1918, company sold the equipment and rails of the Mandan—Lac La Belle branch, because this equipment was not suited for the heavy duty that would be imposed whenever commercial rock was mined in considerable quantities. The proceeds of the sale, $225,000, was invested in Liberty bonds.

Property: 25,195 acres, mainly mineral lands, heavily timbered, in 3 main groups, carrying the strike of the Keweenawan mineral belt for about 14 miles, including practically all of the amygdaloidal and conglomerate cupriferous beds of the district, as well as numerous copper-bearing cross fissures. Lands are in T. 58 N., of Rs. 27, 28 and 29 W., and include the tracts formerly owned by the Aetna Copper Harbor, Empire, Girard, Hanover, Keweenaw, Mandan, Medora, Pennsylvania & Boston, Resolute and Vulcan companies, in addition to lands controlled through stock ownership in subsidiary corporations.

The company's lands carry nearly 2 miles of water frontage on either side of the Montreal river, including Fish cove, 1 mile east of the river's mouth, which might be made a fair harbor at comparatively small expense. The lands include 5 miles of the course of the river, on both banks, and with other holdings, give the company the entire water-frontage of Mosquito lake, making possible the development of a great water power, with a hydro-electric installation at the mouth of the river. There is a mill site on Bete Gris bay, at the mouth of the Montreal river, having about 5 miles of water frontage.

The company also owns the Lac La Belle, or Mendota, ship canal, 1 mile long, connecting Lac La Belle with Lake Superior. This canal has a 14′ channel, and leads to a splendid haven that should be made a harbor of refuge.

The Medora mine, opened about 1860, had 3 old shafts, about 100′ apart, deepest 140′. The Medora amygdaloidal bed, traversing lands of the company for about 4 miles, lies immediately under the Allouez conglomerate, and outcrops several hundred feet north of the Montreal river bed. The Medora, about 12′ in average width, is a soft chocolate-colored amygdaloid, carrying considerable prehnite, calcite and quartz, in connection with fine stamp copper and occasional heavy copper, a 30″ paystreak along the footwall carrying some barrel work, the bed as a whole being bunchy.

The Medora tract also carries other copper-bearing beds, among these being the Medora fissure vein, outcropping about 2 25′ E. of No. 1 shaft, but making into the shaft at depth. About 100′ S. of the Medora amygdaloid is another bed carrying copper in small quantities, and to the northward are the Wolverine amygdaloid, of about 15′ width, and the Allouez conglomerate, lying about 280′ N. of the Medora bed, at surface.

The Medora mine was reopened on a considerable scale to a depth of 1,700′ and length of 1,800′, with about 2 miles of workings. All work in the mine was stopped September, 1909. The Medora workings are fully described in Vol. VIII.

The Empire mine also carries the Medora bed, about 3 miles E. of No. 1 shaft, and some trenching and test pitting, done 1906-07, on the Empire tract, showed a bed of about 15′ width, carrying some copper at surface. The Empire also carries the Montreal river amygdaloid, on which the Manitou did considerable work.

The Medora-Mandan-Resolute tract of 2,440 acres carries the Kearsarge bed under practically its entire territory. The shaft on the Kearsarge bed, known as No. 2, is about a mile S. of the old Medora workings, and was 1,355′ deep when abandoned, 1911.

The company owns a diamond-drill outfit and has made extensive borings, securing a cross section of the Medora, Mandan, Resolute and Empire tracts. Operations, 1912-1914, were confined to exploratory work in the horizon of the

Ashbed lode, and the first drill-hole located a copper deposit of considerable promise, early in 1913, at a depth of about 500′. Mine has been idle since May 28, 1914.

Development: in 1917, operations were conducted on the Phoenix mine only. Fifty-three diamond-drill holes, aggregating 3,063′, were put down for exploratory purposes and the shaft sunk to depth of 1,616′. The 5th, 6th and 10th levels showed fair copper. In 1917, 41,148 tons was stamped, yielding 9,248 lb. refined copper per ton.

Due to scarcity of labor and increasing costs, operations were suspended on December 1, 1917. Company was reported considering the sale of its timber-land or cutting the lumber itself. In either case, there would be a large return.

KEWEENAW LAND ASSOCIATION, LTD. **MICHIGAN**

Office: Room 33, No. 87 Milk St., Boston, Mass. **Operating office:** Marquette, Mich.

Officers: A. B. Emmons, chairman; Nathaniel Wilson, sec.; Dudley S. Dean, treas.; John M. Longyear, gen. agt.

Is a land corporation, holding 400,000 acres, mainly timber lands, but with some mineral lands, partly on the Keweenawan copper belt, in the upper peninsula of Michigan, taken over from the Lake Superior Ship Canal, Railway & Iron Co.

LA SALLE COPPER CO. **MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **Mine office:** Calumet, Houghton county, Mich.

Officers: Rodolphe L. Agassiz, pres.; Jas. MacNaughton, v. p. and gen. mgr., with W. Hunnewell, T. N. Perkins, D. S. Dean and Lindsley Loring, directors; G. G. Endicott, sec.-treas.; H. L. Bennett, asst. sec.-treas.; Ole Hallingby, supt.

Inc. Dec., 1906, in Michigan. **Cap.,** $10,000,000; $25 par; issued 302,977 shares. Old Colony Trust Co., Boston, transfer agent; State Street Trust Co., Boston, registrar. Listed on Boston Stock Exchange. Company absorbed the Caldwell Copper Co. and controlled the Tecumseh Copper Co., through ownership of practically the entire issue, giving 11-3 shares of La Salle for 1 of Tecumseh, and bought the entire property of the Tecumseh, May 11, 1910, for $1,648,000. Is controlled, through ownership of 152,977 shares, by the Calumet & Hecla Mining Co. The Calumet & Hecla contributed $1,000,000 cash to the company's treasury, taking pay in stock, and agreed to loan $750,000 additional cash, as needed. Annual meeting, second Tuesday in April.

Operations—Years ended December 31:

	Total Receipts	Oper. Exp.	Taxes, Reserve	Deprec. Reserve	Inc. in Cur. Ass.	Excess Cur. Ass.
1918.....	$485,013	$407,956	$8,800	$24,359	$92,615	$401,458
1917.....	454,486	311,558	8,676	.....	135,351	308,842

Property: 2,360 acres. The Tecumseh and Caldwell contributed 560 acres each and 540 acres were furnished by the Calumet & Hecla, St. Mary's Mineral Land Co., Sheldon & Douglas Estate, and other interests, these lands being put into the company at a novel basis of valuation, figured upon zones of 2,500′ depth on the dip of the Kearsarge bed, allowance being made for decreased land values on zones carrying the underlay at increased depths. There are 4 shafts, 2 on the Tecumseh and 2 on the Caldwell tract, with room for 3 additional shafts, to give a total of 7 shafts, at intervals of about one-third mile. The property carries the strike of the Keweenawan formation for about 2½ miles.

Development: property has been prospected by diamond-drilling, more than 30 diamond-drill holes having been bored on the Tecumseh and Caldwell tracts, a few years ago.

The first work at the Tecumseh mine was done on the Calumet conglomerate, many years ago, when a 1,000′ shaft was sunk that found no payable ore. During the second era of activity, 1889-1902, a shaft was sunk 2,300′ on the Osceola amygdaloid, but this bed, being found practically barren of copper, work was

abandoned November, 1902. It is probable that the old Osceola shaft will eventually be reopened, as the southern drifts of the No. 6 shaft of the Osceola, below the 4,000′ level, near the Tecumseh boundary, are among the best in that mine.

An arrangement was made in 1916 with the Osceola Consolidated, whereby levels No. 42 and 45 S. of No. 6 shaft, Osceola mine, were extended into La Salle ground. The ground was fair for the most part, but some sections were of no value. The work was discontinued in November, 1917, due to difficulties in operation.

La Salle No. 1 shaft, formerly known as No. 1 Tecumseh, sunk on the Kearsarge bed, has 3 compartments, 2,146′ deep, and shows the Kearsarge lode to be 8′ to 12′ thick, but characterized by irregularly distributed values. The quantity of workable ground is limited and the work done in 1918, was with the idea of mining that ground as soon as possible and abandoning the shaft. Equipment: includes 250 h. p. boiler and 18x24″ hoist.

La Salle No. 2 shaft, 2,511′ deep, formerly known as No. 2 Tecumseh, is located about 1,700′ S. of No. 1 and of the same size, shows a bed of workable thickness, but without much copper. A branch of the Mineral Range railroad was built to the shaft in 1913. Development during 1918, showed fair ground in the North drifts, becoming leaner near Osceola boundary, on the south drift, fair for about 600′ from the shaft and after that point practically no copper. The power plant has a 125 h. p. boiler, an 18x24″ hoist good for 2,500′ depth, and a 15-drill air-compressor. Buildings include a changing house.

No. 5 shaft, 1 mile S. of No. 1, originally known as No. 1 Caldwell, and later as No. 1 La Salle, is 1,450′ deep, shows a poorly-defined bed, with unsatisfactory copper content. Work was discontinued November, 1910.

No. 6 shaft, formerly known as No. 2 La Salle, sunk at a point 1,500′ S. W. of No. 5, was abandoned, June, 1909, at depth of 882′. The surface equipment was removed to No. 2 shaft.

The Kearsarge bed is comparatively thin in the Tecumseh tract, ranging from 7 to 11′, with an average thickness of about 9′.

Total development work amounted to 141′ in 1913; 1,123′ in 1914; 1,127′ in 1915; 3,107′ in 1916; 2,146′ in 1917, and 1,532′ in 1918.

Production:

Year	Tons Ore Treated	Lb. Cu. Per Ton Ore Stpd.	Lbs. Cu. Produced	Mining Cost per Ton	Net Cost Per Lb. Cents	Rec'd Per Lb. Cents
1918.....	176,423	10.388	1,832,665	$1.893	21.96	24.34
1917.....	185,014	10.38	1,919,775	1.87	20.14	28.45
1916.....	144,829	9.53	1,380,352	1.79	19.96	25.68
1915.....	80,959	9.67	782,493	...	....	....
1914.....	45,509	11.88	540,731	...	....	....
1913.....	2,221	19.76	43,906	...	....	....
1912.....	....	....	.....	...	....	....
1911.....	18,970	14.77	280,598	...	....	....

Ore was stamped at the No. 1 mill of the Lake Mlg. Smelt. and Ref. Co., at Point Mills, during 1917-1918, with the exception of the last week in December, 1918, when work was done at the Ahmeek mill at Hubbell.

Production in 1919 was 340,719 lb.

LAKE COPPER CO. **MICHIGAN**

Office: 85 Devonshire St., Boston, Mass. **Mine office:** Lake Mine, Ontonagon county, Mich.

Officers: Wm. A. Paine, pres.; John H. Rice, v. p.; Robt. H. Gross, sec.-treas., with William F. Fitzgerald, Reginald C. Pryor, William S. Rooney, F. Ward Paine, directors. Elton W. Walker, mgr.; James McKie, supt.

Inc. Nov. 27, 1905, in Michigan. **Cap.,** $2,500,000; shares $25 par; $5 paid, fully issued. Shares are listed on the Boston Stock Exchange. Federal Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Annual meeting, third Tuesday in June.

Reports for years ended April 30:

Receipts—

	1919	1918	1917
Copper sold	$168,861	$373,814	$442,696
Misc.	9,457	16,351	7,801
Totals	$178,318	$390,165	$450,497

Expenditures—

Mine and prod. exp.	$265,693	$391,647	$278,357
Equip. and dev.	619	6,744	46,935
Taxes	22,041	21,804	17,007
Dwelling acct.	652	803	.....
Totals	$289,006	$420,999	$342,301
Prev. Surplus	$331,525	$362,359	$254,164

Cash on hand at end of 1919 was about $220,000.

Property: 2,010 acres, the S. E. ¼ of Sec. 29, S. E. ¼ of Sec. 30, N. W. ¼ of Sec. 32, and E. ½ of Sec. 31, T. 51 N., R. 37 W., includes 1,150 acres of mineral land, 680 acres of timber lands and 180 acres of cutover lands.

The company's first work was done on the Knowlton and Butler beds, principally on the Knowlton amygdaloid, on which there were old shafts of 170′ and 300′, latter having been deepened to 600′ by the present company. Though considerable copper was taken from the Knowlton bed, exploration work was transferred to virgin territory, at the southern end of the property, a wise move, as demonstrated by the outcome. There was also a 90′ shaft on the Tresidder bed, 1,000′ E. of the Knowlton, sunk in 1865, whose cost was paid for from the copper extracted. Considerable diamond-drilling has also been done, and the borings of the Adventure, on adjoining lands, indicate that the Lake should have several other promising amygdaloid beds, in the same general horizon as the Lake bed now being opened.

Geology: the strike of the Lake amygdaloid in the immediate vicinity of the shaft is about N. 6° E., with dip of about 35° W. It was at first thought that the Lake bed was a fissure vein, but this was disproven by the disclosure of parallel strata, including a conglomerate lying about 400′ thereunder. The Lake, a typical Lake Superior amygdaloidal trap flow, is exceedingly wide for a copper-bearing bed, ranging from 50 to 100′. The hanging-wall of trap is fairly well defined, but the footwall is extremely irregular, there being no marked line of separation between copper rock and trap. The Lake bed appears to carry 3 well-defined shoots of enriched copper ground, raking northward with depth. An unsuccessful attempt was made to locate the northerly extension of the Lake bed by diamond-drilling from surface and 3 holes were bored, but it is now known that the lode turns W. and passes into South Lake ground. Thirteen diamond-drill holes, aggregating 1,628′, have been bored. The northernmost bottom workings of the mine show a deflection to the westward, with a strike, at the extreme north, of N. 15° W., which corroborates the hypothesis of Dr. L. L. Hubbard, that the Lake bed is the third and the East lode, the fourth bed from the top in the series of 4 amygdaloid beds cut by the drill holes of the South Lake. There are two other lodes only 50′ W. of the Lake with commercial ore. For order and description of the Knowlton, Butler and other lodes of the Evergreen belt, see Mass Copper Co., in this book and section.

The mine is operated by a 1,500′ incline shaft, ore being extracted from all levels from the 2nd to the 11th. The lode is bunchy with very rich spots and some mass copper, but the general average is about 2%, equivalent to 25 lb. of refined copper.

The Knowlton shaft was unwatered August, 1916, to mine ore from the Knowlton lode, which, though narrow, shows good copper values where opened. The Butler and Evergreen lodes are reached by a 900′ cross-cut from this shaft,

the Evergreen being cut late in 1918. Four test runs of ore averaged 26 lb. per ton. Management expects to resume operations here when mine is reopened.

Development: the mine has about 3,500′ of workings, a very large proportion of the drifts being in neither the footwall nor the hanging-wall, giving a rather poor idea of the actual values in the bed. New work during fiscal year ended April 30, 1919, totaled 1,204′, compared with 2,813′ for 1918.

Equipment: includes a 32x72″ duplex-cylinder double-conical-drum hoist, capable of lifting 10-ton loads from depth of a mile; old 6-drill and 15-drill air-compressors, taken from the equipment of the old Belt mine, and a new 50-drill 2-stage cross-compound air compressor, in a steel compressor house. Mine structures include a machine-shop, smithy, office, boarding house, and a change-house at the Lake shaft. There are a number of dwellings and many old houses at the Belt location. The property is reached by the Copper Range railway, which passes through the old Belt location, with a 1½ mile spur to the shaft, and a siding has been built to within 500′ of the shaft by the Mineral Range railway, giving the mine the advantage of competitive railway rates.

Production: fiscal year ending April. Work resumed in May, 1915, after a 2-year shutdown.

	Tons Ore Stmpd.	Mineral Lb.	Lb. Cu. per Ton Ore	Lb. Cu. Produced	Cost per Lb.	Rec'd per Lb.
1919 (d)....	.....	.....	23.13	717,403	....	.....
1918.....	63,191	2,246,970	23.13	1,461,893	25.63(c)	25.57
1917.....	70,440	2,346,970	21.14	1,489,247	20.00(c)	29.726
1916 (a)....	59,848	2,511,216	26.42	1,581,071	15.622(b)	20.149
1914.....	.....	.....	14.95	275,647	....	15.074
1913.....	83,109	2,153,128	15.39	1,300,562	19.5(c)	.....

(a) Did not produce during first 3 months. (b) Includes 1.036c. charge due to resuming operations. (c) Approximately. (d) Did not produce during last three months.

On February 1, 1919, all operations were suspended due to labor conditions, high costs and low copper prices.

The management is both experienced and capable, and the mine, though small, is most promising.

LAKE MILLING, SMELTING & REFINING CO. MICHIGAN

Office: 12 Ashburton Place, Boston, Mass. **Operating office:** Calumet, Mich. Works office: Point Mills, Houghton county, Mich.

Officers: R. L. Agassiz, pres.; Jas. MacNaughton, v. p. and gen. mgr.; Geo. G. Endicott, sec.-treas., with H. F. Fay and D. L. Dean, directors.

Inc. 1891, in Michigan. **Cap.,** $2,500,000; shares $25 par; fully issued; $11.85 paid in. Stock distribution is as follows: Allouez Mining Co., 36,164 shares; Centennial Copper Mining Co., 16,164 shares; Hancock Cons. Mng. Co., 10,000 shares; Isle Royale Copper Co., 18,836 shares; Superior Copper Co., 18,836 shares.

Works: company owns 2 mills; one, called the Centennial-Allouez mill, is at Point Mills, on the shore of Portage lake, on land adjoining the Franklin mill-site. The mill was built by the Arcadian Copper Co., and was bought, 1904, by the Centennial Copper Mining Co., and later transferred to the present corporation. The mill of 4,000 tons daily capacity is equipped with 6 Nordberg stamps and crushing rolls to treat oversize material. Two additional stamp units have been planned. Power is furnished by a 600 h. p. cross-compound engine, and water is supplied by a 15,000,000-gal. pump. A 30,000,000-gal. pump has been ordered. In 1918, company installed a mixed flow pressure turbine to operate a 2,000′ k. w. electric generator. A boiler-house containing 8 boilers was completed in 1915; a new addition was completed in 1917 to house the 4 boilers necessary to run the two new stamps. The other mill, known as Lake No. 2, at Hubbell, has 4 stamps in operation, treating all the ore from the Allouez Mining and Centennial Copper Mining companies' workings. A tailing pumping plant which started operating early in 1919, pumps tailings far out into Torch lake. This was erected jointly by the Osceola, Lake and Calumet & Hecla.

LAKE SHORE MINING CO. **MICHIGAN**

Idle several years. **Office:** 990 West Kensington Road, Los Angeles, Calif. Mine near Green, Ontonagon county, Mich. W. H. Garlick, pres.

Inc. in Michigan. **Cap.**, $500,000; $25 par.

Property: 821 acres, patented, on the shore of Lake Superior, is said to carry slatey rocks enclosing bedded deposits of 5′ and 12′ width, showing copper oxides and chalcocite giving average assays of 2% copper, 0.5 oz. silver and 40 to 80c gold per ton. Apparently, the orebody is of the secondary or Porcupine series of the Keweenawan formation, and ores may change to native copper at depth. A little prospecting has been done.

LAKE SUPERIOR DEVELOPMENT CO. **MICHIGAN**

Office: care Clyde Mackenzie, sec., Houghton, Mich. Jos. Croze, pres.; Jos. W. Selden, treas.

Property: 400 acres, held under option, the N. ½ of Sec. 25, and S. ½ of S. W. ¼ of Sec. 24, T. 57 N., R. 32 W., about ½ mile E. of the Gratiot and about 1½ miles of the Ojibway. Lands are on the Keweenawan formation. Drilling done in 1910-'11 gave encouraging results and company officials hope to resume operations at some future time.

LAKE SUPERIOR SMELTING CO. **MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **Works office:** Dollar Bay, Houghton county, Mich.

Officers: R. L. Agassiz, pres.; C. H. Bissell, sec.-treas., with Geo. A. Flagg, F. W. Hunnewell and Jas. MacNaughton, directors. Jas. MacNaughton, gen. mgr.; Henry D. Conant, supt.

Inc. July, 1891, in Michigan. **Cap.**, $1,200,000; shares $25, fully paid and issued. Is controlled through ownership of 25,000 shares, by the Calumet & Hecla Mining Co., and by the Osceola Cons. Mining Co., which has 15,000 shares, and the Isle Royale Copper Co., which has 8,000 shares.

Balance Sheet—Years ended December 31:

	Assets—				
	Real Estate	Mchy. & Equipt.	Mdse., Mat. In Process	Cash & Accts. Rec	Total
1918.....	$1,044,446	$535,515	$137,113	$193,454	$1,910,528
1917.....	1,044,446	416,000	163,546	157,865	1,781,857

	Liabilities—				
	Cap. Stock	Accts. & Notes Payable	Reserves	P. & L.	Total
1918.....	$1,200,000	$370,890	$132,010	$207,628	$1,910,528
1917.....	1,200,000	391,839	103,437	86,581	1,781,857

The smelter has 11 reverberatory furnaces and 3 refining furnaces. There is a mechanical ladling and casting device having a 1,100-lb. ladle, and a casting machine with molds linked into an endless belt, dumping over sprockets into cooling tanks, whence the ingots are delivered mechanically by cleat elevators to inspection and loading platforms.

The smelter treats ore from the Osceola, Isle Royale, Ahmeek and Centennial mines. The company also owns the dismantled smelting plant at Hancock, Michigan.

LAURIUM MINING CO. **MICHIGAN**

Completely absorbed by the Calumet and Hecla Mining Co., which see. Described Vol. XIII.

LONGYEAR-MICHIGAN EXPLORATION CO. **MICHIGAN**

Address: J. M. Longyear, Jr., Marquette, Mich.

Property: had options on 1,240 acres of land in Sections 26, 27, 34 and 35 T. 56 R. 34, near Calumet, Houghton county. Several diamond-drill holes, made in 1916, failed to show ore. Options reported taken over by Federal Syndicate Copper Co., which see.

MASS CONSOLIDATED MINING CO. **MICHIGAN**

Office: 79 Milk St., Boston, Mass. **Mine office:** Mass, Ontonagon county, Mich.

Officers: John W. Linnell, pres.; Theo. O. Nicholson, v. p.; Wilfred A. Bancroft, sec.-treas.; Elton W. Walker, supt., with Francis L. Maguire, John S. White, Jas. B. Hill, D. Allison Carrick and Fred J. Schultheis, directors. E. Fenner Douglass, mill supt.; A. P. Bennetts, mg. capt.; Jos. Bice, master mechanic.

Inc. 1899, in Michigan. **Cap.,** $2,500,000; shares $25 par; issued, 97,317 shares; paid in, $24; $8 paid on organization, balance in installments. Listed on Boston Stock Exchange. Old Colony Trust Co., Boston, transfer agent. Annual meeting, second Thursday in March.

Balance Sheet, December 31, shares:

	Receipts	Net Profit	Prev. Assets	Divs., Inc. Tax, Etc.	Bal. of Cash Assets
1919.....	$429,845	$146,106(a)	$295,773	.....	$149,667
1918.....	796,638	25,599(a)	321,372	.....	295,773
1917.....	1,062,319	181,631	449,255	$309,514	321,372
1916.....	1,255,896	430,528	213,361	194,634	449,255

(a) Loss.

Construction, 1918, cost $11,269; 1917, $83,782; 1916, $94,556.

Dividends: initial dividend paid, Aug., 1916, with total for 1916 of $194,634. In 1917, $3 per share paid, amounting to $291,951.

Property: about 5,500 acres, lying in a very irregular but fairly compact tract, in Secs. 33, 34 and 35, T. 51 N., R. 38 W., in Secs. 4, 5, 6, 7, 8, 9 and 16, T. 50 N., R. 38 W., and in Sec. 1, T. 50 N., R. 39 W., holding being bounded on the N. by the Union, Adventure and farm lands, on the E. by the Adventure and Toltec, and on the S. by various lands, and on the W. by the Flint Steel, Adventure and St. Mary's Mineral Land Co. Holdings include 4 old mines, the Ridge, Evergreen, Mass and Ogima, also 2 old prospects, the Merrimac and Hazard, joint production of which, under previous managements, was 11,131,023 lb. fine copper. These 5 properties are described, in detail, in Vol. II, Copper Handbook.

The Mass tract carries the outcrop of six of the copper bearing amygdaloid beds of the Evergreen belt, for about 1½ miles. The outcrops vary greatly in width, but average about 10′, showing a sharp bend in the strike, which varies from N. 32° E., on the north, to N. 37° E. at the southern boundary. The dip of the beds varies from 38° at the Ridge to 47° at the old Mass mine. The copper-bearing beds are as follows, from north to south:

1. Knowlton. Carries heavy copper and stamp rock.
2. Mass. Lies 140′ south of the Knowlton, and carries a little heavy copper and stamp rock (milling ore).
3. North Butler. Lies about 75′ south of the Mass bed, is wide and fairly mineralized in places.
4. Butler. Lies about 200′ south of the North Butler, is 12′ to 35′ wide, carrying mainly stamp copper with occasional heavy copper.
5. Ogima. Lies about 100′ south of the Butler. Carries mainly stamp copper with some barrel-work, being 5′ to 10′ wide and showing some good ground.
6. Evergreen or Ridge. Lies about 250′ south of the Ogima and is one of the best beds of the property, ranging 4 to 40′ in width and usually being richest where widest. Is very bunchy, but shows some excellent stopes, yielding mass copper and stamp-rock of good grade.
7. New Mass. This bed, which is the lowest of the series of the Evergreen belt and brings the number of cupriferous beds to 7, corresponding with the number in the adjoining Adventure property, lies about 120′ under the Evergreen bed and was opened by crosscuts from "A" shaft on the 15th and 18th levels. The bed averages about 12′ in width, carrying considerable epidote and is very showy, but the copper is exceedingly fine, most of it being of a flaky nature, very deceptive to the eye. A mill test of ore from this bed in 1909 gave a recovery of only 18 lb. of mineral per ton.

Development: the Mass has openings on all its copper-bearing beds, and is hoisted through the nearest shaft, workings on each level being connected by crosscuts. The Mass carries the outcrop of the copper-bearing beds of the Evergreen belt for about 1½ miles. Shafts "A" and "B" are connected on the Butler lode down to and including the 10th level. The mine as a whole is notably rich in mass copper and carries silver values, but the ground is exceedingly bunchy, ranging from very rich to absolutely barren. Ore is sorted underground, bringing the average content of stamp rock to 16.51 lb. per ton. About 50% of the rock broken is hoisted, and about 25% of the recovery is in mass copper.

"A" shaft, 1.757′ deep, with two compartments, sunk on the Evergreen bed has been abandoned.

"B" shaft, 875′ S. W. of "A" has 3 compartments, and is bottomed at 1,857′. Levels are at variable intervals; those at considerable intervals permit a larger saving in drifting through poor ground and sub-levels can be run where needed.

"C" shaft, 2,148′ S. W. of "B" and 1,554′ deep with a plat cut on the 14th level, is the old Ogima shaft, sunk on the Butler bed, but the Evergreen bed is opened by a 400′ crosscut on the 3rd, 5th and 7th levels. Some high-grade ground was opened on these and on the 9th levels west on the Butler bed. The company has concentrated work upon the Butler, though work was also done on the Ogima and Knowlton beds.

"D" shaft, 150′ deep, is idle.

Company will sink a new shaft 1,800′ west of "C" as soon as labor conditions permit.

Considerable diamond-drilling has been done south from the Evergreen bed into the horizon traversed by the so-called Adventure lodes, cut by diamond drills on the Adventure property, and also north of the Knowlton bed. Diamond-drilling was done in 1910 in the N. E. ¼ of Sec. 5, to test amygdaloidal and conglomerate strata outcropping at that point, which is quite a distance under the hypothetical horizon of the so-called Adventure lodes, with distance to the eastern sandstone undetermined.

Development during 1918 totaled 2,280′, compared with 4,364′ in 1917. Results underground were satisfactory in both years, but development and production were restricted due to labor shortage. Grade of copper produced was: 1916, 16.51 lb.; 1917, 16.29 lb.; 1918, 17.33 lb. Work done on No. 5 level shows the Evergreen lode to be well mineralized as far west as "C" shaft in virgin ground. Drifting and crosscutting in 1917 revealed good ore from this Evergreen lode, and there seems little doubt that a new mine has been opened at this end of the property, and that it can be operated through "C" shaft.

In 1918, the Butler lode produced 127,491 tons, and the Evergreen 59,866 tons, compared with 163,310, and 74,733, respectively, in 1917.

The shaft ore-house at "B" is equipped with a steam hammer, Good Roads crusher, and a 50x24″ engine; "C" shaft has a steel ore-house; both have been equipped with devices permitting automatic handling of ore.

The central power-house has a 24x48″ duplex hoist, good for one-half mile depth. The power plant includes a 50-drill 2-stage cross-compound air-compressor, a 20 k. w. dynamo for electric light, and three 335 h. p. water-tube boilers. During 1918 an air-compressor, with capacity of 2,550 cu. ft. free air per minute, was installed.

In addition to the usual mine buildings, there are about 90 good dwellings. The company also has a town site, Mass City, a village with a number of hotels and business houses, which is the terminus of the Mineral Range railroad, and a station on the C., M. & St. P. railway.

The Mass mill is at Keweenaw bay, on an arm of Lake Superior, at the junction of the Mineral Range and Duluth, South Shore & Atlantic railway, 16 miles S. of Houghton and 34 miles N. E. of the mine. Equipment includes 2 stamps, 1,350 tons daily capacity.

The mill boiler-house contains 3 water-tube boilers. Ashes and cinders are washed into the lake through a launder.

The pump house has a 16,000,000-gal. Nordberg vertical pump, connected with a tunnel running 300′ under the bed of the bay to the intake.

Production: begun 1899, with an output of 42,800 lb. fine copper, gradually increased to 2,576,447 lb. in 1903, decreasing thereafter, through loss of the Evergreen bed. Recent production has been as follows: 2,007,950 lb. copper in 1905; 2,106,738 lb. in 1906; 2,078,677 lb. in 1907; 1,766,930 lb. in 1908; 1,723,436 lb. in 1909; 1,321,885 lb. in 1910; 1,326,898 lb. in 1911; 2,045,006 lb. in 1912; 1,213,545 lb. in 1913; 2,955,952 lb. in 1914; 4,638,452 lb. in 1915; 4,752,588 lb. in 1916; 3,984,616 lb. in 1917; 3,403,827 lb. in 1918; 1,797,000 lb. in 1919.

Ore stamped in 1919 totaled 123,780 tons; in 1918, 196,456 tons; in 1917, 244,671 tons, and in 1916, 287,900 tons.

Cost of refined copper in 1918 was 23.82c and price received 24.34c per lb., compared with 19.81c. and 26.23c. in 1917. The 1919 cost was 27.83c..

The Mass Consolidated has conquered every sort of misfortune that befalls mines and through the acquisition of the Evergreen Bluff property, was placed in a better mining position than ever before. The experience of 17 years has given a thorough knowledge of the vagaries and possibilities of the 7 cupriferous beds of the Evergreen belt; though bunchy, two of the number are of real promise, the Evergreen and Butler. It is probable that other beds can be worked occasionally, but the future of the mine appears to depend on these beds. There also is the possibility of locating and developing other and richer beds to the southward of the main workings, in the horizon of the Lake and Adventure beds.

Management is both progressive and experienced, but labor is short.

MAYFLOWER MINING CO. **MICHIGAN**

In February, 1917, company was consolidated with the Old Colony Copper Co., under title of Mayflower-Old Colony Copper Co. (which see), on a share for share basis. Described, Vol. XIII.

MAYFLOWER-OLD COLONY COPPER CO. **MICHIGAN**

Address: 70 State St., Boston, Mass. **Mine office:** Houghton, Mich.

Officers: H. F. Fay, pres., with R. L. Barstow, G. E. Clarkson, G. P. Gardner, W. A. Mosman, C. J. Paine, and F. W. Nichols, directors; C. J. Morrissey, sec.-treas. G. S. Goodale, supt.

Inc. March 5, 1917, in Michigan, as a consolidation of the Mayflower Mining Co. and Old Colony Copper Co. Stock was exchanged on a share for share basis. **Cap.,** $5,000,000; shares $25 par; $14 paid in. Last assessment of $1 paid February 9, 1920. American Trust Co., Boston, transfer agent. Old Colony Trust Co., Boston, registrar. Annual meeting, third Wednesday in March. Shares listed on Boston Stock Exchange.

Balance sheet for December 31, 1918, shows: receipts from assessments, $85,201; interest, $1,102, and machinery sale, $360; total, $86,663. Expenses were: mining, $81,890; construction, $2,300; equipment, $2,390; and general, $8,619, a total of $95,199. The deficit was $8,536. Balance on hand, December 31, 1917, was $32,303, and on January 1, 1919, $23,766.

Property: about 2,040 acres on Mineral Ridge, near Calumet, Houghton county, comprises Secs. 7, 8, 17 and 18, T. 56 N., R. 32 W. Lands are south of the Kearsarge mine and east of Wolverine, South Kearsarge, and Calumet & Hecla mines. Prospecting was begun on the Mayflower in 1899 and continued for 5 years.

Development: on Mayflower property, by 4 shafts, No. 1, or Faull shaft, 400′ deep, has considerable drifting on the 1st and 2nd levels and a crosscut opens 2 parallel cupriferous amygdaloids, showing occasional patches of copper, but nothing of promise. No. 2, or Isle Royale shaft, 160′ deep, has several hundred feet of drifting and shows a bunchy amygdaloid, 10 to 12′ wide, carrying more or less copper in a 2′ streak next to the hanging wall; No. 3, 60′ deep, in a badly broken amygdaloid. No. 4 shaft, 580′ deep, starts from surface on an unnamed amygdaloid, lying approximately 2,000′ east of the Kearsarge bed and at a depth of 425′ runs into a parallel amygdaloid lying 90′ to the eastward of the first bed. The copper showing is poor. On the Old Colony property, there are 5 shafts, aggregating about 2,200′ in depth, and over

6,000′ of drifts and crosscuts, all of which have so far shown but indifferent results.

The new shaft, known as Mayflower-Old Colony No. 1, down 1,755′ by January 20, 1920, reached the Mayflower lode at 1,665′, where it shows native copper in commercial amount. The shaft lies about 300′ W. and 250′ S. of the quarter post between Sections 8 and 17, on the line which formerly divided the properties. The formation is a mixture of trap and amygdaloid, and at 1,403′ the shaft passed into the latter rock. At a depth of 1,452′ five feet of ore was cut resembling that of the Mayflower lode. The trap at the bottom carries copper, and the geologic features are said to be new to the district.

In the Old Colony mine a cross-section was secured, 1899-1901, by a tunnel driven about 3,000′ and by diamond-drill borings eastward to the western end of the tunnel; this cross-section showed upwards of 75 amygdaloidal and conglomerate beds, a number of which carried a little copper in the drill cores and where cut in the tunnel.

Drilling and exploratory work was resumed in the Mayflower, in July, 1909, after 3 years idleness, and in the Old Colony, in 1911, after 2 years' idleness. Hole No. 16, on the Mayflower property, is known as the discovery hole, because the so-called Mayflower lode was first cut by it. The holes on both tracts disclose this to be a big, well-mineralized amygdaloid bed, extending for a distance of 6,000′, and for a depth of 1,500′. This lode lies on the extreme eastern side of the copper range, near the eastern sandstone. Hole No. 41, started in 1915, was abandoned in 1916 at a depth of 2,635′, having run into a stratum of soft, sandy material. Hole No. 42, started in February, 1916, at a point 600′ N. E. of No. 41, was abandoned October, 1916, at a depth of 2,763′, where crushed and decomposed ground was encountered.

Diamond-drilling in 1917, amounted to 42 holes in the Mayflower and 25 holes in the Old Colony.

Thirteen holes on the Mayflower and 10 on the Old Colony ground showed commercial ore; hole No. 20 showed 101′ of 1.65% ore; hole No. 22, nearby, showed 100′ of 1.2% copper ore, 60′ of which carried 1.9%; holes Nos. 16 and 17 in this locality, showed 87′ and 95′ widths.

These earlier drill-holes were sufficiently promising to warrant shaft sinking, provided both companies shared the expense, and as the most satisfactory way of dividing the expense was a consolidation of both companies, this was accomplished in 1917.

Equipment: includes 15 dwellings, boiler house, change-house and an engine-house, containing hoist and compressor.

MEADOW MINING CO. **MICHIGAN**

Is controlled by the Keweenaw Copper Co. **Office:** C. A. Wright, sec., Calumet, Mich. Mine near Copper Falls, Keweenaw county, Mich.

Inc. 1898, in Michigan. **Cap.,** $1,500,000; $25 par; 81,520 outstanding Dec. 31, 1918; 37,500 shares were given in payment of property. Is a reorganization of the Meadow Mng. Co., inc. 1863, under special Michigan charter.

Property: 364 acres, adjoins the Humboldt and Phoenix mines and carries the Ashbed lode, which was first opened 1851, with a little mining previous to 1860. Where the Ashbed is crossed by transverse fissures, bunches of ore occur and such places usually show pits made by prehistoric miners. Fully described Vol. II, Copper Handbook.

Idle for years.

MICHIGAN COPPER MINING CO. **MICHIGAN**

Office: 15 William St., New York. **Mine office:** Rockland, Ontonagon county, Mich.

Officers: L. P. Yandell, pres.; F. G. Heuman, sec.; R. E. Graver, treas. directors: L. P. Yandell, J. R. Stanton, J. S. Dunstan, W. A. Paine and A. M. Low. Jesse Butler, supt.

Inc. Jan. 5, 1899, in Michigan. **Cap.,** $2,500,000; $25 par; fully issued; $24 paid in. Last assessment levied July 1, 1918, was $2 per share, equal to $200,000. Old Colony Trust Co., Boston, registrar; American Trust Co., Boston,

transfer agent. Annual meeting, first Tuesday in May. Listed on Boston Stock Exchange.

Balance sheet for 1918, indicates receipts, $445,782; including $290,923 from copper sales; $154,859 from assessment and $975 from interest. Surplus for year was $126,810. The accumulated deficit was reduced to $52,068, and $247,473 spent for mining and development. These figures compare with 1917 receipts, $105,864; $8,878 from copper, and $96,986 from assessments. The deficit for 1917 was $69,134; mining and development cost $117,144.

Property: the Minnesota, Rockland and Superior mines, 4,870 acres of mineral territory, 1,466 acres of timber and miscellaneous lands and a 150-acre mill site, giving total holdings of 6,686 acres.

The main tract is 3 miles east and west by 4½ miles north and south, in addition to which there are 4 scattering tracts to the westward, one of 40 acres, two of 80 acres each and one of 160 acres, all carrying the outcrop of the Calico amygdaloid. The Superior mine produced 567,331 lb. fine copper, 1856-69 and 1876-79. The Rockland, lying next east of the Minnesota, was operated 1853-70, making 6,210,309 lb. fine copper from the Minnesota contact vein which averaged about 2′ width and carried considerable silver in that mine. The old Minnesota mine, opened 1847, closed 1870, made 34,704,668 lb. fine copper and paid dividends of $1,820,000. The Minnesota mine is fully described in Vol. II, Copper Handbook.

Geology: the Michigan company's tracts carry the following known copper beds of the Evergreen belt: Calico, Contact, Minnesota, Branch, North Contact, Knowlton, Mass, Butler, Ogima, North Amygdaloid and South Amygdaloid, and presumably the other parallel beds, in addition to various other unidentified copper-bearing beds of the Keweenawan series. The Knowlton, or northernmost of the Evergreen belt of parallel beds, lies about 1,000′ south of the old Minnesota shafts and the 7′ amygdaloidal bed supposed to be the Butler, opened to some extent in Peninsula bluff 2,000′ south of "B" shaft, shows some heavy copper and stamp rock. There are 3 old shafts on the Butler bed and a tunnel cutting several parallel copper-bearing strata. There also are cupriferous amygdaloidal outcrops north of the Calico bed on which no work has been done.

Development: mine has 3 shafts on the Calico bed and about 10 miles of workings. "A" shaft is 2,133′ deep; "B" is bottomed at the 14th level and "C" at the 11th level. The lode grew steadily poorer with depth and showed a tendency to pinch, being only about 5′ wide on the 16th level of "A" shaft, though well charged with copper. The mine was closed down in 1910, when the property was turned over to tributors, who continued to scram the mine with some profit to themselves and the company until May, 1913, when all work was stopped.

In July, 1915, work was resumed at the old "E" shaft, and continued to date. During 1917, this was enlarged from 2 to 3 compartments and sunk to a depth of 873′. Drifting south of the shaft encountered the Evergreen, Butler and Ogima lodes, all showing commercial values. Results from other development work were reported as most encouraging.

It was said in 1919, that a new shaft was to be sunk east of "E" shaft.

Equipment: buildings include a machine-shop, smithy, carpenter shop, warehouse, office and changing house.

The mill, construction of which was begun April, 1906, is about 1 mile north of the Mass mill, on Keweenaw bay, with ample water frontage. Construction was suspended in 1907, after about $175,000 had been expended. In 1916, the equipment was overhauled; necessary additions and improvements were commenced and mill is expected to be in operation at an early date.

Production lb. copper: 1900-1905, 6,113,500; 2,875,341 in 1906; 2,665,404 in 1907; 3,000,206 in 1908; 1,979,305 in 1909; 36,682 in 1910; 327,773 in 1911; 162,590 in 1912; 90,000 in 1916; 35,400 in 1917; and 1,177,176 in 1918.

The mine has thus far proved a disappointment, largely because limited funds have restricted the necessary exploratory and development work. Recent developments have been rather promising. The property is very fully described in Vol. X of the Copper Handbook.

MICHIGAN SMELTER CO. **MICHIGAN**

Office: 82 Devonshire St., Boston, Mass. **Works office:** Houghton, Houghton county, Mich.

Officers: Wm. A. Paine, pres.; John R. Stanton, v. p.; F. W. Paine, sec.-treas.; Frederick I. Cairns, supt., and Chas. A. Snow, directors; John Mugford, asst. supt.

Inc. 1903, in Michigan. **Cap.,** $500,000; $25 par. The entire stock issue is owned by 6 mining companies, the Copper Range group holding 12,000 shares and the Stanton companies 8,000 shares, holdings in shares being as follows: Champion, 4,400 shares; Trimountain, 4,400; Baltic, 3,200; Mohawk, 3,200; Wolverine, 3,200; Atlantic, 1,600. No dividends have been paid, profits having been turned back into improvements. Annual meeting, second Monday in January.

Works: company owns and operates the Michigan smelter, 3 miles west of Houghton, near the old Atlantic stamp mill, with frontage on Portage lake. It was designed by Frank Klepetko, and is the largest and most modern smelter in the Lake Superior district, with a capacity of 90,000,000 lb. fine copper yearly.

The plant is terraced throughout, permitting automatic handling of material. The copper ore (locally rock), is delivered in 40-ton bottom-dumping steel cars by the Copper Range railroad, which also hauls away the refined copper for shipment from the Copper Range wharves in Houghton.

The 3,000-ton storage bins hold 10 days' supply for the works. Concentrate, or in Lake Superior terms, mineral, is dehydrated in rotary dryers by water gases from the furnaces, taken to the furnaces in tram cars and dumped into hoppers on the charging floor. Coal trestles, on an upper level, hold 15,000 tons of hard and soft coal, with tunnels underneath through which fuel is taken in tram cars, descending by gravity to the furnaces and boiler rooms. There also are separate storage bins for charcoal, sand and limestone.

The reverberatory furnace buildings has three 5-ton traveling cranes and 6 furnaces. Alternating with the larger reverberatories are one 300-h. p. and two 200-h. p. Stirling water-tube boilers, heated by waste gases from the furnaces. After leaving the boilers the gases are drawn through a 6x8′ subterranean flue, with arched roof, up the hill to a 150′ smokestack, with base 100′ above the furnace building.

The blast-furnace building has 2 cupola furnaces. Blister copper is cast, mechanically, in molds upon a circular casting table, cooled in water, and carried by a link elevator to the loading platform. Slags are carried mechanically to the sampling mill and reduced in a 30-ton crusher of 1,000 tons daily capacity for re-smelting. The slag from the final fusion is granulated by water and discharged through launders to low ground northward.

The combination machine-shop and power house has a complete equipment driven by an independent engine, and a 300-h. p. Nordberg horizontal tandem-compound engine, driving a 200-k. w. generator, actuates the rotary blowers for the blast furnaces. Electric power is used for operating the drying plant, cranes, casting machinery and lighting. There are 3 specially designed Jeffrey electric locomotives.

Miscellaneous buildings include office, laboratory, warehouse, barn, etc. Water is obtained from the old Atlantic dam, on Cole's creek, through a 4,300′ flume with capacity of 5,000 gals. per minute, leading to a 50,000-gal. storage tank, 100′ above the works, giving good pressure at all points. The plant is well planned and well handled.

MINONG COPPER CO. **MICHIGAN**

Office: 122 Winder St., Detroit, Mich. Louis O. Broadwell, pres.; Hugh A. McPherson, sec.

Inc. Dec. 16, 1874. **Cap.,** $1,000,000; shares $25 par.

Property: 1,455 acres in Secs. 22, 23, 26, 27, 34 and 35, T. 66 N., R. 35 W., lying at the head of McCargo's Cove on the Isle Royale, shows a line of ancient pits, largest 400′ and about 1½ miles long. Idle since about 1881.

MOHAWK MINING CO. **MICHIGAN**

Office: 15 William St., New York. **Mine office:** Mohawk, Keweenaw county, Mich. Mill office: Gay, Mich.

Officers: L. P. Yandell, pres.; R. E. Graver, treas.; F. G. Heumann, sec. Directors: L. P. Yandell, J. S. Dunstan, C. D. Lanier, W. A. Paine and F. W. Denton.

Inc. Nov., 1898, in Michigan. **Cap.**, $2,500,000; shares $25 par; all issued; assessable; paid in $18. Stock listed on Boston Exchange. Boston Safe Deposit & Trust Co., registrar; American Trust Co., Boston, transfer agent. Annual meeting last Tuesday in March. Company owns $80,000 worth of Michigan Smelting Co. stock.

Profit in 1918, was $1,033,690 before deducting dividends and before providing for Income, War and Excess Profit taxes. Dividends for year absorbed $1,000,000. Surplus, Dec. 31, 1918, $5,998,592.

Dividends: formerly paid semi-annually, but are paid quarterly since August 1, 1918. Payable Feb., May, August and Nov.; $5 in 1906; $9 in 1907; $2.50 in 1908; $3 in 1909; $2 in 1910; $1.75 in 1911; $3.50 in 1912; $5 in 1913; $1 in 1914; $6 in 1915; $17 in 1916; $20.50 in 1917; $10 in 1918; $5 in 1919; $1.50 in 1920, on Feb. 2. The grand total is $9,257,000.

Property: 800 acres, in an irregular tract, having its axis on the strike of the Kearsarge amygdaloid bed, in Secs. 27, 28, 33 and 34, T. 57 N., R. 32 W., about 4 miles N. E. of Calumet, with the Ahmeek and Seneca mines on the north and Ahmeek to the west. In May, 1916, purchased 900 acres near Dollar Bay, lying between Torch and Portage lakes, with a long strip of shore on each side, thus acquiring an excellent millsite on Torch lake.

Geology: property carries the Kearsarge amygdaloid bed, which is from 15′ to 18′ in average width, as at the Wolverine, and the upper workings carry about the same percentage of copper as in the Wolverine mine, but the lower workings are by no means so rich. The Kearsarge bed is crossed at approximately right angles by a number of narrow fissure veins, with nearly vertical dip, that yield a considerable amount of mass copper and in addition there are 3 cross-fissures carrying copper arsenides, including mohawkite, keweenawite, mohawk-whitneyite, and stibio-domeykite, the first two being peculiar to this district and first found in this mine. The fissures carrying mohawkite range 3″ to 3′ in width, are well mineralized where crossing the amygdaloidal bed and for an indefinite but usually short distance on either side, the mohawkite and allied arsenides occasionally occurring massive, but commonly being disseminated in an arenaceous gangue. The copper arsenides decrease with depth, and recent production has been small. There also are other cupriferous amygdaloidal beds in the stratified series that may be prospected later.

Development: 6 shafts, numbered from north to south, of uniform size, 8x18′ inside of timbering, with solid cribbing through the overburden and with identical equipment. All operating shafts, i. e. No. 1, 4, 5 and 6 are equipped with concrete collars. The skipways in the shafts, are laid with concrete stringers which prove very satisfactory. The mine is equipped with electric signals and operates about 65 power drills. New work in 1918, totaled 9,253′ which compares with 13,134′ in 1917.

No. 1 shaft, about 1,500′ south of the northern boundary, is bottomed at the 25th level and is 2,693′ deep. No. 1 hoist, in the central power-plant at No. 2 shaft, operates two 4-ton skips in counterbalance. No. 1 shaft has a combination shaft-rock house, equipped with a 12x24″ engine and crushers. The new openings continue to show the necessity of selective underground working.

No. 2 shaft is 2,364′ deep. Like No. 1, it had good ore near surface with impoverishment at depth, followed by improvement below the 12th level. The power plant at No. 2 shaft, serving both No. 1 and 2, includes an engine house and boiler house. Hoists are double-conical-drum duplex-cylinder engines, good for 6,000′ depth, each handling two 4-ton skips in counterbalance. The boiler house has locomotive firebox boilers with foundations for 3 additional boilers, and the engine house has 2 air compressors, of 40 drills aggregate capacity. Shaft was not operated during 1918.

No. 3 shaft, 1,600′ deep, was abandoned, as the ground can be reached

through shafts No. 2 and 4. No. 4 shaft is 2,489′ deep, developing good average copper content from surface. Equipment includes a steel shaft rock house with 3 crushers and a steam hammer. The engine house has a double-conical-drum hoist, good for 6,000′ depth. A compressor plant, at No. 4 shaft, has two compressors and two 4-ton trolley locomotives.

No. 5 shaft is 1,787′ deep. Equipment includes a new all-steel shaft rock house and a Bullock hoist good for 2,000′ depth.

No. 6 shaft, the southernmost and newest, is about 2,600′ south of No. 5 and 2,600′ from the Ahmeek boundary, commanding about three-fourths of a mile of the strike of the Kearsarge bed under about 160 acres, or approximately as much ground as the entire Wolverine mine. This shaft, located about 60′ in the footwall rock, is 1,451′ deep, and can be sunk to a maximum of 4,000′. Mechanical haulage was installed on No. 8 level in 1916, and two 4-ton trolley locomotives were put in operation in 1918.

New openings at No. 4, 5 and 6 shafts in 1918 continued to show same excellent mineralization as in previous years.

The mill, near the mouth of the Tobacco river, on Traverse bay, Lake Superior, opposite the mill of the Wolverine, is 178x206′ in size, of steel frame sheathed with iron, on foundations of sandstone. A steel trestle, 350′ long and 50′ high, leads into the mill, loaded cars being pulled up the incline by a winding engine. The mill has 4 stamps, all compounded, giving a daily capacity of 2,800 to 3,000 tons. The mill has a Chilean mill and 3 sets of auxiliary crushing rolls, with fixed bearings, to reduce oversize material from the mortar boxes of the heads, this averaging 20 to 25% of rock stamped. Mineral from the wash discharges automatically and is sluiced into the basement, where shoveled into 1½-ton mineral cars, having 14-mesh perforated steel bottoms that allow the drainage out of water, after which the cars are weighed, then lifted by a cage elevator and dumped into bins. The bin house has 4 compartments, each with cement floor and steam-pipes underneath, for drying the remaining moisture from the wash. The mineral is taken from the bin house, in self-dumping steel mineral cars to the Michigan smelter at Houghton for reduction. Tailings from the mill are dewatered, then raised by bucket elevator, and stacked by belt conveyor, some distance from the mill. To utilize exhaust steam from stamps a 1,250-k. w. turbo-generator has been installed.

In 1918 a concrete building 42′x42′x18′ on a concrete foundation 12′ high was built to accommodate this turbine which will furnish power to drive all the mill machinery in addition to three 7,000 gallon electrically-driven centrifugal pumps which are to be installed at the old pump-house, thereby eliminating the present pumping boiler plant.

Water for both the Mohawk and Wolverine mills is furnished from a joint pump house, standing near the Tobacco river, from which water is taken. The pump house has at present a 20,000,000-gal. triple expansion pump, supplemented by a 9,000,000-gal. pump, giving an ample water supply for both mills.

A 30x300′ wharf, on Traverse bay, a short distance from the mill, with 14′ of clear water alongside, is fitted with coal hoists and storage sheds, ample for the needs of both mills. Employs about 700 men.

Yield of fine copper, per ton of rock stamped, averaged 15.79 lb. for the decade ended 1912.

Production:

	Tons Ore Hoisted	Cost per Ton Hoisted	Tons Ore Stmpd.	Cost per Ton Stmpd.	Lb. Cu. per Ton	Mineral Lb.	Ref. Cu. Lb.	Cost per Lb. Cts.	Cts.(a)	Sell. Price Cts.
1918....	465,603	$2.204	454,293	$2.259	23.73	15,011,000	10,781,041	9.521	14,641(c)	24.73
1917....	.....	.....	605,202	.....	20.35	17,775,200	12,313,887	9.25	12.06	27.94
1916....	700,412	1.47	664,547	1.54	20.82	18,468,100	13,834,034	8.52	8.85	25.28
1915....	865,029	1.16	829,789	1.20	19.15	20,705,600	15,882,914	7.21	7.48	17.00
1914....	665,852	1.21	649,649	1.24	17.08	14,591,000	11,094,859	8.23	8.58(b)	12.47
1913....	395,100	1.53	366,458	1.64	15.76	8,018,000	5,778,235	10.42	13.22(b)	15.36
1912....	868,841	1.34	787,941	1.47	15.22	15,901,500	11,995,598	9.67	10.61	16.08
1911....	902,859	1.294	802,548	1.406	15.07	15,760,700	12,091,056	9.33	10.399	12.63
1910....	906,243	1.267	802,537	1.433	14.22	15,013,500	11,412,066	10.076	11.441	13.00

(a) Includes construction. (b) Includes strike expense. c) Includes cost of depreciation, depletion, smelting, freight, taxes, etc. The actual cost of operating was 11.2 c.

Production for 1919 was 12,800,000 lb.

The mine was closed from July, 1913, to April, 1914, due to the Miners' strike.

Finlay, in 1911, estimated 176,000,000 lbs. extractable copper, and a further life of 15 years. Our estimate made in 1915 was 260,000,000 lb. and a life of 23 years. In 1918, the company engineers estimated 260,738,612 lb., or a yield of 13,000,000 lb. annually for 20 years. Production to Dec. 31, 1918 has been 170,235,843 lb.

The Mohawk, while a much lower grade mine than was anticipated at the beginning, is a fine property, having an assured future with the benefit of a strong, honest, competent and thoroughly economical management.

MULOCK MINE **MICHIGAN**

Office: care R. P. Mulock, owner, Colfax, Iowa. Mine near Matchwood, Ontonagon county, Mich.

Property: 240 acres, the N. W. ¼ of Sec. 9 and the N. W. ¼ of N. W. ¼ and S. W. ¼ of Sec. 15, T. 49 N., R. 41 W., one-half mile N. W. of the Norwich mine. Exploratory work, 1903-05, showed 4 cupriferous amygdaloidal beds, of which two, about 400′ apart, averaging 6′ and 15′ in width, were opened by several pits, showing copper.

NATICK COPPER CO. **MICHIGAN**

Office: Leopold Bldg., Houghton, Mich. Mine near Copper Falls, Keweenaw county, Mich. F. W. Nichols, resident mgr.

Property: 200 acres, the N. E. ¼ and E. diagonal ½ of E. ½ of N. W. ¼ of Sec. 28, T. 58 N., R. 31 W., surrounded by holdings of the Frontenac Copper Co. Property slightly explored in early days, has been idle many years.

NATIONAL MINING CO. **MICHIGAN**

Idle. **Mine address:** Rockland, Ontonagon county, Mich.

Officers: B. T. Morrison, pres.; Harry Highley, sec.-treas.; Chas. M. Baker, Harry M. Howard and W. S. Warn, directors.

Inc. 1848, in Michigan; rechartered 1878, cap. increased later to $2,500,000; shares $25 par; issued, $1,875,000, and rechartered 1908. Listed on Boston Stock Exchange. Paid dividends, 1861-72, of $320,000, and levied a 40c. assessment 1909. The company has no debts.

Property: 1,852 acres, having the Michigan on the north and east and the Victoria on the south and west, carries the western continuation of the contact vein of the old Minnesota mine, now owned by the Michigan Copper Mining Co. When the work was begun, the property showed the relics of ancient mining operations, including a shaft of 50′ depth, timbered and scaffolded, with a nearly continuous sheet of copper extending down one side. The company had considerable litigation with the old Minnesota company over the title to 115 acres of land, the National finally winning. Stopped work in 1893.

NATIVE COPPER CO. **MICHIGAN**

Idle since 1855. **Office:** Delaware mine, Keweenaw county, Mich.

Officers: at last accounts, Ashley Watson, pres.; Chas. E. Adams, sec.-treas.; Ashley Watson, Frederick Hoitt and Frank L. Van Orden, directors.

Inc. 1849, and reincorporated March 29, 1880, in Michigan. **Cap.,** $1,000,000; $25 par; assessable; fully issued. Annual meeting, first Wednesday in March.

Property: 480 acres, being the S. ½ of Sec. 3 and N. W. ¼ of Sec. 10, T. 58 N., R. 30 W., all on the Keweenawan trap belt. A little work was done, 1852-55, on a fissure vein crossing the Ashbed. Assessments levied total $39,000.

NAUMKEAG COPPER CO. **MICHIGAN**

Office: 61 Broadway, New York. **Mine office:** Houghton, Mich.

Officers: J. Parke Channing, pres.; Sam A. Lewisohn, v. p.; E. H. Westlake, sec.-treas. Directors: J. Parke Channing, Adolph Lewisohn, I. J. Sturgis, F. L. Van Orden, Theo. L. Herrmann, J. H. Susmann and Chas. J. Paine, Jr. J. Harry Reeder, supt.

Inc. March 21, 1912, in Michigan. **Cap.,** $5,000,000; $25 par; $10 paid

in, issued 102,000 shares. U. S. Mortgage & Trust Co., registrar. Annual meeting, third Wednesday in March. Listed on Boston Curb.

Company ended 1918 with a cash balance of $28,426. Development expenses, $213,434, or $523,836 since 1912. This compares with a cash balance of $84,295 and development expenses of $159,870 in 1917.

Property: 1,200 acres, in Secs. 34 and 35, T. 55, N., R. 34 W., and Sec. 3, T. 54 N., R. 34 W., just west of Houghton, on the south shore of Portage lake, carries practically all of the Ashbed amygdaloidal beds, including the Atlantic and the Quincy-Pewabic lodes.

Development: property but slightly explored under former owners, whose efforts were sporadic and unimportant. Operations by present company were begun July 10, 1912, in the horizon of the Hancock lodes. Drill borings yielded good showings of copper at depth of 513′ in what is presumed to be an extension of Hancock No. 3 lode, and again at a depth of 1,301′ where a 6″ streak of coarse copper was encountered.

In 1914, the main, or Dakota Heights adit on the old Pewabic lode was extended 126′, encountered the lode at 100′, and drifts No. 2-A north and south were continued for 70′ and 63′.

This work showed a lode, 6-8′ wide, opened for 700′ and showing copper ore, but not of commercial value. During 1915 exploratory work on the Pewabic lode showed considerable copper on the No. 2 North drift. A 200′ winze was sunk from this drift and 1,602′ of drifts and crosscuts driven from the lower level. No beds of value were found in the southern part of the property.

In 1916, all exploration was confined to workings from No. 4 adit at N. end of property. No. 2 drift was put out 352′ on the old Pewabic lode, showing no copper. Work from No. 4 E. crosscut disclosed nothing worth further exploration, save the bed in which the breast of crosscut is in.

In 1917, main shaft was sunk 47′ to the 400′ level. "A" shaft sunk 107′ to adit level for ventilation, but the shaft and 250′ of drifting along the bed showed less mineralization than was indicated by diamond-drill cores. During 1918 work at the main shaft was pushed on the 400′ North drift, crosscut No. 2 W. was driven 450′, excellent copper showing in spots. An incline shaft was sunk 1,027′ from adit level. The showing at 1,000′ was so inferior to either the adit or the 400′ levels that work was abandoned in that section. Because of discouraging work in north end of property, company will explore south.

Equipment: includes hoist, compressor, pump and electric power. Is a legitimate mining speculation, backed by the Lewisohn interests.

NEW ARCADIAN COPPER CO. **MICHIGAN**

Fully described in Vol. XIII. Merged November, 1919, with New Baltic Copper Co., to form the Arcadian Consolidated Mining Co., which see.

NEW BALTIC COPPER CO. **MICHIGAN**

Fully described in Vol. XIII. Merged November, 1919, with New Arcadian Copper Co., to form the Arcadian Consolidated Mining Co., which see.

NEW YORK CONSOLIDATED MINING CO. **MICHIGAN**

Charter expired and corporate existence of company wound up by F. W. Nichols, Receiver, Houghton, Mich.

Property sold to J. H. Rickard, trustee, 1917.

NORTH LAKE MINING CO. **MICHIGAN**

Office: 60 Congress St., Boston, Mass. **Operating office:** Shelden Bldg., Houghton, Mich.

Officers: R. M. Edwards, pres and gen. mgr.; Arthur C. Paine, v. p.; Henry Tolman, treas., with H. D. Forbes and S. L. Powers, directors; A. L. Wyman, sec.

Inc. Aug. 26, 1908, in Michigan. **Cap.,** $2,500,000; $25 par; fully issued; $10.50 paid in. Assessment, No. 3, of 50c. levied March 6, 1918.

Company paid $144,000 for 360 acres of land, bought of St. Mary's Mineral Land Co., one-half in cash and one-half in 9,000 shares of stock at $8 beginning business with $300,000 cash in the treasury. The company suffered heavily by the failure of S. R. Dow & Co., Sept., 1912, losing $160,188 in cash and interest, unlawfully borrowed by its former president, S. R. Dow, and at the end of

1912 was $19,000 in debt. This indebtedness was wiped out by an assessment of $1 per share, levied April 18, 1913. Federal Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Shares are listed on the Boston Stock Exchange. Annual meeting, third Thursday in April.

Annual reports show:

Year	Assessments	Other Inc.	Exp.	Prev. Bal.	Curr. Bal.
1918.....	$50,000	$184	$35,098	$26,310	$11,224
1917.....	.....	387	55,264	28,567	26,310
1916.....	100,000	333	56,188	15,556	28,567

Cash on hand, Dec. 31, 1918, was $650, compared with $1,271 in 1917, and $26,683 in 1916. Accounts payable, 1918, $6,372; 1917, $8,999, and 1916, $6,520.

Property: 1,120 acres, in Secs. 28, 29, 32 and 33, T. 51 N., R. 37 W., lying immediately north and east of the Lake Copper Co. Property was supposed to carry about 7,000′ of the strike of the Lake amygdaloidal bed, but apparently the Lake bed curves to the westward, rather than to the east. Property also carries the copper-bearing series of the Evergreen belt of amygdaloidal beds, and various other unidentified cupriferous strata. The company's lands are crossed by the Fire Steel river, and are traversed by both the Mineral Range and Copper Range railways.

Development: exploratory work has been thoroughly and systematically planned and carried out the preliminary work consisting of diamond drilling to give 2 complete cross-sections, of about 8,500′ and 9,500′, respectively, to determine the strike and dip of all the strata on the property. These sections are about 1,000′ apart, and the contact of the Keweenawan series with the eastern sandstone has been definitely located by drilling.

Fifteen diamond-drill holes were put down between 1909 and 1911, with depths of 200′ to 2,000′. Several cupriferous amygdaloidal beds were disclosed, and No. 6 and 8 conglomerates, have been correlated as extensions of No. 1 and 2 of the Adventure series of lodes. No. 1 bed, of about 33′ width, showed 10′ charged with copper, but No. 2 bed was lean. Formations above No. 8 conglomerate bed are practically unexplored, and excepting the work done in holes No. 3 and 7 remain entirely untouched. Results obtained from holes 3, 7 and 13, below this conglomerate bed, were very promising and a vertical shaft was started July, 1913, near No. 3. At 300′ depth a crosscut to the N. W. cut No. 8 conglomerate. A 200′ winze, 30° incline, was sunk and 100′ gained in depth. On the 400′ level exploratory work to develop lodes cut on South Lake property was continued, but no commercial rock was found. At a distance of 1,050′ N. W. of the shaft the crosscut broke through into the overburden. In the summer of 1915 shaft sinking was resumed, and by June, 1916, had been bottomed on the 800′ level.

Crosscuts at right angles to the general trend of the formation were driven in both directions from the shaft on the 800′ level. In Dec., 1918, the S. E. crosscut was 1,576′ long and the N. W. crosscut was 1,969′ long. The S. E. crosscut penetrated a lode which showed 2 to 8″ of rich brick copper, and considerable fine copper. In September, the Butler lode was cut by the N. W. crosscut and a 30′ drift on the lode shows considerable copper; but operations were suspended at end of 1918 until more favorable cost conditions prevail.

Equipment: includes a hoist good for 1,200′ depth, small air-compressor, boarding house, and all mine buildings.

The North Lake is an exploration company, but in view of the encouraging results secured by diamond-drill borings on this and adjoining properties, is considered promising; the management is very capable.

OJIBWAY MINING CO. **MICHIGAN**

Office: Suite 3300, 120 Broadway, New York City. **Mine office:** Calumet, Mich.

Officers: Thos. F. Cole, pres.; Thos. Hoatson, v. p.; Jos. B. Cotton, v. p.; Frederic R. Kennedy, sec.-treas.; Henry Paull, auditor, above with G. A. Tomlinson, Walter B. Congdon, E. R. Grochau and Saml. Brenner, directors. Wm. J. Uren, mgr.

Inc. June 1, 1907, in Michigan. **Cap.**, $2,500,000; $25 par; assessable; issued 84,000 shares, $15.50 paid. Last assessment, 50c., paid August 1, 1918. Previous assessment of $1 paid Dec., 1912. Boston Safe Deposit & Trust Co., registrar, American Trust Co., Boston, transfer agent. Listed on the Boston Stock Exchange and New York Curb. Annual meeting, first Tuesday in June.

Balance sheet, Dec. 31, 1918, showed assets: mining property, $497,719; investments, $48,037; due on calls, $13,766; cash, $8,424; accounts receivable, $348; supplies at mine, $6,856; loss and gain, $726,879; total, $1,302,030. Liabilities: capital stock, $1,302,000; bills payable, $30.

Property: 2,520 acres, in T. 57 N., R. 32 W., Keweenaw county, bounded on the north by the Cliff and on the south by the Seneca. Owns in fee, 980 acres, mineral rights to 580 acres and recently purchased 960 acres for $37,800 cash.

The Kearsarge bed, located 1904, on the Miskwabik tract, about 4 miles N. E. of Mohawk No. 1 shaft, was proven by 5 bore holes drilled across the formation at intervals of 1,200′. Four of these holes gave good cores, being especially rich toward the northern limits of the tract. The holes showed the Kearsarge amygdaloidal bed to be divided into 7 alterations of amygdaloid and trap, immediately above the geological horizon of the Wolverine sandstone, the different cores each showing copper from either one or more of four horizons. Drilling indicates that copper values alternate from bed to bed, or layer to layer, if the cupriferous zone of the Ojibway be considered a single strata; only two of the amygdaloidal layers being well mineralized in a given cross-section, as a rule.

Development: by two 3-compartment shafts. No. 1, or north shaft, 1,500′ from the northern boundary of the property, is 2,051′ deep, disclosing copper from grass roots. Developments in this shaft show that the Kearsarge stratum is split in two, having distinct beds of 20′ and 13′ respectively, separated by 13 to 15′ of trap. The 1,600′ and 1,700′ levels show good ore.

No. 2 shaft, 1,116′ S. W. of No. 1, is sunk about 90′ in the footwall, and is 1,954′ deep, disclosing very little copper ground above 800′, though a material betterment is noted below that depth, and a very marked improvement is noted below 1,500′ depth. This shaft is sunk in unusually firm ground, requiring very little timbering. Work was suspended June 30, 1913, for lack of working capital.

The mine is equipped for development to a depth of 2,000′. Development has been systematic, but the former management planned making a mine upon 5-drill cores, which, as has been proven, gave rather too favorable an indication of the richness of the lode.

No work was done in 1919, and date of resumption of operations is uncertain.

OLD COLONY COPPER CO. MICHIGAN

By vote of stockholders, Feb. 26, 1917, company was consolidated with the Mayflower Mining Co., on a share for share basis, under the title of Mayflower-Old Colony Copper Co., which see.

ONECO COPPER MINING CO. MICHIGAN

Office: 78 Devonshire St., Boston, Mass. **Mine office:** Hancock, Mich.

Officers: John D. Cuddihy, pres.; John Brooks, sec.-treas.; preceding, with F. L. Maguire, J. E. Fitz Gerald, Jr., directors; John L. Harris, gen. mgr.

Inc. Dec., 1898, in Michigan. **Cap.**, $2.500,000; $25 par; $5.50 paid in; issued 70,000 shares June 9, 1913. Levied a 50c, assessment, Jan. 15, 1906, a $1 assessment, Feb. 21, 1910, and a $1 assessment, Oct. 10, 1912. Annual meeting, third Thursday in March. Stock listed on Boston Curb. Company its own transfer agent; Federal Trust Co., Boston, registrar.

Property: 800 acres in Houghton county, all on the Keweenawan copper formation, in Secs. 2, 10 and 11, T. 56 N., R. 33 W., forming a main tract of 640 acres, and a smaller tract of 160 acres, adjoining diagonally, on the N. E. corner. The property lies east of the Franklin Junior and Rhode Island mines, but is separated therefrom by a quarter mile of intervening lands.

Development: the mine was opened in 1862, and exploring work done 1890 and 1898. Present company began sinking June 26, 1899, putting down a 500′ shaft. Drifting on the upper levels showed a bed of fair width, carrying a little copper, and the shaft cut a narrow fissure, rich in copper, this being of

interest because it is one of the few productive crossveins found in the Portage Lake district. The bed on which the shaft was sunk has been variously identified as the Isle Royale, Grand Portage and Kearsarge amygdaloids, but is now termed the Oneco amygdaloid.

Work was suspended 1900 until Aug., 1909, when a diamond drill campaign was begun, 10 drill-holes being bored, cutting the Oneco bed and an unidentified amygdaloidal bed, called the Torch Lake or Tomahawk lode, about 1,200′ west of the Oneco, cores from both beds showing more or less copper. Drill holes were bored to depth of 1,000′, to 1,700′, locating the eastern sandstone and giving 2 complete cross-sections, 2,700′ apart.

The mine was reopened Nov., 1910, drifting resumed on the 4th level, the shaft sunk to a depth of 1,250′ and extensive drifting done on the 9th, 10th, 11th and 12th levels, both north and south, which showed the vein to be 10 to 20′ wide and well mineralized. Mine has been idle since 1914, due to lack of funds.

ONONDAGA COPPER CO. **MICHIGAN**

Address: Houghton, Mich.

Officers: Reginald C. Pryor, pres., treas and gen. mgr.; C. H. Lang, v. p.; Wm. Duffney, sec., with Ward B. Smith and D. L. Robinson, directors.

Inc. April 22, 1912, in Michigan. **Cap.,** $3,750,000; $25 par; $4 paid; issued, 99,955. Stock listed on the Boston Curb Exchange. State Street Trust Co., Boston, transfer agent; Commonwealth Trust Co., registrar. Balance, Dec. 31, 1916, $33,130.

Property: 10,230 acres in Ontonagon county, Mich., near the White Pine mine of the Calumet & Hecla Co. The formation, a fine-grained sand-stone, has been exposed by surface trenching at several points and found to carry flake copper in considerable quantity. The metal appears to be patchy, but as the ore frequently averages 10% where cross-faults occur, a commercial average may reasonably be expected.

Development: has been confined to diamond-drilling. The first hole completed in Jan., 1913, has a depth of 1,912′ and is apparently in the horizon of the Isle Royale-Arcadian lode. Hole No. 2 is 1,500′ deep. Hole No. 5 driven in 1913 to 2,000′ depth, failed to reach the contact. In 1914 holes Nos. 6, 7, 8 and 9 were drilled, making a complete cross-section from the S. E. corner of Sec. 14 to the N. W. corner of Sec. 4. None of the lodes cut in the holes gave cores showing copper in commercial quantities. Owing to financial conditions work was discontinued Sept. 21, 1914. Drilling near the northern boundary was again started July, 1915, each hole exploring the territory farther south. In the extreme S. E. corner the lode was located at 1,100′ depth, but had no copper. In 1916, drilling gave cores from the lode in several places, but revealed no commercial values, so operations were stopped, and management awaits results of development on neighboring properties.

OSCEOLA CONSOLIDATED MINING CO. **MICHIGAN**

Office: 12 Ashburton Place, Boston, Mass. **Mine office:** Osceola, Houghton county, Mich.

Directors: Wm. H. Dwelly, E. V. R. Thayer, J. M. Longyear, Wm. D. Calverly, D. S. Dean, E. B. Dane and J. T. Burnett.

Officers: E. V. R. Thayer, pres.; R. L. Agassiz, v. p.; C. H. Bissell, sec-treas.; G. L. Osgood, asst. sec.-treas.; James MacNaughton, gen. mgr.; Frank H. Haller, supt.; A. Lincoln Burgan, mill supt.; Chas. D. Hohl, chief engr.; Jas. Rowe, mng. capt.

Osceola branch: Jos. Discombe, mng. capt., North Kearsarge branch; Frank Lands, mng. capt., South Kearsarge branch; John T. Reeder, purch. agt.; Wm. Veale, chief clerk.

Inc. 1873, in Michigan, and reincorporated 1903 for a term of 30 years. **Cap.,** $2,500,000; $25 par; issued, $2,403,850. State Street Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Listed on Boston Stock Exchange. Annual meeting, second Thursday in March. Controlled by the Calumet & Hecla Mining Co., through ownership of 33,560 shares.

Dividends: 95 dividends paid from 1878 to Dec. 31, 1919, aggregate $17,670,125. Recent dividends were: $2 in 1904; $4 in 1905; $16 in 1906; $7 in

1907; $2 in 1908; $14 in 1909; $8 in 1910; $7 in 1911; $12 in 1912; $7.50 in 1913; $3 in 1914; $11 in 1915; $19 in 1916; $14 in 1917; $10 in 1918, and $3 in 1919.

Net Earnings:

1908.....	$667,105	1912.....	$1,163,288	1916.....	$2,776,160
1909.....	1,070,645	1913.....	381,967	1917.....	1,078,743
1910.....	758,586	1914.....	353,677	1918.....	487,915
1911.....	664,628	1915.....	1,610,860		

Income Account, years ended December 31:

	Total Income	Taxes and Expenses	Construct.	Dividends	Surplus for year	Total Surplus
1918.....	$4,082,236	$2,878,282	$716,038	$961,500	$19,136	$2,652,970
1917.....	3,494,468	1,716,843	698,882	1,346,100	*267,357	2,410,190
1916.....	5,065,134	2,222,916	66,058	1,826,850	949,309	2,677,547

* Deficit.

Current Assets and Liabilities.

Assets.

	Cash	Accts. Rec.	Liberty L. Bonds	U. S. Certif.	Copper on hand	Supplies	Total
1918....	$721,596	$1,007,861	$412,950	$500,000	$546,924	$285,365	$3,474,696
1917....	1,505,475	534,238	317,500	.....	499,441	335,719	3,192,373

Liabilities.

	Accounts Payable	Reserve for Taxes	Surplus	Total
1918.....	$160,844	$660,882	$2,652,970	$3,474,696
1917.....	229,779	552,404	2,410,190	3,192,373

Property: 2,120 acres, in 4 separate tracts, also an extensive millsite, in Houghton county, and miscellaneous lands in Houghton and Keweenaw counties, includes the Osceola, North Kearsarge, South Kearsarge and Tamarack Junior mines.

The **Osceola** mine proper, 720 acres, lying next south of the Calumet & Hecla, was opened 1873, on the Calumet conglomerate; this bed proving unremunerative, work was begun on the Osceola amygdaloidal bed, parallel and 730′ east of the Calumet conglomerate. The Osceola amygdaloid has a strike of approximately N. 39° E., and is opened by six shafts numbered from north to south. Crosscuts have been sent from the Osceola workings to the Calumet conglomerate, at various depth, without encouragement, and diamond drilling was done, 1904, to locate and test the Kearsarge amygdaloid on the old Osceola tract, but the results were not encouraging. It is said that the company ceded the right to mine the Kearsarge bed on its property to the Laurium Mining Co., in exchange for certain surface rights.

The 4 northernmost shafts of the Osceola mine proper are abandoned. No. 5 Osceola shaft, 700′ S. E. of No. 3, is 4,667′ deep. No. 6 Osceola shaft, formerly known as the Opechee, 1,300′ S. W. of No. 5, is 4,734′ deep. This shaft shows some good stopes, especially on the lower levels in the southern drifts, toward the Tecumseh mine.

Some work was done at No. 3 shaft in 1916, but stopped 1917, awaiting an improvement in labor and mill conditions. Mining was limited to No. 6 shaft, where the 46′ level was the most active and most productive. A new level was opened above the 38th in very good ground for 500′. No. 42 and 45 were driven into La Salle ground. The Auxiliary shaft 1,800′ S. of No. 6 was operating between No. 43 and 46 levels. Rope haulage was used to tram ore from this new shaft.

Osceola contributed 230,517 tons of 14.11 lb. copper ore in 1918, which compares with 203,288 tons of 12.38 lb. ore in 1917 and 225,030 tons of 14.89 lb ore in 1916.

The compressor house is equipped with a 50-drill, 2-stage cross-compound

air-compressor. Two trolley-type locomotives were ordered in 1918 for this section of the mine.

Water is secured from Lake Superior through a 1½-mile line of 6" pipe, connecting with a stand pipe at the Tamarack mine, leading to a 130,000-gal. concrete reservoir between Osceola shafts Nos. 5 and 6.

The **Kearsarge** or **North Kearsarge** mine, 1,120 acres, lies north of the Wolverine, with which its has underground connections. Extensive diamond drilling, 1905-1907, showed considerable good stamp rock in the foot and hanging walls, at points where the main bed was impoverished. The Kearsarge amygdaloidal bed ranges 16 to 20' in width, in this mine, and has proven very bunchy, though with very good average values. The southern workings, approaching the Wolverine, have shown improvement, but the mine is richest near the Ahmeek, to the north.

No. 1 North Kearsarge shaft is 4,229' deep and has a hoist good for 6,500' depth, operating two 6-ton skips in balance. No. 2 North Kearsarge shaft was abandoned at depth of 2,400', some years ago.

No. 3 North Kearsarge shaft, 1,825' N. E. of No. 1, is 3,403' deep and develops a large area of good ground, especially in the northern drifts. No. 4 North Kearsarge shaft, begun 1907, sunk 75' in the footwall, is 1,622' deep. The shaft is lined with concrete for 185' from surface, and has large loading bins just below the 10th and 13th levels, to which rock is milled through chutes, from the levels above. Equipment of the rock house includes two 24 by 36" crushers driven by an electric motor. The steel-frame boiler-house at No. 4 has three 84" boilers, with room for 2 additional. During 1917 and 1918, four storage-battery locomotives with 5-ton cars, were installed on No. 15, 16 and 18 levels.

The North Kearsarge surface plant includes a stone compressor house and a 30-drill compressor at No. 1 shaft, combination machine and carpenter shops, warehouse and office, all of wood.

Electric haulage was installed early in 1919 on levels No. 31 and 32, shaft No. 1, and levels No. 34 and 35, shaft No. 3.

North Kearsarge contributed in 1918, 745,722 tons of 12.60 lb. copper ore, which compares with 691,263 tons of 12.54 lb. ore in 1917, and 651,079 tons of 14.23 lb. ore in 1916.

The **South Kearsarge** mine, 160 acres, lying south of the Wolverine and east of the Centennial, was known formerly as the Iroquois. Development was begun September, 1899, and the best stopes are toward the Centennial line, the Kearsarge bed averaging about the same width as in the North Kearsarge and Wolverine mines, and being remarkably uniform in copper values. This mine is completely developed, both shafts and all but a few of the drifts having reached the boundaries of the property, and the mine is officially stated to have a very short life. There are about 600,000 tons in the pillars and arches yet to be mined, which will be a slow operation, with comparatively high costs.

In 1918, mine yielded 218,728 tons of 14.96 lb. copper ore, which compares with 343,254 tons of 14.28 lb. ore in 1917, and 408,572 tons of 17.06 lb. ore in 1916. About 180,000 tons came from the shaft pillars in 1917 and 1918.

No. 1 South Kearsarge shaft, the northernmost, is 2,820' deep, and practically at the boundary. The shaft rock house cares also for rock from No. 2 shaft, with which it is connected by an 1,100' trestle. Two skips are operated in balance. No. 2 S. Kearsarge shaft is 1,992' deep. This shaft was closed in September, 1918, due to lack of labor.

A 350-gal. per min. motor-driven pump handles the water coming through caved workings.

The **Tamarack Junior** mine, 120 acres, lying between the Centennial and Calumet & Hecla, has 2 vertical shafts, on the Calumet conglomerate, No. 2 being 3,360' deep, with 12 levels opened. The Tamarack Junior has been idle since 1903, and apparently is dead, so far as the conglomerate is concerned, with indifferent prospects of finding other workable cupriferous beds on the tract.

Rock is transported from the various mines to the mills by the Hancock & Calumet railway, a branch of the Duluth, South Shore & Atlantic system.

Mill: is built in 2 sections, the main section being 176x213', of steel

frame, with 4 steeple-compound stamps. These stamps, which are now in very general use in the Lake Superior district, were invented by B. Nordberg as the result of some years of experimentation. The stamps have circular mortars, with 5/8" screens, and hydraulic separators, about 20% of the copper from milling coming from the mortar discharges and separators. The older section has 3 stamps with circular screens having 3/8" openings, and is otherwise a duplicate of No. 2 mill.

The wash department of the 2 mills are equipped with classifiers and jigs with 6 round tables and 1 Wilfley table for each stamp, the Wilfleys taking headings from the round tables. Chilean mill reduces over-size material from the stamp mortars and there are crushing rolls and Hardinge mills.

A complete automatic sprinkler system for fire protection was installed in 1917 and a plant to pump the tailings further into Torch lake was put into operation in 1919. This plant was built jointly by the Osceola Consolidated Mining Co., the Lake Milling, Smelting & Ref. Co. and the Calumet & Hecla Mg. Co.

The steel boiler-house, adjoining the mills and furnishing power for both, has three 250 h. p. 72" boilers, delivering steam at 150 lbs. pressure, and nine 250 h. p. 84" boilers operated under 105 lbs. pressure, all of the locomotive-firebox type.

The power plant has an Allis-Chalmers Corliss engine, operating a 100 k. w. Morgan-Gardner d. c. generator, furnishing current for 220-volt incandescent enclosed arc lamps.

The joint pump-house of the Osceola and Tamarack mines has two 40,000,000-gal. triple-expansion pumps having 22", 40" and 60" cylinders, with three 30" horizontal plungers of 52" stroke and 42" discharge. Water is taken through an 8' tunnel, running 1,275' under Torch lake, with 3" intake holes, guarding against clogging by ice.

Production:

	Tons Ore Treated	Lb. Conc. Produced	Lbs. Cu. per Ton Ore Stpd.	Cost per Ton (a)	Lb. Cu. Produced	Cost per Lb. Cts.	Rec'd per Lb. Cts.
1918.....	1,194,967	.....	13.3	$1.78	15,919,647	17.67	24.41
1917.....	1,237,805	.....	13.0	1.63	16,084,958	13.86	27.89
1916.....	1,284,681	26,901,015	15.2	1.36	19,586,501	11.69	25.73
1915.....	1,361,089	26,777,790	14.5	1.18	19,731,472	10.03	18.19
1914.....	1,108,447	20,997,900	13.5	1.29	14,970,737	10.79	13.14
1913.....	735,044	14,945,645	15.4	1.60	11,325,010	12.30	15.50
1912.....	1,246,557	24,282,312	14.8	1.23	18,413,387	10.36	16.63
1911.....	1,246,596	24,452,912	14.8	1.14	18,388,193	9.28	....
1910.....	1,217,720	25,669,913	15.9	1.28	19,346,566	9.37	....

(a) Includes mining, transportation, stamping and taxes per ton of rock.

The total cost per pound in 1918 includes depreciation and depletion amounting to 3.07c per lb., but not taxes, about 4c per pound.

Production for 1919 was 10,825,841 lb.

Mine costs per ton, at each mine vary, as shown below:

	Osceola	North Kearsarge	South Kearsarge
1918.....	$2.10	$1.69	$1.74
1917.....	2.14	1.55	1.48
1916.....	1.84	1.30	1.18

Osceola is a low-grade mine whose profitable operation is ensured by the efficient management of the Calumet & Hecla control.

PACIFIC COPPER CO. **MICHIGAN**

Office: 705 Sears Bldg., Boston, Mass. **Mine office:** Leopold Bldg., Houghton, Houghton county, Mich.

Officers: Geo. P. Gardner, pres.; Chas. J. Paine, Jr., sec.-treas., with W. Cameron Forbes, Chas. E. Perkins, Nathaniel H. Stone, E. V. R. Thayer,

T. N. Perkins, Walter Hunnewell and R. R. Goodell, directors; F. W. Nichols, agent.

Inc. Aug., 1890, in Michigan. **Cap.**, $1,250,000; $25 par; issued, 20,000 shares, $10 paid, and 20,000 shares, $2 paid. Is controlled, through ownership of 20,000 shares, $10 paid, by St. Mary's Mineral Land Co. Paid a $1 distribution November 18, 1910. Ended 1918 with $9,585 cash on hand and $20,000 in Liberty Bonds.

Property: 820 acres, the N. W. ¼ and the S. W. diagonal half of the S. W. ¼ of the N. E. ¼ of Sec. 4, and Sec. 5, T. 54 N., R. 34 W. Land lies just N. W. of the Atlantic mine, and supposedly carries the northern extension of the Atlantic ashbed, on which a little exploratory work was done previous to organization.

Of the $40,000 originally raised by sale of 20,000 shares, one-half was spent in prospecting work. The timber on the lands has been sold at various times and 140 acres sold to the Naumkeag Copper Co. From these sales and interest on funds, company has distributed $40,000 cash and 4,000 shares of Naumkeag Copper Co. stock to its stockholders.

No mining done since 1900.

PHOENIX CONSOLIDATED COPPER CO. MICHIGAN

Controlled by Keweenaw Copper Co.

Office: Calumet, Mich. Mine near Phoenix, Keweenaw county, Mich.

Officers: Thos. F. Cole, pres.; Spencer R. Hill, v. p.; F. W. Taylor, sec.-treas., with G. G. Hartley, A. L. Warner and Thos. Hoatson, directors.

Inc. April, 1889, in Michigan. **Cap.**, $2,500,000; $25 par; all issued; $18.50 paid in. Last assessment $1, October 1, 1917. Is controlled by the Keweenaw Copper Co., through ownership of about 98% of the share capital, acquired by an exchange of shares on the basis of 10 shares of Phoenix for 1 share of Keweenaw.

Report for year ended December 31, 1918, showed assets of $1,873,016 which includes real estate $505,246, development and exploration $1,265,763, cash $3,339. Liabilities consist of capital stock $1,850,000 and $23,016 liability insurance fund.

In 1917, assets totalled $2,134,393, which included real estate $505,222, development and exploration $1,418,368; cash $2,192. Liabilities included $103,987 to Keweenaw Copper Co., $38,461 accounts payable, $23,538 contingent liability.

Property: 2,505 acres, carrying 5 different fissure veins, on which more or less mining has been done, at various times. The old Phoenix mine, included in the consolidation, is famous for having produced the largest mass of native copper ever found, weighing upwards of 500 tons. The Phoenix fissure, on which work was begun 1846, was opened to a depth of only about 90′, yielding considerable mass copper and silver. There also are possibilities on the Ashbed lode, which has been slightly developed by an exploratory tunnel. The mine has extensive openings and a modern equipment, and was worked for 6 years without success, until closed down June 15, 1905.

Diamond drilling on the Ashbed lode, 1910, gave encouraging results and a resumption of this work late in 1913, after several years of idleness, showed fair copper ore.

In 1917, diamond-drill holes, aggregating 3,063′, were put down, besides 1,410′ of underground work. The shaft is 1,616′ deep. In 1916, the "Old Phoenix" fissure was explored by a crosscut northwards to the hanging wall of the Ashbed lode; it is not mineralized, excepting where it cuts the lode.

Equipment: at power plant at No. 1 shaft includes 3 boilers, 2 air-compressors, hoist and pumps. The mill contains 7 Wilfley tables.

Operations suspended December 1, 1917, due to high operating costs and labor shortage.

QUINCY MINING CO. MICHIGAN

Office: 32 Broadway, New York. **Mine and works office:** Hancock, Houghton county, Mich.

Officers: Wm. Rogers Todd, pres.; W. Parsons Todd, v. p.; Jas. L. Bishop, Chas. J. Devereaux, Isaac H. Meserve, Wm. M. Belcher, John M. Longyear, Walter P. Bliss and Otto Kirchner, directors; W. A. O. Paul, sec.-treas.; F. J. McLain, asst. sec.-treas.; Chas. L. Lawton, gen. mgr.; Alex. Laist, smelter supt.; Ralph Hayden, mill supt.

Inc. March 30, 1848, under special charter from the state of Michigan. **Cap.,** $3,750,000; shares $25 par; issued, $2,750,000. Original cap., $500,000; reincorporated March 6, 1878, for 30 years more with cap. $1,000,000, increased, 1889, to $1,250,000, again increased, 1896, to $2,500,000, and once more increased, 1906, to $3,750,000. Re-incorporated 1908 for a third term of 30 years. Old Colony Trust Co., Boston, transfer agent. Shares are listed on the Boston Stock Exchange. Annual meeting, first Wednesday in June.

Comparative Statement: assets and liabilities exclusive of real estate, mine plant and supplies in use.

	Cash, Cu., Invest's	Accounts Rec.	Total	Accounts Pay.	Add. Supplies At Mine	Add. Supplies At Smelt.	Total
1918.....	$2,380,849	$263,330	$2,644,179	$467,440	$554,640	$71,745	$2,803,124
1917.....	2,512,676	530,377	3,043,053	403,055	485,665	67,219	3,192,882
1916.....	1,824,784	624,799	2,449,584	246,417	404,283	56,164	2,663,615
1915.....	1,018,381	626,283	1,644,664	282,861	271,035	32,118	1,664,956
1914.....	736,617	152,795	889,412	255,620	229,912	33,827	897,531
1913.....	406,633	53,110	459,733	110,179	352,998	44,386	746,938

Operations:

	Metal Sales	Total Income	Expenses	Net Income	Dividends	Balance Dec. 31
1918.....	$4,857,085	$4,938,560	$4,075,515	$863,044	$935,000	$2,803,124(c)
1917.....	6,350,500	6,402,836	3,893,569	2,509,267	1,980,000	3,192,882
1916.....	5,400,874	5,421,835	2,663,176	2,758,659	1,760,000	2,663,615
1915.....	3,983,958	3,999,745	2,126,071	1,873,674	880,000	1,664,956(b)
1914.....	2,054,622	2,063,650	1,858,057	205,593	55,000	897,532
1913.....	1,921,198	1,940,128	1,863,968	76,160	412,500	746,938(a)

(a) Balance Jan. 1, 1913, $1,233,278, also deduct $150,000 paid on note given St. Mary's Canal Mineral Land Co.

(b) After deducting $226,250 paid Hancock Cons. Mining Co. for mineral land purchased.

(c) After deducting income and excess profits tax for 1917, amounting to $314,461, plus correction for 1916 income $3,342, total $317,803.

Dividends: Quincy paid its first dividend in 1862, and profits have been disbursed to shareholders in every succeeding year except 1866 and 1867, giving the company a continuous dividend record of 49 years, from 1868 to date, rendering it the oldest dividend-paying American copper mine, and second only to the Tharsis Sulphur & Copper Co., Ltd., which has a record of continuous dividends since 1867, or 1 year longer than the Quincy's record. Recent dividends, by years, have been as follows: 1900-1, 36%; 1902, 28%; 1903, 22%; 1904, 20%; 1905, 24%; 1906, 50%; 1907, 54%; 1908, 18%; 1909, 16%; 1910, 20%; 1911, 16%; 1912, 21%; 1913, 15%; 1914, 2%; 1915, 32%; 1916, 64%; 1917, 72% 1918, 34%; 1919, 16% to December. Total dividends, $26,892,500.

A table of statistics, production, costs, etc., 1864-1905, is given in Vol. X., of The Copper Handbook.

The year 1918 marked Quincy's 70th anniversary. During this time it paid its stockholders $26,452,500 in dividends and still had $2,803,124 cash surplus; this is equivalent to a profit of 4⅓c on each of 613,596,622 lb. copper produced, and sold at an average price for the entire 70 years of 16.1300c, equal to $98,973,406.

Property: is very extensive, the management having adopted the policy, many years ago, of expansion of territory as opportunities offered. Acquisitions include a purchase of the Arcadian Copper Co., 1907, at a price of $750,000; the old Franklin mine, 1908, at a cost of $170,000, and the acquisition, 1910, of Sec. 14 and the N. E. ¼ of Sec. 22, of 800 acres, from St. Mary's

Mineral Land Co. bought for $600,000; 80 acres under and to the S. of shaft No. 2 were bought from Hancock Mining Co., July, 1915, for $226,250. In June 1919, company purchased 125 acres from the Hancock Mining Co., for $235,000. This parcel adjoins the original 80 acres.

The holdings of the Quincy now include lands formerly held by the Pewabic, Franklin, Mesnard, Pontiac, Arcadian and St. Mary's, in order named, from south to north.

Development: property carries the Pewabic bed and a number of parallel copper-bearing amygdaloids, from the Hancock mine, on the northern shore of Portage lake, to the boundary of the Franklin Junior mine, or about half way from Hancock to Calumet. Through the territory lately acquired shafts No. 2, 6 and 8 can be sunk to practically unlimited depth.

The mine was opened 1848, on the Quincy amygdaloid, a bed lying some distance west of the Pewabic, but the Quincy bed was abandoned 1856, when the Pewabic amygdaloid was opened. There is a footwall branch, known as the Pewabic East lode, underlying and parallel with the main bed, which occasionally yields good returns. The so-called West branch, about 300′ west of the Pewabic bed, has been opened by shafts No. 2, 4 and 7 through crosscuts on different levels and considerable stamp rock has been stoped therefrom. About 1,000′ west of the Pewabic bed is the Hancock amygdaloid, which is narrow but fairly mineralized, and which yielded an average of 21 lb. fine copper per ton, after reasonable selection, when worked in the old Hancock mine, this figure being materially above the present average return from the Pewabic bed.

The Pewabic amygdaloidal bed, on which all shafts are sunk, has a strike of about N. 30° E., with an average dip of 52 to 54° at surface, flattening in the lowest workings at depth of more than a mile to approximately 37° 30′, the shafts following the dip of the bed on catenary curves. The Pewabic averages about 20′ in width in the upper workings, but is materially narrower at the bottom. The lower workings show decreased copper values with much less heavy copper than above, but the ore is more uniform in value. Part of the decrease in copper returns is due to mining rock that formerly would have been left as worthless and practically the entire Pewabic bed is now mined. There are copper courses, or shoots, that rake to the north with depth.

The Pewabic bed has good walls and the mine requires comparatively little timbering. Dry-walls are built of waste rock, in wide stopes, saving the expense of hoisting waste and also the cost of timber. Shafts are sunk mainly in the footwall. The Pewabic rock now runs 19 lb fine copper a ton, with some silver. Previous to about 1890, about 40% of the copper was secured in masses. In 1912 the proportion of mass copper was about 15%; company reports approximately the same percentage to date. The southernmost drifts of the Quincy are about 3,000′ below mean water datum of Portage lake, while the northernmost workings at No. 8 shaft are fully 2 miles from the southern breasts.

Fire doors have been installed and every precaution is taken against fire. Miners are carried to and from work in man cars holding 30 men each, and hoisting cables are inspected frequently, with every care taken to prevent accidents.

The mine has a complete electric underground traction plant, tram lines averaging about 1,800′ each in length with gradients of 1.5% towards the shafts. The equipment includes 20 electric trolley locomotives, each hauling 4 or 5 three-ton rock cars at a speed of 6 to 8 miles per hour, 1 man caring for each train. In 1918 4 storage-battery locomotives were installed.

Tram cars are unloaded into 500-ton storage bins, built on the hanging-wall side of the shafts. This system of storage obviates the loss of time by either the tram lines or skips, and adds about 25% to the hoisting capacity of the mine, the property being equipped with hoisting and rockhouse

capacity for production of over 4,000 tons daily. About 200 rock-drills are used in sinking, drifting and stoping, and extensive use is made of the diamond drill for exploratory and preliminary development work.

The Quincy has been much troubled by air-blasts, violent disturbances brought about by the settling of super-incumbent rock in the scores of miles of worked-out openings, causing violent compression of the air elsewhere throughout the mine. The most serious disturbances from air blasts, which are practically artificial earthquakes, felt for only a few miles distance upon surface, were experienced in February, 1906, and March, 1914, and there seems reason to fear that these troubles will prove intermittently continuous for the balance of the mine's life. The air-blasts, while unpleasant, have caused more alarm than damage.

Development:

	1918	1917	1916
New openings	24,580′	26,900′	29,910′
Shaft-sinking	428′	499′	547′

New work averages slightly over 5 miles yearly, the mine having approximately 120 miles of workings.

Owing to the acquisition of adjoining mines, the Quincy shafts are numbered irregularly and are described herein in order of occurrence, from south to north, rather than in order by number.

No. 7 shaft: the southernmost, planned and sunk by John L. Harris, leaves surface at an angle of 53° and is bottomed at an angle of 37° 30′. The shaft was sunk 4,000′, in 18 months, through refractory rock, this phenomenal speed being rendered possible by sinking and raising in 5 sections simultaneously. The shaft is bottomed at the 71st level, at a depth of about 6,500′.

No. 7 shaft has a steel shaft rock-house, with 750-ton bins, a steam hammer, two 24x36″ crushers and an 8,000 h. p. hoist, with 52x84″ cylinders and winding drums 28′ in diameter by 11′ 9″ face, carrying 8,000′ of 1½″ steel cable, the main shaft weighing 120,000 lb. This hoist can raise 6-ton skips from a depth of 1½ miles at a speed of 3,000′ per minute, hoisting being limited to this rate by an automatic cutoff which also prevents overwinding. Starting a load of 6 tons from a depth of more than a mile, the hoist, if untouched, will check without damage after raising the skip only a few feet higher than the appointed place in the shaft house. There is a 1,300-gal. bailer in addition to skips. Operations were suspended at this shaft on June 1, 1918.

No. 4 shaft is closed down.

No. 2 shaft is 8,000′ deep (1919). It lies 585′ north of No. 4 shaft, and has about 38,800′ of active levels extending from the 51st to the 79th. Equipment includes a 1,300-gal. bailer for raising water and 30 to 40 power drills are operated normally.

Stamp ore from the shaft is dumped onto grizzlies, with wide bars, smaller material falling into circular bins, whence it passes by gravity to the crushers and thence into the main ore house bin. The smaller mass copper passes through the grizzly bars, is picked out by workmen and dropped into a chute carrying it to a steam hammer, there also being a chute for waste rock. The grizzlies allow large pieces of ore to fall into a bin of reinforced concrete in front of the steam hammer, where broken and sent to the main ore-house bin through a chute, while mass copper is dropped into a steel tube leading to a circular steel bin, which loads into railroad cars through chutes with pneumatic gates.

No. 2 shaft has a special crushing plant for waste rock, between the collar of the shaft and the rock-house. Poor ore is dumped into a circular bin and drawn by gravity to a crusher, going thence to circular storage bins, from which it is drawn off into wagons or railroad cars for use in rail-

road ballasting, road building and concrete work. There are similar crushing plants at the other main shafts, except No. 7.

The surface equipment of No. 2 shaft is very heavy, being practically a duplicate of that at No. 7, including two 60-drill cross-compound 2-stage air-compressors. A handsome concrete building was erected to house a new hoisting engine, being installed December, 1919. The new hoist will have a hoisting capacity of 10 tons from a vertical depth of 10,000′. It is probable that the hoisting plant at No. 2 will be removed to No. 8 and the equipment at No. 8 will be installed at No. 9.

No. 6 shaft, 1,928′ north of No. 2, below the 77th level, being sunk to the 78th, and has about 22,200′ of active openings extending from the 59th to 77th levels. This shaft yields Quincy's highest grade ore.

Equipment: includes duplex hoist, with a 22′ 6″ straight-face drum, raising 8-ton skips; a 1,300-gal. bailer, a centrifugal feed-water heater being attached to one cylinder of the hoist, and a 100-drill 2-stage compound air compressor. The boiler house has four 250-h. p. water-tube vertical boilers, nine 100-h. p. locomotive firebox boilers, and a powerful fire pump.

The Franklin mine lies next north of No. 6. The Quincy bought the old Franklin mine, 160 acres, for $170,000, taking possession December, 1908, and closing the mine immediately. It is doubtful if the old shafts ever will be used by the Quincy.

No. 8 shaft the Mesnard, 4,168′ north of No. 6, is at the 69th level. It was sunk 187′ in 1918 and has 21,800′ of active openings extending from 51st to 69th level. Levels in this shaft were opened at 135′ intervals and former numbering made the 24th level of No. 8 correspond with the 42d level of No. 6. This lode was poor in the upper levels, but the lower workings, while by no means up to the Quincy average of some years ago in quality of ore developed, show a bed wider and better mineralized than above, and the ground is of very satisfactory and profitable average, the improvement that began on the 10th level being very marked below the 20th level. The present average of the lode at the Mesnard shaft is nearly up to the present average of the older workings. This shaft is connected with the workings to the south, which at this depth are at 200′ intervals, from the 41st, which was the first to pass under the old Franklin mine, to the 63rd inclusive. Shaft started production in 1907.

The power-house at No. 8 has a 32x72″ duplex-cylinder engine with double conical drum, of 12′ 6″ minimum and 18′ 6″ maximum diam., good for 6,000′ depth, and a 65-drill 2-stage cross-compound air compressor. The boiler room has ten 250-h. p. boilers. There is a large changing house of reinforced concrete at this shaft, and many well-built houses for employees.

No. 9 shaft: 2,600′ north of No. 8 is the old 100′ Pontiac shaft, given a concrete collar and cut down to 3-compartment size. The shaft is 2,900′ deep, and at 2,600′ cuts a drift from No. 8, giving ventilation; it is not in operation.

To the north of the Pontiac shaft there is a long stretch of ground, bought of the Arcadian Copper Co. and St. Mary's Mineral Land Co., carrying the extension of the Pewabic bed and available for later development.

The surface plant of the Quincy is very complete. Miscellaneous buildings at the mine include a large warehouse, general office, several hundred dwellings at the mine location and a considerable number of houses at the mills.

Water for boilers and potable use at the mine location is taken from Portage lake, the pumps forcing water for a mile against a static head of 640′.

The company's private rail line, the Quincy & Torch Lake, built 1890, is 6 miles long, touching at all shafts and shops at the mine and at the boiler house, wharves and coal sheds at the mill. This line is connected with the Mineral Range, Hancock & Calumet and Copper Range railways.

Equipment includes several locomotives, freight cars and nearly 150 hopper cars for rock, the latter having automatic couplers and air brakes.

Storage-battery locomotives have been added, and are very successful.

Stamp-mills: at Mason, on Torch lake, 6 miles from the mine, have 8 stamps, with combined capacity of about 5,500 tons daily, the stamps giving an average duty of about 700 tons. Two 36″x8′ Hardinge ball-mills were added in 1916. In 1917, steel balls were substituted for pebbles in these mills. In 1918, 2 additional buildings were added to house 5 Marcy ball-mills and 240 tables for re-washing and re-grinding coarse tailings. The addition to No. 1 mill is 123′x215′ and to No. 2, 91′x132′. Automatic fire sprinklers have been installed in both mills.

No. 1 mill, of wood, has five 2-way stamps, taking steam at 100 lbs pressure. There is a mill for regrinding raggings, and the dressing machinery includes 92 jigs, and 32 Wilfley tables.

No. 2 mill, 630′ north of No. 1, has 3 heads, each set on foundations of heavy timbers and concrete, surmounted by a bottom plate of 22 tons, a middle plate of 18 tons and a top plate of 18 tons, all of solid iron castings, above which are the mortar boxes of the stamps. The stamps have 1″ revolving screens for the mortar boxes, with hydraulic discharges, as have the launders leading from the mortars, these yielding about 60% of the copper secured. Finishing jigs and slime tables have been replaced by 24 Wilfley tables, 8 for each stamp, assisted by 3 Standard concentrators. Each stamp has 12 rough jigs, 6 Wilfleys for finishing and 2 Wilfleys and 1 Standard table for slimes. There is a settler from which slimes are taken to the Wilfley tables. Regrinding is done by a Chilean mill, with 3 jigs and 3 Wilfleys as auxiliaries. By the adoption of hydraulic discharges and other improvements the capacity of the stamp-heads has been increased about 25%, while changes in the wash have given an increased capacity of 30%, with labor costs reduced 25% and loss in tailings cut down 40 to 50%. About 35% of the present product of the mill is No. 3 grade mineral, carrying very fine copper.

The mill power-house at No. 2 mill, has four 250-h. p. vertical water-tube boilers. There is an electric light plant.

The mill and pump-house has a 20,000,000-gal. centrifugal pump, and a 20,000,000-gal. triple-expansion pump, and the old pump house has 3 pumps with combined capacity of 21,000,000 gal. daily. Water is taken from a 7x7′ 6″ tunnel, driven 100′ under the bed of the lake. A 6x6′ 6″ tunnel 440′ long, connecting mills, boiler houses and pump houses, carries both water and steam pipes.

Tailings retreatment:

Tailings at the mills amount to millions of tons, and various experiments on reconcentration have been conducted at intervals since 1902. The companies that have attacked this project have bankrupted themselves with monotonous regularity, notwithstanding which, the successful results being secured at the regrinding mills of the Calumet & Hecla offer promise that the Quincy sands also may be retreated profitably at some future time. In November, 1919, it was reported that the company was to spend $500,000 on a plant for the treatment of this sand.

Smelter: this was blown-in Dec. 1, 1898. It is at Ripley, on the shore of Portage lake, opposite Houghton, just east of Hancock and only a half-mile from the mine. Remodeling of the mill was started in September, 1919. Smelter treated 23,000 tons of mineral in 1918.

One building has four 40-ton reverberatory furnaces, and a second building has 60-ton and 120-ton reverberatories, the latter having an automatic casting machine. On arriving at the reverberatory building the trucks carrying mineral are lifted by electric cranes and contents dumped into the furnaces, which are top-charged. An overhead trolley in the main building permits handling large bars and cakes, and a trolley dipping system is used for casting. Slags are trammed, in 3,000-lb. pots, to a

30′ hydraulic elevator which raises the ladles and dumps their contents over the end of a trestle. The cupola building has 1 blast furnace only, for reverberatory slags. A briquetting plant has 2 boiler-iron retorts for briquetting low-grade mineral before smelting. Miscellaneous buildings at the smelter include an engine house, casting house, cooper shop, office, laboratory, machine shop, 50x100′ warehouse, and a coal-shed.

Production has remained nearly constant for several years, but was seriously lessened by the labor strike of 1913. Silver production during 1918 was 13,982 troy ounces of metal about 80% pure and 20,800 troy ounces of alloy 12-20% pure. Profit on silver in 1918 totalled $54,680.

Recent Production:

	Tons Ore	Lb. Mineral Produced	Ref. Copper Lb.	Lb. Cu. per Ton Ore	Cost(a) per Lb.	Sell. Price
1919....	.....	.....	19,400,000	....	....	.....
1918....	1,174,147	31,970,969	19,948,965	16.99	18.7c	24.07c
1917....	1,280,837	35,785,490	22,195,577	17.33	15.6	28.6
1916....	1,204,026	33,864,280	21,065,612	17.5	12.4	25.5
1915....	1,269,000	34,251,765	22,054,813	17.38	9.42	18.01
1914....	.....	22,612,460	15,356,380	.....	11.51	13.29
1913....	804,645	18,161,575	12,184,128	15.11	13.65	15.59
1912....	1,309,258	30,040,360	20,634,800	15.76	11.09	16.24
1911....	1,382,524	32,550,440	22,252,943	16.1	10.17	12.72

(a) Includes mining expense, smelting transportation, etc., and taxes paid in Michigan.

Management has followed an unswerving policy of expansion so that Finlay's 1911 estimate of a life of 7 years with production of but 200,000,000 lb. of copper, has been altered by additional acreage purchased since that year, making probable the production of over 1,000,000,000 lb. more copper and a further life of more than 50 years. The company has the longest record of continuous annual dividend payments of any American copper mine, and bids fair to continue disbursing large profits for at least another generation or two.

RHODE ISLAND COPPER CO. MICHIGAN

Subsidiary of the Franklin Mining Co.

Office: 60 Congress St., Boston, Mass. **Mine office:** Demmon, Houghton county, Mich.

Officers: R. M. Edwards, pres.; Henry Tolman, treas.; Albert L. Wyman, sec.; with S. J. Jennings, H. M. Howard, Carl F. Moore and C. A. Hight, directors.

Inc. Dec. 9, 1898, in Michigan. **Cap.,** $2,500,000; $25 par; paid in $10.50. Assessment No. 2, of $1, was payable January 14, 1907, and assessment No. 3. of 50c, was payable June 15, 1910. The Franklin Mining Co. owns 99,524 shares, or 99%, acquired by exchange of 3 shares Rhode Island for one of Franklin. Annual meeting, second Wednesday in April. No bonded debt. American Transfer Co., Boston, transfer agent.

Annual report for 1917 shows rents $806, advanced by Franklin Mining Co., $15,791, total receipts, $16,597. Expenses amounted to $4,619 at mine, $1,295 taxes, balance being interest and incidentals.

Property: 800 acres, immediately north of the Franklin Junior mine. The ground has been explored by extensive diamond-drill work, showing cores from the Mesnard epidote, Allouez conglomerate, Pewabic amygdaloid, Kearsarge amygdaloid, and other copper-bearing beds. All the formations lying between the Kearsarge amygdaloid and the Calumet conglomerate were drilled by a series of holes, the Calumet bed showing traces of copper. The first cores from the Kearsarge bed showed copper in encouraging quantities from a bed of about 19′ width.

Development: No. 1 shaft, 500′ deep, is sunk on the Pewabic amygda-

loid. This lode is 8 to 10′ thick, of which 2 to 3′ near the hanging wall is well mineralized but spotty in the 4 levels opened.

No. 2 shaft, 1,227′ deep, has 10 levels, with a 125′ winze below the 10th The workings are north of the shaft, except on the 8th, 9th and 10th levels, the latter 2,400′ long. The 8th level south develops a stretch of copper ground toward the Franklin Junior, and a 1,400′ drift on the 8th level north showed 25 to 75′ stretches of payable ground. The Rhode Island property is being developed by the Franklin Mining Co., where at a depth of about 2,000′, the Pewabic bed averages 8 to 10′ width.

The Albany & Boston, or Allouez conglomerate, has been opened by crosscuts on the 500′ and 1,000′ levels, but the result was discouraging. A 250′ crosscut on the 10th level, about 1,100′ south of No. 2 shaft, has disclosed an amygdaloid bed of some promise. The east crosscut on the 8th level, at depth of 1,000′ cut 2 apparently valueless beds, one being the Mesnard epidote. The East lode, about 5′ wide, carries a little copper, but nothing of promise. The West lode, 96′ from the Pewabic, is 7 to 9′ wide, carrying occasional bunchy copper. The 4 amygdaloidal beds lying between the West lode and the Allouez conglomerate have been tested by N.-S. drifts, 3 proving barren.

Equipment: includes a frame shaft house at No. 2, with an engine house having hoist capable of raising 2-ton skips from a quarter mile depth, and a 12-drill air compressor. Buildings include a machine shop and smithy, warehouse and 15 dwellings.

The Rhode Island is idle and the plan of developing at greater depth through the north drifts of the Franklin is a good one, since the Pewabic bed to the south of the Rhode Island has shown great improvement below a depth of 2,000′ in both the Mesnard shaft of the Quincy and the main shaft of the Franklin.

ST. LOUIS COPPER CO. **MICHIGAN**

Out of business. Assets transferred to Calumet & Hecla Mining Co. For description, see Vol. XII.

ST. MARY'S MINERAL LAND CO. **MICHIGAN**

Office: 705 Sears Bldg., Boston, Mass. **Mine office:** Houghton, Houghton county, Mich.

Officers: Geo. Peabody Gardner, pres.; Walter Hunnewell, v. p.; Chas. J. Paine, sec.-treas., J. F. Dolloff, asst. treas., with John E. Thayer, Jr., W. Cameron Forbes, Albert S. Bigelow, Thos. N. Perkins, Charles E. Perkins, N. H. Stone and G. H. Russell, directors, Frederic W. Nichols, resident agent.

Inc. March 4, 1901, in New Jersey. **Cap.,** $5,000,000; $25 par, issued, $4,000,000. Controls through ownership of entire stock issue, except founders' shares, the St. Mary's Canal Mineral Land Co., a corporation incorporated 1863, in New York, to acquire 180,000 acres of land given by the State of Michigan for the construction of the first ship canal at Sault Ste. Marie. These lands in Houghton, Ontonagan and Keweenaw counties, formerly included the tracts on which the Calumet & Hecla, Baltic Trimountain, Champion, Ojibway and other mines have been developed. Company has about 400 shareholders. Shares are listed on the Boston Stock Exchange, American Trust Co., Boston, transfer agent. Old Colony Trust Co., Boston, registrar. Annual meeting, first Wednesday in March, in Jersey City, N. J.

Income of the company consists mainly of dividends from the Champion Copper Co., with a small but steady revenue from sales of land, timber and wood and occasional but irregular large receipts from sales of mineral lands. The receipts for 1918 were $465,506, the balance sheet of December 31, 1918, showing $206,169 cash on hand, with notes receivable $26,455; $215,000 in Liberty bonds, and no liabilities.

Share assets of the company December 31, 1918, were 50.000 shares Champion Copper Co ; 20.165 shares La Salle Copper Co.; 79 shares Han-

cock Cons. Mng. Co.; 20,000 shares Pacific Copper Co.; 37,222 shares of Houghton Copper Co.; 1,571 shares of Franklin Mining Co.; 2,000 shares Ojibway Mining Co.; 208 shares Copper Range Co.; 640 shares St. Mary's Mineral Land Co.; 8,340 shares Naumkeag Copper Co.; 17,902 shares Douglass Copper Co.; 10 shares Amphridrome Co.; 100 shares D. A. Stratton Co.; 3 shares Mayflower-Old Colony Copper Co.

From 1863 to 1900 the old company paid cash dividends of $2,200,000, and also paid stock dividends of 1 share of Tamarack, 1884; 1 share of Iroquois, 1890; 1¼ shares of Baltic and one-half share of Winona, 1898; 1 share of Old Colony and 1½ shares of Trimountain in 1899.

Dividends: (of the present company)—

1903	$1	1912	$3
1904	1	1913	3
1905	2	1914	0
1906	4	1915	8(b)
1907	5	1916	19
1908	0	1917	14
1909	1	1918	5(c)
1910	1(a)	1919	4(d)
1911	3		

(a) Not including Franklin stock distribution equivalent to $4.

(b) Not including North Lake and Hancock stock distributions equivalent in cash to $2.59 a share.

(c) Including $1 per share for depletion Champion ore reserves. Not including Winona and Mayflower-Old Colony distribution, which amounted to 36 shares of Winona Copper Co., and 16 shares of Mayflower-Old Colony Copper Co., for each share of St. Mary's Mineral Land Co., stock held. Stockholders entitled to fractional shares were paid 2½ for each share of Mayflower-Old Colony stock and 1½ for each share of Winona stock.

(d) Up to December 15, 1919.

Property: Jan. 1, 1919, consisted of 93,011.69 acres freehold, with mineral rights to 14,133.96 acres additional, property being scattered along the Lake Superior copper belt, with principal holdings on the South Range, S. W. of Houghton, in Houghton and Ontonagon counties.

The company, since its reconstruction in 1900, has refused to sell its mineral lands outright, preferring to join with other land holders in the formation of new companies, taking pay for its lands in shares, on a pro rata basis, or partly in shares and partly in cash. This policy has involved heavy outlays for exploratory and development work, but has resulted in giving the company a half interest in a new mine, the Champion, which is capable, alone, of furnishing funds to St. Mary's company for both dividends and development work elsewhere, and a continuance of this policy must result in time in making St. Mary's Mineral Land Co. the part or sole owner of a number of fine mines. Owing to the great extent of its lands, located mainly on the Keweenawan copper belt, stretching along the mineral range for scores of miles, the landed holdings of the company are of great potential value. The management is vigorous and far-seeing.

SENECA COPPER CORPORATION **MICHIGAN**

Offices: 11 Broadway, New York, and W. J. Uren, gen. mgr., 3 Calumet State Bank Bldg., Calumet, Mich. Mine near Mohawk, Mich.

Officers: Frederick Lewisohn, pres.; Walter Lewisohn, v. p.-treas.; E. C. Westervelt, v. p.-asst. treas.; with Hamilton Fish, Jr., T. F. Cole, F. deC. Sullivan, P. A. Clarke and W. F. Bartholomew, directors. O. B. Van Sant, v. p., E. J. McNamara, sec., J. M. Broan, supt.

Inc. Dec. 28, 1916, in New York. **Cap.,** authorized and outstanding 200,000 shares, no par value, but of declared value of $5 each. Bankers Trust Co., New York and Commonwealth Trust Co., Boston, transfer

agents. Central Union Trust Co., New York and United States Trust Co., Boston, registrars. Listed on Boston Stock Exchange and New York Curb. Annual meeting, second Tuesday in February.

In January, 1920, company decided to issue 50,000 additional shares and $500,000 of 8%, 5-year convertible bonds.

Corporation was formed to acquire control of the 11,207 shares Seneca Mining Co.'s stock; par 25, of which $10.05 was paid in, held by the Calumet and Hecla Mining Co. This stock was acquired January, 1917, for 44,828 shares, minority stockholders being offered the same terms of four shares of new corporation's stock for $60 cash. per share. Seneca Copper Corporation has now acquired all the 20,000 shares of Seneca Mining Co's stock, and that company is dissolved, the property passing to the new Corporation, which now operates it.

In June, 1919 company purchased the Gratiot Mining Co. holdings, comprising 600 acres lying south and east of the Seneca property and carrying the Kearsarge amygdaloid lode. The Gratiot Co. (controlled by the Calumet & Hecla Mining Co.), receiving $25,000 cash with additional payments extending over a number of years. The Gratiot property has two shafts which can be sunk deeper to connect with the Seneca mine, giving ventilation and better working conditions.

In October, 1919, Seneca acquired from the Cliff Mining Co., a millsite on north side of Keweenaw point consisting of 346 acres, the purchase including a railway right-of-way across Section 34.

Income Account—Years ended December 31:

	Interest Received	Expenses	Surplus for year
1918	$17,784	$8,635	$9,509
1917	30,772	22,849	7,923

Balance Sheet, January 1, 1919, shows assets: mining property $1,990,200; general construction, $162,757; development and exploration, $246,027; material and supplies, $114,897; accounts received, $132; insurance sustained, $704; cash, $94,312; U. S. Liberty bonds, $447,647; total $3,056,676. Liabilities: stated capital $1,000,000; cap surplus, $1,400,000; surplus, $600,000; accounts payable, $24,425; liabilities insurance fund, $14,818; profit and loss, $17,433; total, $3,056,676. Cash on hand at end of 1919 was over $300,000.

Property: 1880 acres (exclusive of the Gratiot and Cliff properties, just mentioned) north of the Mohawk and Ahmeek mines, is a swampy tract, somewhat irregular in outline and heavily covered with drift. The property carries the Calumet, Keweenaw and Allouez conglomerates and the Osceola, Kearsarge and other amygdaloidal beds, this statement being based mainly upon the outcrop of the Kearsarge lode seen in the N. E. corner and extending for 1¾ miles across the property. The mine is on the Keweenaw Central railway.

Development: the property was diamond drilled, 1907-08, giving some good cores from the Kearsarge amygdaloidal bed. This was followed by the sinking of a 957′ 3-compartment shaft, located about 3,000′ north of No. 1 shaft of the Gratiot mine. The shaft is sunk in the footwall country being 60′ from the Kearsarge bed on the 1st level, 250′ on the 3rd level, and 220′ on the 5th level. Development shows little or no copper above the 4th level, but on the 5th level the Kearsarge bed is about 15′ wide and carries a 4′ pay-streak having fair copper content. No. 1 shaft has a rock-house, with crusher.

Early in 1918, company started another shaft, near the Mohawk property. This is of three compartments, vertical for 1,450′ and then curves to meet and follow the Kearsarge amygdaloid bed which dips at an angle of 34° from horizontal, the lode being reached at the 1,624′ level, and the shaft bottomed late in 1919 at 1,985′. Company cut through the vein, sinking an additional 100′ to get the shaft out of the curve and into the incline. The cut showed the vein to be about 22′ wide.

Equipment: includes a small power-house, duplex hoist, good for 2,000′;

a 15-drill air-compressor and 2 boilers. Buildings include a boarding-house and bunk-houses.

Property is considered promising, and is being well, though judiciously advertised. Late in 1919, arrangements were made for shipping ore to the Baltic mill. About $25,000 per month is being spent on development and new equipment.

SENECA MINING CO. **MICHIGAN**

Inc. March 23, 1860, in Michigan. **Cap.**, $500,000; shares $25 par. A subsidiary of the Calumet & Hecla Mining Co., was dissolved October 10, 1918, all its property being conveyed to the Seneca Copper Corp., which see.

SHELDEN & COLUMBIAN COPPER CO. **MICHIGAN**

Address: care J. H. Rice, Houghton, Mich.

Property: lies next north of the Isle Royale mine and includes mineral rights under many private residences, near Portage Lake. An important discovery of sheet copper was made September, 1915, in an unidentified lode opened in excavating a cellar in this tract. Described in Vols. I and II of Copper Handbook. Idle for years.

SOUTH LAKE MINING CO. **MICHIGAN**

Office: 60 Congress St., Boston, Mass. **Mine office:** Houghton, Mich.

Officers: R. M. Edwards, pres.-gen. mgr.; Arthur C. Paine, sec.-treas.; preceding, with Thos. S. Woods, E. C. Robinson and Geo. E. Davis, directors.

Inc. Feb. 25, 1880, in Michigan, as the **Aztec Copper Co., reincorporated** Aug. 12, 1909, under present title and corporate existence extended for 30 years from Feb. 25, 1910. **Cap.**, $5,000,000, increased Dec. 11, 1917, from $2,500,000; par $25; 104,863 shares issued December, 1918; $7.60 paid in. Last assessment 50c paid, April 22, 1919, previous assessment, 50c, October 1, 1918. American Trust Co., Boston registrar, Federal Trust Co., Boston, transfer agent. Annual meeting, 1st Tuesday in March. Listed on Boston Stock Exchange.

Of the total issued stock 40,000 shares were given to the old stockholders share for share, 20,000 were offered and taken by the same stockholders at $2 per share and 10,000 shares were offered to holders of record May, 1913, at $6.60, but were largely taken by the underwriters; 10,000 shares more were offered in March, 1915, and an additional 10,000 in October, 1915, at $5, both of these last offerings being practically all taken by shareholders. In April, 1916, 10,000 shares more were offered to the stockholders at $7.75 per share.

January 2, 1918, the 100,000 new shares authorized by the increase in capitalization of record were offered to stockholders of record at $2 per share, at the rate of one additional share for each share held. This money was used to purchase 166 acres S. W. ¼ of Sec. 30, immediately north of its property, for which company paid $90,000.

Excess of liabilities December 31, 1918, was $178,176. Expenses at mine were $66,984, including $38,905 for underground work and $274 for construction. Cash on hand $4,244. This compares with 1917 excess of liabilities $97,076. Mine expenses, $203,593, including $130,049 for underground work, and $1,919 for construction.

Property: 500 acres of mineral lands, being the W. ½ of Sec. 31 and S. W. ¼ of Sec. 30 T. 51 N., R. 37 W., adjoining the Lake mine on the east, and the Adventure on the west.

History: work was begun on the property in 1862, though the name Aztec was originally given because the extensive prehistoric workings were thought to have been the work of the Aztecs. A 16-lb. stone hammer was taken from the old workings.

The mine had a stamp mill in early days, and produced 756,853 lb. fine copper, of which 100 tons was secured in a single mass. Exploratory work was done, 1905-06, on the Knowlton bed of the Evergreen series, by the Aztec-Algomah Development Co., and diamond-drilling was begun Sept., 1909, con-

tinuing until March, 1911, when suspended because of adverse financial conditions. Borings were begun at the base of Evergreen bluff, near the foot of the Evergreen belt, thence working southward toward the eastern sandstone. Eight drill-holes were put down at various points on the property.

Exploratory drilling having shown copper rock in five holes, four of them at the corners of a 200′ square, actual mine development work was determined upon. The holes showed that the beds run N. 70° W. and dip at about 56°. The drill-cores and recent underground work were carefully studied by A. C. Lane in 1916, who reports that of the four lodes cut by this work, No. 2 lode, or possibly a combination of number 1 and 2 lodes, is the Lake lode, mined by the Lake Copper Co., and that lodes dipping north in the 300′ crosscut, north of the South Lake shaft, are identical with, and the same as those dipping south on the 600′ crosscut south of the shaft. This means that the veins fold over, dipping both N. W. and S. E., and that a vertical shaft can reach both limbs of the V-shaped fold.

A 600′ vertical shaft, started 1912, opened up No. 1, 3, and the Butler lode, all north of the shaft. Ore was mined from all 3 lodes in 1917, and principally from the Butler, in 1918. A connection with the Lake mine on the sixth level gives good ventilation. Owing to the long distance ore has to be trammed, stoping will not be started until mechanical haulage is installed. The Butler lode is opened at 3 levels, viz., by crosscut into bluff from shaft collar, 300′ and 600′ level.

The tract north of the mine acquired in 1918, permits mining on the Butler lode to a depth of 5,000′, and carries the Knowlton lode, that is well mineralized and worked in the Lake Copper Co. ground.

New work in 1918 amounted to 573′ which compares with 2,520′ in 1917. Operations were suspended in July, 1918, due to labor shortage and high production costs.

Equipment: in 1915, a steel shaft-rock-house was completed and all machinery including a 5-drill air-compressor installed.

Production: commenced May, 1916, and to end of 1917, 63,368 tons sent to the Franklin mill, yielding 754,433 lb. of refined copper, or 11.03 lb. per ton. In 1918 to July, 7,694 tons were stamped, producing 226,141 lb. copper, or 28 lb. per ton. Company has a decidedly promising property.

SOUTH RANGE MINING CO. **MICHIGAN**

Out of business. Property sold, 1917, to Copper Range Cons., which see.

SOUTH SIDE MINING CO. **MICHIGAN**

Liquidated, and final dividends paid 1916. See Vol. XIII.

SUPERIOR COPPER CO. **MICHIGAN**

Controlled by the Calumet & Hecla Mining Co. through ownership of 50,100 shares.

Office: 12 Ashburton Place, Boston, Mass. **Operating office:** Calumet, Mich. **Mine address:** Houghton, Mich.

Officers: Rodolphe L. Agassiz, pres.; James MacNaughton, v. p. and gen. mgr., with C. F. Ayer, Walter Hunnewell, directors; G. G. Endicott, sec.-treas.; H. L. Bennett, asst. sec.-treas.; Ocha Potter, supt.

Inc. July 23, 1904, in Michigan. **Cap.,** $2,500,000; shares $25 par; fully issued and $1 paid. Listed on the Boston Stock Exchange. Old Colony Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Annual meeting, second Tuesday in April. Company owns 18,386 shares of the Lake Milling, Sm. & Ref. Co.'s stock.

Operations, years ended December 30:

	Total Receipts	Expenses	Assm'ts Taxes and Const. Res.	Divid.	Surp. for year	Inc. in Res. for Depr. & Depl.	Bal. Curr. Assts.
1918..	$520,523	$468,743	$33,945	.....	$17,835	$115,482	$622,609
1917..	483,877	269,782	59,115	100,000	54,980	.....	489,293

Dividends: initial dividend of $1 paid Oct., 1916; $1 paid April, 1917. Total dividends, $200,000.

Property: 400 acres, carries about 6,000′ of the strike of the Baltic amygdaloidal bed, between the Isle Royale and Atlantic mines, embraces Sec.

15, of T. 54 N., and R. 34 W. The tract has room for 3 or 4 shafts, and has a light overburden, the bed being proven by trenches at intervals of 1,000′, showing an amygdaloid of 35 to 40′ average width, with extensive carbonate stains, due to weathering, and a little fine copper near surface. The property has been trenched to the eastern sandstone.

The mine has two workable copper lodes, the Baltic, locally known as the Superior, and the West lode, discovered in 1911, a formation independent of the Superior, 14 to 30′ thick, which, however, cannot be stoped until the Superior lode is mined. On the Superior lode all ground above No. 15 level has been stoped out.

Development: by 2 shafts, sunk in the footwall of the lode, insuring solid ground, but necessitating crosscuts at each level. Owing to the great width of the copper-bearing stratum, it is necessary to crosscut along the bed at 100′ intervals. The Superior mine is opened on the northern extension of the Baltic amygdaloid bed, though some call this the Superior lode, not being satisfied that the correlation is correct. The Baltic bed, in the Superior mine, carries copper impregnations in the footwall, always an evidence of strong mineralization, and there is a conglomerate bed under the foot that carries a small amount of copper. The milling ore is remarkably deceptive in appearance, as the copper oxidizes readily, and when it has been broken a few weeks, appears lean, unless a fresh fracture shows its true nature. As a triangular tract of land intervening between shafts No. 1 and 2 is owned by others, they cannot be connected above the 12th level. The mine has about 11 miles of workings, underground work for 1918 totalling 2,564′, compared with 2,502′ in 1917, 5,136′ in 1916, 4,199′ in 1915, and 2,654′ in 1914.

No. 1 shaft, 3,104′ deep, is 1,200′ from the northern limit of the property; it develops the Superior lode on all levels, and the West lode from the 12th to 31st inclusive. The ground, especially in the upper levels, is very treacherous, and requires careful attention and close timbering. All recent development has been confined to the West lode, which shows commercial values. Exceptionally good ore was opened on the 31st level for 350′. A raise made from the 19th to the 23rd level, provides for safety and ventilation.

No. 1 shaft has a frame shaft-rock house, of the Calumet & Hecla type, equipped with engine and two 23x36″ crushers. The hoist is good for 4,000′.

The equipment at No. 1 shaft includes a combination boiler and engine house, with 90″ boilers, a hoist, and 10-drill and 18-drill air compressors. No. 1 shaft is connected with the main line of the Atlantic railway by a 7,000′ spur, and also with the Isle Royale railway.

No. 2 shaft, 2,540′ S. W. of No. 1 and 2,400′ from the southern boundary, sunk 40′ in the footwall, at an angle of 53°, is 20′ below the 18th level or 1,628′ deep. Equipment at No. 2 includes a steam hoist, formerly used at No. 1, and a shaft rock house having 2 crushers and an engine, with rated capacity of 1,000 tons daily.

Company reports that the future of the mine depends on developments on the 23rd and 31st levels south of No. 1 shaft, as there is only a reserve of 150,000 tons of ore to be stoped.

Buildings include an office, warehouse, smithy, change house, and a number of dwellings for employees at a small townsite lying between the shafts.

Production: (begins January, 1909)

	Tons Ore Stamped	Lb. Cu. per Ton	Cost per Ton	Lb. Cu. Produced	Cost per Lb., cts.	Rec'd per Lb., cts.
1918.....	102,213	15.78	$2.682	1,676,446	23.29	24.22
1917.....	129,587	16.99	2.50	2,201,672	16.88	29.39
1916.....	185,315	16.38	2.07	3,034,656	14.61	24.67
1915.....	212,051	18.23	1.88	3,866,484	12.29	18.125
1914.....	191,628	16.79	1.75	3,217,635	12.43	12.645
1913.....	130,826	22.87	2.36	2,992,765	12.86	15.387
1912.....	172,322	22.76	2.33	3,921,974	12.75	16.45
1911.....	162,599	19.90	2.39	3,236,233	15.31	12.70
1910.....	140,514	22.64	2.69	3,181,041	14.29	12.63
1908-09.....	16,835	22.22	....	374,077	.....	.....

The cost per pound in 1918, includes cost of depreciation and depletion amounting to 5.78 cents per lb.

Production for 1919 was 555,660 lb.

The Superior has thus far been a disappointment, the copper yield per ton of ore being much lower than calculated. The financial position of the company is, however, improving satisfactorily.

TAMARACK MINING CO. **MICHIGAN**

Out of business. Property sold for $3,600,000, equal to $60 per share, to Calumet & Hecla Mining Co., on April 1, 1917. For history and description of property, see Vol. XII.

TOLTEC MINE **MICHIGAN**

Idle many years. **Office:** care J. M. Longyear, Marquette, Mich. Owners, Gogebic & Ontonagon Land Co. and Galen L. Stone, of Hayden, Stone & Co., Boston.

Mine at Greenland, Ontonagon county, Mich, 960 acres, carries the underlay of the Evergreen belt and the Calico and adjacent beds of the Michigan.

Production: 1851-1860, was 413,443 lb. fine copper. Some diamond-drilling was done in 1908.

TORCH LAKE MINING CO. **MICHIGAN**

Idle. **Office:** 4-24 Exchange Place, Boston, Mass. **Mine office:** Leopold Bldg., Houghton county, Mich.

Officers: Thacher Loring, pres.; Chilton Cabot, sec.; F. W. Nichols, agent.

Inc. in Michigan. **Cap.**, $500,000; shares $25 par; assessable.

Property: 1,280 acres, Secs. 35 and 36, T. 56 N., R. 33 W., lying east of the Tecumseh mine of the La Salle company and about midway between Calumet and Lake Linden. The property was prospected, 1899-1900, by diamond-drill.

TREMONT & DEVON MINING CO., LTD. **MICHIGAN**

Office: First National Bank Bldg., Hancock, Mich. Mine at Victoria, Ontonagon county, Mich.

Officers: H. L. Baer, pres.; W. M. Gibson, v. p.; Chas. D. Hanchette, sec.-treas., with Claude Cooper, W. M. Gibson and Robt. T. Dunstan, directors, at last accounts.

Inc. Dec., 1908, in Michigan. **Cap.**, $250,000; shares $25 par; 6,000 issued; two 10c. assessments levied to date.

Property: 680 acres, freehold, including the old Tremont and Devon mines, adjoining and directly W. of the Victoria, carrying about 1¼ miles of the strike of the Keweenawan copper formation, and apparently in the horizon of the western extension of the Lake bed. The Victoria has a vein of some promise, outcropping about one-half mile from the Tremont & Devon line. A little work was done many years ago by shallow shafts near the center of the property, from which rock was taken, said to have yielded 500 lb. fine copper per fathom of ground broken, which was better than 25 lb. of finished copper per ton.

In Feb., 1916, the E. J. Longyear Co. began diamond-drilling. Three holes were put down; the first cut an unidentified lode lying above the Forrest lode; the third is said to have shown good values in the Victoria lode. No recent information.

TRIMOUNTAIN MINING CO. **MICHIGAN**

Office: 82 Devonshire St., Boston, Mass. **Mine office:** Trimountain, Mich.

Fully described under Copper Range Co., Mich., which see.

UNION COPPER LAND & MINING CO. **MICHIGAN**

Office: 70 State St., Boston, Mass.

Officers: Harry F. Fay, pres.; Harold H. Anthony, Ezra H. Baker, Samuel Carr and Albert B. Merrill, all of Boston, and John G. Stone, of Houghton, Mich., directors; C. J. Morrissey, sec.-treas.

Inc. 1863, in Michigan; charter extended in 1893. **Cap.**, $2,500,000; issued, $2,000,000; shares $25 par, $2.06—2/3 share, paid in. Old Colony Trust Co., Boston registrar; American Trust Co., Boston, transfer agent. Stock listed

on Boston Stock Exchange. Annual meeting, fourth Thursday in March. Books close 20 days before, and reopen day following.

Cash on hand Jan. 1, 1919, $18,985, principally derived from timber sales, 1914-1917.

Dividends: in 1899, 50c per share and ⅛ share of stock of Old Colony Copper Co.; in 1907, $2, and in 1908, 50c. per share; none since.

Property: 5,283 acres of land, carrying both surface and mineral rights, and 1,083 acres additional of mineral rights only, divided into 200 or more tracts in Keweenaw, Ontonagon and Gogebic counties, Mich. Company is primarily a land-holding corporation, although its charter empowers it to carry on mining operations as well, and it has from time to time investigated various tracts to determine their mineral value. Greater part of the land is heavily timbered, valued in 1910, at $125,000.

In 1910-11, exploratory work was done by diamond drill on 320 acres of land, lying W. of the Allouez and North Kearsarge mines, with satisfactory results, especially on the Quincy-Pewabic amygdaloid, which showed well in copper. The Allouez conglomerate was cut; also several other beds carrying copper.

VICTORIA COPPER MINING CO. MICHIGAN

Office: 60 Congress St., Boston, Mass. **Mine office:** Victoria, Ontonagon county, Mich.

Officers: Fred H. Williams, pres.; Chas. D. Hanchette, v. p.; Jas. P. Graves, treas.; with Willard S. Martin and A. W. Chesterton, directors; Sydney S. Millet, sec. and transfer agent; George Hooper, supt.; Chas. D. Hooper, mill and power supt.; G. A. Braun, Jr., engr.; A. R. Penberthy, clerk and purch. agt.

Inc. Jan. 16, 1899, in Michigan. **Cap.,** $2,500,000; $25 par; all issued; paid in, $15. Last assessment $1, April 15, 1914. Shares listed on the Boston Stock Exchange. First National Bank, Boston, registrar. Annual meeting, fourth Monday in February.

Income Account—Years ended December 31:

	Receipts				
	Copper Sold	Other Inc.	Expenditures	Prev. bal.	Surplus
1918.....	$305,644	$84,678	$358,917	$267,836	$299,242
1917.....	343,508	119,129	392,412	197,611	267,836
1916.....	293,298	176,930	384,898	112,280	197,611

Since organization, the revenue totalled $4,832,088, of which $3,119,853 was from copper sales. Mining expenses were $2,223,632, equipment $629,-379; real estate, $387,862; surface $290,967; general $100,920; crushing $269,871; and smelting, etc., $304,773.

Property: 2,389 acres mining lands, in Sec. 19, 20, 29, 30 and 31, T. 50 N., R. 39 W., and Secs. 24, 25 and 36, T. 50 N., R. 40 W. This tract has an extreme E.-W. width of 2 miles, and a N.-S. length of 2¾ miles, lying just W. of the Ontonagon river. It is practically all on the mineral belt, only about 100 acres lying on the eastern sandstone. The tract may carry the western extension of the amygdaloidal bed under development by the Lake Copper Co. Neighboring mines, all idle for many years, are the West Minnesota on the N., National on the E., and Tremont-Devon on the W. The lands are well timbered, with an inexhaustible supply of good sandstone for building purposes. Nearest railroad is the C. M. & St. P., at Rockland, 3 miles distant.

The first known attempt at Lake Superior copper mining was made in the winter of 1770-'71, on what is now the Victoria property. In 1849, the property, known then as the Cushin, was opened on a line of prehistoric pits containing masses of native copper, one weighing upwards of a ton. The name was changed, 1850, to Forrest, and property reorganized, 1858 as the Victoria Mining Co. Under these titles the property made 373,279 lb. fine copper at a loss of about $180,000. The mine was operated regularly,

on a small scale, 1849-'55, and thereafter spasmodically. It was unwatered 1883, but remained idle until work was begun March 1, 1899, by the present company.

Geology: the mine is on a high and steep hill, notwithstanding which the solid rock is covered with heavy sand and clay drift. The Forrest amygdaloid bed, on which the mine is opened, is 5 to 80′ wide, averaging about 12′, but of very irregular width and dip, and very bunchy in contents. The average strike is N. 66° E., and dip 61° N. W., the lode having about 2 miles of outcrop on Victoria lands. The formation is much disturbed at surface, the bed being irregular in dip, but widening at depth, with more regular walls. The lode is low in average grade, but fairly regular in copper contents, carrying low-grade milling ore, with best value near the hanging wall.

Considerable diamond drilling has been done N. of the Forrest bed, a total of 15,292′ of holes having been drilled, in 2 cross-sections, disclosing several beds that may warrant future attention.

Development: the old mine was opened by 5 shafts, deepest, 300′, located at irregular intervals, with levels spaced at 55 to 65′.

The Victoria, or, No. 2 shaft, which was chosen for new operations, was enlarged to 2 compartments, and a third compartment was added, 1916, 16″ E. of the skipway. The two skips work in balance. The shaft is 2,835′ deep, bottomed below the 27th level. Levels between the 4th and 24th have been opened at regular intervals of 100′; below the 23rd at intervals of 150′, with drifting on all levels. The total openings tributary to No. 2 shaft were 67,385′ on January 1, 1919.

The productive part of the mine tributary to Victoria or No. 2 shaft is on the Forrest bed, an epidotal amygdaloid having an average width of 4′ to 12′, widening to 80′, at one point. Walls are quite regular, but where crush zones occur, the mineralization extends into the walls, giving an occasional maximum of 50′ width of ore. The footwall bed underlying the Forrest, at a depth of 2 to 12′, is well mineralized in places, carrying occasional masses from 100 lb. to 3 or 4 tons in weight, but is very bunchy, copper occurring mainly on the foot, with considerable epidote on the hanging. Underlying this epidotal bed, at a distance of 60′, is a 6′ amygdaloid showing much epidote and allied minerals, with a little milling ore. Stopes opened on all levels from the 4th to the 22nd inclusive, give fairly uniform results.

The copper shoot developed by this shaft is 1,000 to 1,500′ wide, with a slight rake to the S. W. The ore stoped is low in average grade, but fairly regular in contents, with main values in stamp copper. All levels down to the 17th are connected by winzes, giving ventilation and safety.

	New drifts	New work	Cu. fathoms stoped
1918	2,447′	2,847′	5,833
1917	3,113′	4,090′	8,526
1916	1,350′	3,806′	10,755

Openings on the property totaled, January 11, 1919, 74,661′, or more than 14 miles. The mine uses 35 drills.

No. 6 shaft, 3,455′, E. of No. 2, started December, 1919 develops the eastern end of the property already explored by diamond-drill work; it has three compartments with two skipways, designed for 6-ton skips. The shaft is 1,172′ deep and has 2,593′ of workings in generally poor ground.

The mine also has crosscut tunnels, 419′, 150′ and 724′ long, the longest showing the contact between the Keweenawan trap beds and the eastern sandstone and cutting several amygdaloidal beds on which drifting, in the past showed encouraging copper mineralization.

Equipment: No. 2 shaft has a new shaft house, equipped with a duplex 32x72″ cylinder, with conical drum, hoist, good for 5,000′, and a 5-ton traveling crane for handling skips, man-cage and timber.

Equipment is sufficient to take care of exploration to a depth of 5,000′, the present depth being 2,835′.

The rock-house has storage-bins for stamp ore and waste, with chutes, loading gates and air lifts, and there is a pneumatic hammer for mass copper. The boiler house is for heating purposes only.

Buildings at No. 2 shaft include machine and carpenter shops, smithy, concrete changing house, hospital, warehouse, general store, mine office, boarding house, 76 dwellings, sawmill, lathe, shingle and planing mill. An amusement hall, for motion pictures, etc., was installed 1918. Water for domestic use and fire protection is pumped from a well having a storage tank about one-half mile from the mine.

The stamp-mill, on the bank of the river, near the hydraulic works, has a single 24x24″ Allis-Cuyahoga stamp. The stamp of 650 tons daily capacity, has ⅝″ mortar screens, and all oversize above 3/16″ is run to a set of 16x36″ Traylor rolls. The washing floor contains 22 jigs, 5 Wilfley tables, 6 Card tables, 1 Standard table, hydraulic separators and settling tanks. In 1917, 15 new concentrating slime tables were installed. Machinery is driven by a 12x12″ piston-valve engine. A 12x36″ engine was installed in 1918. The mill started June, 1906, shows tailing losses of only 0.1 to 0.15% copper with an extraction of 81%. Mineral (concentrate) was formerly smelted by the Calumet & Hecla Co., but is now smelted at the Quincy smelter at Ripley. In 1916, three boilers were erected at the stamp mill to insure power when the water supply is low. The mine and mill are connected by a 4,800′ tram line, in two sections, the upper with 6%, and the lower with a 12% grade. A stationary double-sheave hoist, at the top of the incline, serves to pull the empty cars up the steeper grades, but otherwise trains are operated by gravity, in counterbalance.

Hydraulic Plant: a large water power has been developed from Glenn Falls, on the W. branch of the Ontonagon river, about a mile from the mine, at a cost of $251,603. This is the best natural water power of the Lake Superior copper district, the stream dropping about 110′ on the company's property, by a series of small falls, between which are numerous rapids, with sandstone bottoms. The company utilizes 72′ of this drop. Power is developed by means of a dam, canal and hydraulic air-compressor.

The dam is 225′ between abutments, has an extreme height of 24′, is 14′ wide at the bottom and 8′ at the top, and has a 320′ main section with wings of 100′ and 160′, giving a total of 580′, built with an arch upstream. It is provided with two 44′ flush gates, for drainage and flushing out silt, a log chute, waste weir and sand fence.

The canal diverting water from the dam is 4,800′ long, 10′ deep at the head gates, with a bottom slope of 1″ in 100′. At the end the canal opens out in a forebay, at the extreme end of which the compressor shafts are located. The canal is equipped with drainage gates, slush gates, overflow weirs and submerged measurement gates.

The 3 intake shafts of the compressor are 5′ in diameter, spaced 19′ from center to center. The shafts were sunk through solid sandstone, by means of 5″ preliminary holes, bored to the required depth of 343′, then enlarged from 5″ to 5′ in diameter.

The shafts, lined throughout with concrete, formerly drew air through 5,000 special ⅜″ tubes. This proved unnecessary as the water falling down each shaft sucks air with it and this air is carried through 280′ of air chamber cut in the rock at the bottom of the shaft. A water seal at the intake end is formed by ⅜″ steel shells, firmly concereted into the bottom of the shafts. The air chamber is 281′ 6″ long, and 18′ wide, with minimum of 21′ and maximum of 26′ height, having a maximum capacity for 80,264 cu. ft. of compressed air. The water seal at the upflow end is formed by an arch of rock, 40′ long, below which a tunnel 10′ high leads to the upflow shaft, which is 16x18′ in section, sunk at 72°, with a vertical depth of 271′, leading to surface, where the water is again discharged into the river. The power head developed is 72′, and the pressure head 271′, giving a

maximum air compression of 117 lbs. per sq. inch. Imprisoned air, carried down the shafts by suction and swept along the tunnel in bubbles, by the rushing water, is released in the chamber where the constant accession of bubbles causes compression, escape backwards being prevented by the ⅜" steel shells connected in the shafts. The chamber, known as the compressor, is connected with a 12" pipe line to mine and mill. Extra pressure is relieved by a safety or blow-off pipe.

The Taylor hydraulic-pneumatic plant was completed in March, 1906, furnishes 4,000 to 5,000 h. p. under a full head of water, and has shown an efficiency of 82% under test. It is the largest single-unit air compressor in existence and the fifth installation of the sort in the world. It is possible to operate 1, 2 or 3 of the inlet shafts if so desired, with corresponding variation of energy developed, but only one unit is in regular use. The compression is automatic, practically isothermal, and the air as delivered is unusually dry.

An extensive topographical and hydraulic survey of the company's lands and the watershed shows that an average of 15,000 h. p. can be developed on the western branch of the Ontonagon river, but the expense of development necessarily will be large. During the drought of 1910, the water supply fell far below normal and additional storage for water was secured on the western branch of the Ontonagon, near the outlet of Lake Gogebic.

Production:

Year	Tons Ore Stamped	Lb. Cu. per Ton	Cost per Ton (a)	Copper Produced, Lb.	Cost per Lb., Cts.
1918.....	106,730	14.3	$3.12	1,533,536	22.18
1917.....	137,286	11.8	2.63	1,612,640	22.43
1916.....	146,690	11.3	2.16	1,661,832	18.40
1915.....	133,984	11.1	1.46	1,499,695	15.66
1914.....	139,862	10.6	1.41	1,486,242	16.0
1913.....	137,163	10.4	1.42(b)	1,428,693	16.5
1912.....	131,955	9.3	1.32	1,224,911	17.41
1911.....	126,894	10.2	1.20	1,303,331	13.01
1910.....	122,497	9.0	1.17	1,164,564	13.04
1909.....	118,605	9.0	1.48	1,062,218	17.09
1908.....	109,015	11.8	1.56	1,290,040	14.34
1907.....	95,035	12.7	1.71	1,207,237	15.8
1906.....	39,185	13.9	....	546,334	18.7

(a) Mining and milling. (b) High cost due to the labor strike and high footage, 7,428′ of development.

Tonnage costs are low, but finished copper costs are high, owing to the exceedingly low average tenor of the rock stamped which contains only about 0.65% copper. Costs would be ruinous, and the mine hopeless, were it not for the great advantage that the property enjoys through the cheapest power that is had by any copper mine in this or any other district. The company's holdings are extensive, exploratory work is being conducted with vigor, and the management has displayed both courage and good judgment in its operations.

The October, 1919, output was 110,000 lb., but it was said that no metal had been sold for a year.

WASHINGTON COPPER MINING CO. MICHIGAN

Office: Calumet, Mich. Mine near Delaware, Keweenaw county, Mich.

Officers: Chas. A. Wright, Jr., sec.-treas.; Thos. F. Cole, Spencer R. Hill, G. G. Hartley and Thos. Hoatson, directors.

Inc. in Michigan. **Cap.**, $2,500,000; shares $25 par; issued $1,500,000. Is controlled, through ownership of a majority of issued stock, by the Keweenaw Copper Co. Annual meeting, fourth Tuesday in March.

Property: 1,050 acres, on the western short of Mosquito lake, on which desultory work has been done at intervals in the past. Idle since 1901.

WEST MINNESOTA MINING CO. MICHIGAN

Defunct. John Coughlan, receiver, 68 Devonshire St., Boston, Mass. **Inc.** about 1864, in Michigan. **Cap.**, $500,000; shares $25 par. Was an old

and long inactive company owning 550 acres lying mainly W. of the Ontonagon river. Property sold May, 1916, to F. W. Nichols of Houghton, presumably for T. W. Cole. Sale ordered because company's charter had expired.

WETTERHORN LAND CO. **MICHIGAN**

Idle since 1913, and probably out of business. Owned 760 acres, in Secs. 21 and 22, T. 51 N. R. 42 W., Ontonagon county, Mich.

WHEALKATE MINING CO. **MICHIGAN**

Address: R. C. Pryor, mgr., Houghton, Mich.

Officers: N. F. Leopold, pres.; R. R. Goodell, v. p.; R. C. Pryor, sec.; A. F. Leopold, treas., with J. H. Rice, directors.

Inc. 1902 in Michigan. **Cap.,** $50,000; $25 par; all issued and paid.

Property: 240 acres in and adjoining village of South Range, Mich. Company only conducts a real estate business. Part of its mineral rights sold to the South Range Copper Co.

WHITE PINE COPPER CO. **MICHIGAN**

(Subsidiary of Calumet & Hecla Mng. Co.)

Office: 12 Ashburton Place, Boston, Mass. **Mine address:** Ontonagon, Ontonagon county, Mich.

Officers: R. L. Agassiz, pres.; Jas. McNaughton, v. p.-gen. mgr., with D. S. Dean, Fred'k Ayer, Jr., J. M. Longyear and E. V. R. Thayer, directors; G. G. Endicott, sec.-treas.; H. L. Bennett, asst. sec.-treas.; Thos H. Wilcox, supt.

Inc. 1909. **Cap.,** $5,000,000; $25 par; in 150,000 common shares and 50,000 5% cumulative preferred shares; issued 85,320 common and 10,000 preferred. Is controlled by the Calumet & Hecla Mng. Co., through ownership of 10,000 shares of preferred stock and 42,602 shares of common stock.

Company bought and retired 24,759 shares preferred stock in 1917-18.

Operations for years ended December 31:

	Total Receipts	Oper. Exp.	Taxes Divs., etc.	Surplus for year	Pfd. Stock Decrease	Balance Curr. Assts.
1918.....	$850,156	$724,649	$30,028	$95,479	$332,814	$402,040
1917.....	897,935	455,850	73,925	368,160	472,336	509,733

A dividend on preferred shares, equal to $116,676, was paid Jan. 2, 1917.

Property: the White Pine mine and surrounding land, formerly owned by the Keweenaw Association and others. The White Pine mine, 80 acres, is in Sec. 5, T. 50 N., R. 42 W., 3 miles E. of the Nonesuch mine at the extreme south end of the Keweenawan mineral belt. The other property was paid for by stock. A 9 mile railroad line connecting the property with the Chicago, Milwaukee & St. Paul R. R., was completed in Dec., 1915.

Geology: the tract shows eruptive rocks with interbedded sandstone and conglomerates of the secondary Keweenawan series. It also holds what F. E. Wright called epidote veins which are epidotal melaphyrs crossing the face of the cliffs parallel to the sandstones, but showing evidence of faulting and crushing. There is a second set of minor, nearly vertical epidote veins which, unlike the first, are barren of copper. The sandstone beneath the melaphyr is a fine-grained, dark red, almost quartzite rock that is jointed and has numerous calcite veins and occasional threads of malachite which extend down a few feet from the contact. The sandstone is, however, usually concealed by talus from the cliffs. Native copper also occurs in a very fine-grained sandstone-conglomerate, which is said to run from 5 to 10%. The dip of the bedded formation is towards the S. E., varying from 8 to 35°. The so-called Nonesuch formation consists of 2 parallel beds of sandstone running from 4 to 8′ in thickness and separated by a 5′ bed of slate, the entire copper-bearing ground having a width of about 40′. The beds carry considerable finely disseminated native copper which is as a rule very flaky. This formation is badly faulted and ground is said to have been thrown so that the payable lode abutted directly against the unpayable one. Besides the 2 veins described, there is a third which lies about 45′ back in the footwall.

Development: includes 4 shafts. The No. 2 temporary shaft was 1,578′ deep and had about 4,756′ of openings, Jan. 1, 1919. It connects with the old

White Pine shaft. This shaft is vertical for 581′, has 392′ of curve and 605′ of 45° underlay. A new hoist was installed in 1918. The main working shaft (called No. 3), located between the two temporary shafts (No. 1 and 2), is an incline 1,090′ deep, with about 9,666′ of workings. It is equipped with 5-ton skips.

The No. 4, an inclined shaft, west of No. 1 shaft, sunk in the hanging at a considerable distance above the lode, is 977′ deep and has about 14,560′ of workings. It is equipped with 5-ton skips. New workings totaled 3,578′ in 1918; 3,478′ in 1917; 5,288′ in 1916. The rock is soft and can be mined and crushed cheaply. The property has been extensively diamond-drilled, more than 120 holes having been made since work was begun in 1907. The drilling in 1917 consisted of 10 holes totalling about 1,000′ showing the second lode in shaft No. 4 to be of fair quality, and the third lode of shaft No. 4 to be of poor quality. Generally, recent development has shown good values.

Equipment: includes a power plant and compressor at the mine. A 750-k. w. electric turbine on Iron river, 1½ miles from the mine and mill, supplies water for the mill.

Mill: company has a 1,000-ton mill equipped with gyratory crushers, rolls and Hardinge mills instead of the steam stamps common in the Lake Superior copper country. Concentration is effected on Wilfley tables and the tailings saved, as future regrinding and leaching will undoubtedly be used in reclaiming the copper content.

During 1917, experiments were carried on with a 50-ton flotation plant, Minerals Separation type, with results so encouraging that a 600-ton flotation plant was erected. Two pebble mills were converted to ball mills for finer grinding and 2 Dorr thickeners, 3-tray type, each 40′ in diameter added. The mill is near the working shafts and connects with them by means of trestles over which rock is transferred from the shaft rockhouses to the crushing plant at the mill.

Production:

	Tons Ore Treated	Lb. Cu. per Ton	Mine Cost per Ton	Lb. Cu. Prod.	Cost per Lb.	Rec'd per Lb.
1918.....	194,568	16.83	$2.984	3,273,680	22.48c	24.30c
1917.....	212,889	19.11	2.365	4,067,529	14.99c	28.30c
1916.....	188,890	22.27	2.082	4,207,449	12.70c	25.26c
1915.....	114,039	24.76	2.182	2,824,145	16.54c	18.353c

1915 production is for 8 months only.

Mine costs include mining, transportation, stamping and taxes per ton of rock treated; 1918 cost per lb. includes 3.64c. per lb. for depreciation.

Production for 1919 was 1,987,543 lb.

Property is decidedly promising and its life has been lengthened by the flotation plant, which will reduce tailing losses and make available both lower grade ore and rock in which the copper is in an extremely fine state of subdivision.

WHITE PINE EXTENSION COPPER CO. MICHIGAN

Offices: 15 William St., New York, and Pinex, Ontonagon county, Mich.

Officers: J. R. Stanton, pres.; F. L. Smith, v. p.; G. W. Drucker, sec.-treas., with Angus Smith, Gerrit Smith, L. P. Yandell, Theo Dengler (mgr.), and J. H. Hurley, directors; Wm. R. Bolly, supt; John Jacka, mine capt.

Inc. June, 1915, in Michigan. **Cap.,** $3,750,000; $25 par; assessable; issued 85,640 shares, 85,000 of which have been paid in at $10. American Trust Co., Boston, transfer agent; Boston Safe Deposit and Trust Co., registrar. Listed on Boston Stock Exchange. Annual meeting, first Tuesday in March.

Due to labor conditions and high costs, all mining operations were suspended on May 28, 1918, and mine was closed down August 7, 1918.

	Receipts		Expenditures				
	Stock Sold	Int.	Mine	Const'n	Offices, etc.	Def. for year	Total Def.
1918.....	.....	..	$36,291	$1,691	$1,365	$39,347	$75,544
1917.....	$6,540	$18	81,103	1,181	8,705	84,430	36,197

Property: 1,440 acres mineral land in the White Pine district, Ontonagon county, 5 miles west of the White Pine property of the C. & H. Mng. Co. The company owns the leases and exclusive mining rights for 50 years, paying a sliding scale royalty. These leases were purchased from F. L. Smith of Detroit, and associates, who received 60,000 shares of stock in payment for their lands and the development work done prior to June 1, 1915.

The property is similar to that of the White Pine Copper Co. in that it shows sandstone and soft shales and slates. Considerable copper glance was found during diamond drill exploration work the copper in the core of one hole showing glance only, no native copper being present.

Development: thorough diamond drill development has been completed. It consists of one line of holes, spaced 1,000′ apart, which cut the copper-bearing beds about 400′ below the surface and on their dip; a second line of holes, similarly spaced, cut the beds about 600′ in depth; the third line of holes, also 1,000′ apart, cut the beds at a depth of 1,100′. The second line was located half way between the holes of the first; the third line holes were put down 250′ from those of the second line. Drilling has disclosed very uniform values for a distance of 4,000′ along the strike of the formation and at an average depth of 300′.

The first of the five shafts planned, 1,495′ from the E. boundary, reached a total depth of 438′ by 1918. It has 4 compartments, 21′14″x11′ outside timbers, with ultimate hoisting capacity of 1,500 tons per day. The first level is at 55′ depth, second 220′, third 320′ and fourth 420′. Drifting and crosscutting in 1918 totalled 1,963′. Total drifting to date, 5,623′, total crosscutting 1,322′. This work reveals that the ground carries a shale (No. 1), 5′ on the foot-wall, assaying 15 lb. copper per ton, then 6′ of barren sandstone, followed by shale (No. 2), or main lode, 4½′ wide, containing 22 to 30 lb.; 9′ below this is 18 to 24″ of fine-grained sandstone, returning up to 50 lb. per ton. Work indicates that these veins will outcrop on the property for 2½ miles. During 1918, a banded quartz shale was encountered 33′ E. of shale (No. 2) in the main crosscut, 4th level, that assays 20 lb. copper for 3″ along the foot, and contains fine copper sulphide grains disseminated through the mass.

Concentration will undoubtedly be by means of the flotation system, experimental work showing possibilities of an 85% extraction.

Equipment: 60′ head-frame, 329′ trestle, shaft-house, hoist of 500-ton daily capacity to 1,000′ depth, 12-drill compressor, 3 boilers, machine-shop, saw-mill, fire system, water-supply, 26½-mile telephone line, and dwellings, etc., for 67 men. A 9-mile railway is to be constructed.

Production: ore hoisted to date totals 18,189 tons of milling grade and 11,507 tons of low-grade ore. That for the mill is estimated to contain 21 lb. of copper per ton.

Possibilities of this mine are good, and exploration is in capable hands.

WILMOT MINING CO. **MICHIGAN**

Described in Vol. XIII. Probably out of business.

WINONA COPPER CO. **MICHIGAN**

Office: 60 Congress St., Boston, Mass. **Operating Office:** Winona, Houghton county, Mich.

Officers: T. S. Woods, pres.; N. W. Dean, v. p., with P. D. Burke, A. B. White, J. R. Findley, R. H. Summers, and G. A. Braun, directors. A. C. Paine, sec.-treas.; R. R. Seeber, supt.

Inc. 1898, in Michigan. **Cap.,** $2,500,000; shares $25 par; increased 1911 to $5,000,000; issued 166,667 shares, fully paid. Last assessment of $1 was paid July 2, 1914. The company, in 1911, acquired the property of the King Philip Copper Co., issuing 166,667 shares of Winona stock therefor. Boston Safe Deposit & Trust Co., registrar; American Trust Co., Boston, transfer agent. Listed on the Boston Stock Exchange. Annual meeting, last Tuesday in March.

Income Account—Years ended December 31:

	Copper Sales	Other Income	Expenditures	Prev. Surplus	Cu. Sold payt. not due	Balance of Assets
1918..	$166,228	$14,043	$284,020	$1,197,613(a)	.....	$1,304,362(a)
1917..	355,624	16,000	480,162	330,045	$79,602	301,110
1916..	473,583	15,500	545,202	223,324	162,840	330,045

(a) Deficit. The books being readjusted to meet present Governmental requirements.

Property: 2,608 acres, with timber rights to 1,768 acres additional, lying 3 to 5 miles S. of the mine.

Geology: the main tract carries the outcrop of the Winona amygdaloidal bed for about 2 miles. The mine was discovered 1864, by a line of old Indian pits along the outcrop, and a single shallow shaft was sunk, but owing to entire lack of transportation facilities little was accomplished. The property was leased in 1880 and worked for mass copper, but did not pay and was closed, until the present company began work April, 1898, when the old shaft was cut down, retimbered and deepened, and 3 new shafts sunk. The Winona bed is an amygdaloid of 12′ minimum, 20′ average and 46′ maximum width, striking N. 59° E., and having an average dip of about 70°. The Winona amygdaloid greatly resembles both the Baltic bed and the Knowlton bed of the Evergreen belt, carrying considerable epidote, calcite and quartz, with a limited amount of both mass and barrel copper, though the bulk of the metal occurs in milling ore. Diamond drilling has located several cupriferous beds on the Winona tract, all lean where cut. The older workings show mineral of the lighter grades, with somewhat heavier copper at depth. The mine is on a spur of the Copper Range railway.

Conditions underground are much better to the S. of the shaft than in the original workings to the N., but the mine has been extensively opened, and contains a large tonnage of rock available for stoping.

Development: No. 1, the discovery shaft, has 3 compartments, is 400 feet deep, with 4 levels opened, which show a little heavy copper and some stamp rock in the northern drifts, but is of little promise and has been idle since 1901.

No. 2 shaft is 1,000′ deep, with 9 levels opened, showing good copper at depth of about 200′, but with poor ground below, and has been idle since early 1906.

Old No. 3 shaft, 750′ deep, has been idle for years.

New No. 3 shaft, 1,650′ S. W. of No. 2, is bottomed at the 13th level. The 3d to 10th levels, inclusive, have been extended to No. 4 shaft at depth of 1,272′ showing alternations of good and poor ground. The openings, as a whole, show rock carrying 12 to 15 lbs. fine copper per ton, allowing for judicious stoping and reasonable selection of ground broken.

Equipment at No. 3 shaft includes a steel shaft rock house, equipped with two 18x24″ crushers, pneumatic steel gates, and pneumatic trolley cranes.

No. 4 shaft, about 1,700′ S. W. of No. 3, is bottomed at 1,460′, just below the 15th level. The shaft is sunk in the footwall. Connection is had with the King Philip workings on the 5th, 7th, 8th, 9th, 10th and 12th levels.

No. 4 shaft is equipped with a modern steel shaft rock house, having a cylindrical ore bin of about 40′ diameter, built of heavy steel plate, and a 24x36″ crusher. The hoist at No. 4 shaft is about 1,700′ from the central plant, and good for 1,500′ depth; it operates two 3-ton skips, working in counterbalance, at a speed of 1,200′ per minute.

King Philip No. 1 shaft, about 1,400′ S. of Winona No. 4 shaft, is 14x25′ in size, sunk about 85′ inside the footwall, at an angle of 70° and is bottomed at 1,500′. Copper content was improving in Nov., 1919. The lode shows a width of 20 to 25′, and carries considerable epidote. Company plans to sink this shaft and explore the Winona lode at depth.

King Philip No. 1 has a wooden shaft and rock house completed in May, 1916, which allows a 35% increase in output.

King Philip No. 2 shaft is 2,780′ S. of No. 1, on the southern side of Sleeping river, and 3,400′ from the southern boundary of the tract. This shaft, 1,108′

deep, and temporarily idle, is also sunk in the footwall; it has crosscuts on the 6th, 8th and 10th levels to the Winona bed, which show about the same copper content as in No. 1 shaft with which it has underground connection on the 8th level.

King Philip No. 2 shaft has an isolated steam hoisting plant. It contains a motor driven 18x24" crusher, and a mass hammer of drop type.

Development in 1918 amounted to about 166' of new openings. Due to the small amount of development some lean stopes were opened to keep up tonnage. Underground work has been confined principally to stoping for some years past.

Equipment: the power plant at No. 3 shaft includes an Allis-Chalmers 250-k. w. 3-phase 60-cycle 2,300-volt cross-compound a. c. generator. The equipment at No. 4 shaft includes a motor-generator set which has a 450 h. p. 3-phase 60-cycle 2,080 volt variable speed induction motor, at 600 r. p. m., connected on either side by flexible couplings, to two 20-ton fly-wheels, 10' in diameter. The motor-generator set has 2 bearings of 11x33", and 2 bearings of 9x27" with oil pumped through them at the rate of 16 gals. per minute, automatically filtered and water-cooled, insuring perfect lubrication. A 150 k. w. motor-generator operating the electric locomotives, transforms a 2,200-volt alternating current into a 500-volt direct current. There is a 25-drill air compressor in the central power house, and steam is provided by three 270 h. p. water-tube boilers, operated at 175 ibs. initial steam pressure.

The King Philip boiler house has a battery of two 300 h. p. Parker tubular boilers. The 34x40' power house has a 50-drill, 3-stage air compressor.

Mine buildings include a carpenter shop, machine shop, smithy, warehouse, office buildings, 2 boarding houses and about 150 dwellings for employees. There also is a sawmill, with wing for boilers, and a wing containing a shingle mill, the plant having a daily capacity of 20,000' of sawed lumber.

Ore treatment: the mill, built at a cost of about $300,000; is near No. 4 shaft, thus saving about 13c. per ton in transportation charges. The mill secures its water from the Sleeping river by a dam, with a storage capacity of 150,000,000 gal. Careful hydrographic surveys for 3 years show that the watershed tributary to this river yields about 3,000,000 gal. per day, which is enough for the mill. The item of 13c. per ton transportation charges saved by the new mill may seem small, at first sight, but it actually means about 1c. per lb. on the cost of finished copper, and may mean the difference between success or failure, so closely are costs and income adjusted in a low-grade Lake Superior copper mine. The custom for many years past has been to put Lake Superior mills some miles away from the mines, on large bodies of water, but in the case of the Winona, the management has had to consider costs rather than the easier solution of its milling problem.

Ore, brought to the mill by electric locomotives, is crushed by 2 Allis-Chalmers stamps, 1 a single head having a 24" cylinder, and 1 a steeple-compound head with 16" and 32" cylinders. Equipment includes 6 Hardinge conical tube-mills, 60 Wilfley tables and 12 setting tanks. Under the wash floor there are 6 large settling tanks for the wash water, which is reused after clarification. Tailings are carried by belt-conveyor for a distance of 321' from the mill, and delivered at a height of 123' above the ground, forming a great hill of waste at hand for retreatment at some future time. Slimes are delivered by a 1,200' steel launder to a ravine beyond the sand discharge. During 1918, a concrete building 48x66' with wing 22x35½' was built adjacent to stamp-mill, to be used as a flotation building, and a contract was let for equipment of a 600-ton flotation plant consisting of a 24" 16-cell Minerals Separation machine, Dorr thickeners, classifier, pumps, tanks and one Oliver filter. This plant was ready for operation in August, 1919.

In August, 1914, the mine was shut down on account of the low price of copper. In Oct., lessees started work, the rock being shipped at first to the Centennial-Allouez mill, and after January 1, 1915, to the Trimountain mill, until June, 1915, when the company resumed work, sending the mine output to its own mill.

Operations were again suspended in July, 1917, as company had been producing about 166,000 lb. of copper per month at a cost of 27c. per pound, and

copper was then selling at 23½c., the price fixed by the Government. A loss being inevitable, the mine was leased in October, 1917, to the superintendent and others on a royalty basis. Company resumed operations, May, 1918, closed down February, 1919, and resumed August, 1919.

The Winona has made various separate campaigns of production, because the percentage of copper extracted ran down to unpayable figures on several occasions. Returns show an average of 18.95 lb. fine copper recovered per ton of rock stamped in 1904, 14.34 lb. in 1906, and 12.59 lb. in 1907.

Winona's ore actually averages 20 lb. of copper per ton, but inasmuch as the copper is light and flaky, the mill has never been able to make adequate recovery. Much experimental work has been done in an attempt to solve the problem, and the new flotation unit may be the solution.

Production: 1902, 101,188 lb. copper; 1903, 1,036,944 lb.; 1904, 646,024 lb.; 1905, no production; 1906, 278,182 lb.; 1907, 1,285,863 lb.; 1908, 1909 and 1910, no production.

Recent production:

	Tons Ore Stamped	Mineral Lb.	Lb. Copper per Ton Ore	Rec. per Ton Ore	Ref. Copper Produced Lbs.
1918	57,837	1,359,055	23.67	14.15	819,857(b)
1917	112,083	2,640,780	23.56	13.33	1,494,472
1916	161,829	3,700,180	22.85	13.39	2,167,255
1915	102,594	3,032,045	29.55	16.79(a)	1,722,638
1914	123,339	2,239,170	18.15	10.96	1,352,085
1913	120,806	2,467,460	20.42	11.99	1,448,737
1912	181,148	3,586,520	19.79	12.738	2,307,237
1911	97,445	2,533,870	26.00	13.091	1,275,675

(a) Higher recovery due to closer selection of rock stamped. Copper was sold, 1917, at about 20.05c. per lb., and 1918, at about 26c. per lb.

(b) Does not include 756,826 lb. produced by lessees for the first four months of the year.

Notwithstanding the unsatisfactory results secured thus far, the Winona is believed to have a very good chance of making a successful low grade mine. The management is efficient and resourceful.

WOLVERINE COPPER MINING CO. MICHIGAN

Office: 15 William St., New York, **Mine office:** Kearsarge, Houghton county, Mich.

Officers: L. P. Yandell, pres.; R. E. Graver, treas.; F. G. Henmann, sec. Directors: L. P. Yandell, C. D. Lanier, W. A. Paine, J. S. Dunstan, J. R. Stanton and Theo. Dengler. Theo. Dengler, genl. mgr.; W. R. Bolley, supt.; Chas. L. Noetzel, clerk; Arthur Williams, mine capt.; A. Floetter, engr.

Inc. 1890, in Michigan. **Cap.,** $1,500,000; $25 par; $13 per share paid in. The company owns $80,000 stock in the Michigan Smelting Co. Old Colony Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Annual meeting, first Monday in August. Listed on Boston Stock Exchange. In August, 1919, stockholders voted for continuation of corporate existence for a further term of 30 years beyond date of present article of association which is July 28, 1920.

Financial Statement for fiscal year ending June 31:

	Receipts	Tot. Exp.	Profit	Div.	Surp. for year	Total Surplus
1919	$997,376	$875,278	$122,098	$150,000	$27,902*	$847,812
1918	1,074,491	737,711	336,780	570,000	233,220*	875,714
1917	1,707,441	681,036	1,026,405	780,000	246,404	1,108,933
1916	1,369,286	634,068	735,218	660,000	75,218	862,529
1915	929,193	610,991	318,201	360,000	41,798*	787,311
1914	484,061	402,936	81,075	.....	81,075	829,109
1913	1,326,501	724,987	601,514	600,000	1,514	748,034
1912	1,327,030	713,840	613,180	540,000	73,180	746,520

* Deficit.

Surplus at end of last financial year was $847,812, including cash $110.169:

Liberty bonds, $630,000; copper, $72,015, equal to $14.13 per share, which compares with $14.59 a share in June, 1918.

Dividends: the first dividend was paid Oct. 1, 1898, and 45 dividend disbursements, to Jan. 1, 1920, aggregated $10,350,000.

Property: 320 acres, 280 acres freehold, and 40 acres mineral rights, carries 3,100′ of the strike of the Kearsarge amygdaloidal bed, on which the mine is opened. Neighboring properties are the North Kearsarge (Osceola Cons. Mng. Co.), on the N., Mayflower on the E., Mayflower and South Kearsarge (Osceola) on the S., and Centennial on the W.

The Kearsarge bed averages about 16′ in width on the Wolverine property, and this mine was for many years the richest amygdaloidal mine in the Lake Superior district, second in richness only to the Calumet & Hecla among all Lake Superior copper mines. All shafts are sunk at an angle of 41°, and skip tracks have been given crossties, in place of longitudinal stringers, following the plan introduced in the Calumet & Hecla, which permits the use of a cheaper grade of timber and allows quicker repairs. All levels, except some of the very upper ones, are opened at 100′ intervals. Owing to the uniformity of the cupriferous bed, all levels from the 1st to the 23d, inclusive are opened through the entire property, connecting all 4 shafts to the bottoms of No. 1 and 2 and connecting Nos. 3 and 4 only below the 17th level.

A new lease of life was given the mine by working the footwall rock of supposedly worked out stopes, throughout the mine. The total width of the lode is 15′ to 20′; in the original work only 12′ was mined, so there remains 3′ to 5′ of rock which contains about 18 lb. copper per ton.

For the year ended June, 1919, 35% of the total rock hoisted was secured by continuation of this re-working practice compared with 40% from similar work in year ended June, 1918.

Company is reported negotiating for the purchase of 640 acres from the Centennial or the Kearsarge properties. This would allow shafts to be carried to a depth of about 10,000′. No authentic confirmation of the report could be obtained.

Development: several parallel lodes have been prospected, an exploratory crosscut being driven for 2,000′ across the formation on the 14th level, reaching the Kearsarge conglomerate on the W., where it was barren. Another exploratory crosscut, 1,600′ long, driven E. on the 28th level, intersects the Old Colony lode 1,489′ E. of the Kearsarge amygdaloid and cuts other cupriferous beds. A little drifting on the Old Colony lode failed to disclose payable ground. The West lode lying 80′ W. of the Kearsarge has been opened by several levels, with some payable ore.

The Wolverine lands also carry the Osceola amygdaloid, but it proved noncommercial in a 631′ shaft with drifts on 5 levels.

No. 1 shaft near the Kearsarge line, was abandoned years ago. No. 2 shaft, next S., is bottomed at 1,700′ and is used for handling men and supplies.

No. 3 shaft sunk in the footwall, is bottomed at the 39th level, total depth 4,005′. Sinking was stopped at the 39th level as the hoist had reached the limit of its rope capacity. It is proposed to open and mine the remaining 100′ below the 39th level by means of a winze 600′ S. of the shaft. This inclined winze will eventually attain a depth of 700′ in order to reach the boundary of the property.

Shafts No. 3 and 4 are connected by drifts down to and including the 33rd level.

No. 4 shaft sunk 45′ in the foot, to guard against drawing, has reached the 43rd level, total depth 4,460′, the bottom of the mine.

Development in 1918-1919 amounted to 1,259′ which compares with 1,972′ the previous year. All ground north of No. 3 shaft, from the 25th to the 40th levels, with the exception of about 90′ of shaft pillars, was stoped out in 1919. Other openings showed a satisfactory grade. In 1918, levels No. 40, 41, 42 and 43 had practically reached the southern boundary, and drifting showed the levels to be well mineralized.

Early in 1919, the South Kearsarge mine of the Osceola Cons. Mng. Co., discontinued pumping the lower levels. The Wolverine management was forced to connect from their 29th level to the South Kearsarge 23rd level, and cement

in pipes with control valves and pressure gauges. The water is carried by pipe, 2,870′ along the 31st level to a fork at the 30th level in No. 3 shaft. As an additional safeguard, concrete dams were built on the 38th and 39th levels, south of shaft No. 4, to intercept any sudden, large volume of water. The pumping facilities were doubled and a 1,400-gal. boiler installed in shaft No. 3. Company handles 110,000 gals. of South Kearsarge water per day, in addition to their own water.

Equipment: at No. 3 shaft duplicates that of the Mohawk mines. That at No. 4 includes a 14″x60″ duplex-cylinder hoist with double conical drum having a maximum diameter of 18′, capable of raising 4-ton skips from 1 mile depth, with a 1¼″ steel cable. There are 20-drill and 22-drill compressors, and 3 water-tube boilers, with automatic stokers and fuel economizer.

Mine has electric pumps, 3 at No. 2 shaft, and two at shafts No. 3 and one at shaft No. 4, three pumps having an average lift of more than 1,000′ each.

The principal mine buildings are at No. 4 shaft, but there is a model changing house at No. 3 shaft. A telephone system connects underground pump stations and all buildings. The company maintains a 6-ward hospital and staff, and owns a large number of substantial dwellings, the location being exceptionally prosperous in appearance.

Rock is transported between the mine and mill by the Mohawk & Traverse Bay railroad, with a down-grade haul of 13 miles.

Mill is near the mouth of Tobacco river, on Traverse bay, Lake Superior, and adjoins the Mohawk mill, both being served by a single pump and managed by a joint superintendent. The mill has 2 Nordberg heads and uses Wilfley tables. Mineral from the heads and wash is sluiced to the basement through iron pipes, going to the works of the Michigan Smelting Co. at Houghton. A tailings plant provides for settling out the water and stacking the tailings 800′ from the mill by belt conveyor.

The boiler-house contains a battery of 200 h. p. water-tube boilers, equipped with automatic stokers.

The pump-house, owned jointly by the Wolverine and Mohawk, has a 20,000,000-gal. horizontal triple-expansion pump, with 18″, 33″ and 54″ steam cylinders and 22″ water plungers, with 36″ stroke, besides an auxiliary 8,000,000-gal. triple-expansion water-end pump, with 3 plungers. The pump house is located on the river, near its mouth, the intake being protected by timber cribs running 300′ into the lake to prevent clogging from floating bark and anchor ice.

Work was started, 1919, on an intake shaft and tunnel under the lake. Pump station was cut at 90′ below lake level; shaft was 110′ below lake level and tunnel was driven 1,423′ to July, 1919. Estimated length to be 2,200′ where 30′ of water will be attained.

A concrete building, 42x42x18′ was constructed in 1918, to house a 1,250-k. w. capacity, 60-cycle, 3-phase, 2,200-volt mixed pressure turbine. This turbine will furnish power to drive all the mill machinery plus three 7,000-gal. electrically-driven centrifugal pumps to be installed at pump house, thereby eliminating present boiler pumping plant. This expense is being shared by the Mohawk Mining Co.

In normal times the average number of men employed at mine and mill was 370, but during 1919 the force averaged 30% below normal, and in 1918 20% below normal.

Recent Production: (fiscal year ending June 30).

	Tons Ore Hoisted	Cost per Ton	Tons Ore Stamped	Cost per Ton	Lbs. Cu. per Ton	Mineral Lbs.	Ref. Cu. Lbs.	Cost per Lb.(a)
1919.....	298,279	$2.117	298,089	$2.118	15.306	7,339,025	4,562,617	15.905c
1918.....	304,015	1.911	303,498	1.914	15.185	6,961,500	4,608,865	14.603
1917.....	354,899	1.54	352,845	1.63	16.59	8,753,945	5,856,889	11.62
1916.....	391,898	1.31	388,989	1.39	17.07	9,127,790	6,541,492	9.54
1915.....	403,219	1.28	397,614	1.30	18.23	9,734,850	7,250,866	8.43
1914.....	188,147	1.85	182,127	1.92	18.86	4,606,015	3,435,459	11.72
1913.....	403,514	1.53	388,502	1.62	21.49	10,782,405	8,350,312	8.665
1912.....	414,544	1.53	401,308	1.58	23.45	12,164,780	9,408,960	7.586
1911.....	400,296	1.59	388,476	1.64	24.75	12,227,500	9,617,168	7.542
1910.....	405,790	1.55	390,837	1.61	24.96	12,359,000	9,757,101	7.413

(a) Cost per pound includes construction, but does not include costs of depreciation, depletion and taxes, which amounted to 4.395 c in 1919, and 4.324 c in 1918.

Output for calendar year of 1919 was about 5,000,000 lb.

Company has produced to June 30, 1919, a total of 165,944,757 lb. copper.

Rumors that Wolverine was trying to get options on certain blocks of land in the district, seem to indicate that the management is contemplating expansion. The relatively large resources, small share capitalization, and efficient organization certainly admit such a policy.

WYANDOT COPPER CO. MICHIGAN

Office: 68 Devonshire St., Boston, Mass. **Operating office:** Houghton, Mich. **Mine office:** Winona, Houghton county, Mich.

Directors: Ashley Watson, pres.; Jos. Dorr, v. p.; Chas. E. Adams, sec.-treas., and Frank L. Van Orden, mgr. Louis La Rochelle, mng. capt.

Inc. Feb. 3, 1899, in Michigan. **Cap.,** $2,500,000; shares $25 par; paid in, $13. Last assessment $1, levied August, 1917, payable 50c., Sept., 1917, and 50c., March, 1918. Has levied assessments of $700,000 since organization. Shares are listed on the Boston Stock Exchange. State Street Trust Co., Boston, registrar; Federal Trust Co., Boston, transfer agent. Annual meeting, second Monday in May.

Due to labor shortage and excessive costs, plus the fact that many stockholders neglected to pay the last assessment, operations were suspended in April, 1918.

Property: 1,065 acres, adjoins the Winona, in Secs. 16, 20 and 21, T. 52 N., R. 36 W. Exploratory work, begun Feb., 1899, was done in search of the Winona bed; later to locate the southern extension of the Baltic amygdaloid, after which attention was turned again to the Winona bed, and latterly to development of an amygdaloidal bed, the No. 8 lode, lying about 2,300′ E. of the Winona lode. The average strike of the Keweenawan formation on this land is N. 53° E., with an average dip of 65°, and the Wyandot lands carry the strike of the Keweenawan bedded series for about 1½ miles.

Development: by several shafts, No. 1, 1,000′ deep, located in the S. E. ¼ of Sec. 21, T. 52 N., R. 36 W., is sunk in the footwall of the Winona bed. No. 11 exploratory shaft is sunk 710′ on a stratum paralleling the Winona bed, at a distance of 1,200′. This bed looked good when first opened, and diamond-drill cores were rich, but proved poor under development. A crosscut driven S. E. from the bottom of No. 11 shaft for 2,640′, intersects 13 distinct amygdaloidal beds, Nos. 3 and 2 showing copper. Drifting done on No. 3 bed disclosed considerable mass and barrel copper, but No. 8 is the more promising.

Miscellaneous work of the past includes a 102′ vertical shaft, sunk on a lean amygdaloidal bed, known as the Misery river bed, in Sec. 16, T. 52 N., R. 36 W., but nothing of value was developed. Some years ago a vertical shaft was sunk on lands held under option, near the W. quarter post of Sec. 28, T. 52 N., R. 36 W., to depth of 250′, and crosscuts driven both E. and W. with about one-half mile of workings. This work crossed the horizon of the Baltic bed, but what was deemed the Baltic amygdaloid was found highly altered, and worthless, as was the whole country in the neighborhood.

Extensive diamond-drilling has been done on the property and a core, taken 1904, from the horizon of the Lake bed, showed a little copper, but was not considered important at that time. The ground has been carefully prospected again by diamond drill, in Secs. 16 and 21. Holes Nos. 21 and 22 showed beds offering encouragement, and some trenching was done on 1 bed, 48′ wide, carrying a little copper from foot to hanging. Another trench, 1,500′ N. E. disclosed the bed under only 16′ of overburden, and a shaft known as the Sec. 16 shaft, was sunk to a depth of 65′. A crosscut at this depth shows the bed to be 38′ wide, carrying finely-disseminated copper for about 10′, with small masses along the footwall.

Recent activity has been centered in development work in the No. 8 lode, 1,100′ S. E. of the No. 11 shaft. This lode is opened by the long crosscut on the 700′ level, and below this depth by a 115′ winze, with about 800′ of drifts on the 815′ level, 400′ of drifts on the 900′ level and about 600′ of drifts on the 1,000′ level, the bottom of the winze, up to March, 1918. The showing on these levels has been varied and sufficient work has not been done to demonstrate fully the value of the lode.

Equipment: includes a steam plant with hoist, good for 1,000′ and compressors of 12 drills aggregate capacity.

Two mill tests have been made, the second in 1917, on 654 tons, averaging 21.62 lb. copper recovered per ton.

The Wyandot company has worked persistently and with skill for more than a decade to make a profitable mine, and, though not yet successful, has not exhausted the possibilities of its holdings.

MICHIGAN IRON MINES

Normally, the American production of iron ore is about 60,000,000 tons. Of this, the Lake Superior region contributes 85%, Michigan accounting for 25%, its output in 1919 being over 13,000,000 tons. There are three iron ranges or districts in Michigan, namely, the Gogebic, Marquette and Menominee. Part of the first named is in Wisconsin, but the most important section is in Michigan. The iron formation rests on quartzite, cut by igneous dikes. The ores are mostly soft, red hematites, carrying 54% iron 0.03% phosphorus, and 6% silica. Some of the mines are over 2,000 feet deep.

The Marquette range is smaller than the others. The formation lies in quartzite and greenstone, and is cut by dikes. The ores are massive or micaceous hematite (rarely magnetite) similar to those of the Gogebic area, but carry 60% iron, 0.5% phosphorus, and 7% silica. The mines are also deep, down to 2,200 feet. The Menominee range though usually considered a Michigan district, is partly in Wisconsin. In Michigan, the productive formation occurs in steeply-dipping narrow belts, resting on dolomite and overlain by slate. The ores are soft, bluish-black hematites containing 55% iron, 0.6% phosphorus, and 5% silica. Mining is conducted to a depth of below 1,500 feet.

From the various Ranges the ore is railed to docks on Lake Superior, carried by steamer to lower lake points, and then by rail to furnaces at Pittsburgh and other centers.

ANTOINE ORE CO. — MICHIGAN

Address: F. J. Webb, mgr., Youngstown, Ohio. **Mine office:** Iron Mountain, Dickinson county, Mich.

Company equipped mine with a new plant, in 1918, including 2 pumps and compressor. Controlled by Republic Iron and Steel Co.

ASHLAND MINE — MICHIGAN

See Hayes Mining Co., Michigan.

BREITUNG IRON CO. — MICHIGAN

Name changed July, 1918, to Marquette Iron Co., which see.

BRISTOL MINING CO. — MICHIGAN

Office: E. W. Hopkins, mgr., Ironwood, Mich.

Property: on the Menominee range, Mich. **Ore:** hard, brown, non-Bessemer hematite, containing 49.48% iron, 3.96% manganese, 0.6% phosphorus and 7.25% silica. Mine closed 1917, but reopened April, 1918.

Mining method: by stoping to 1,060′.

Production: 188,688 tons in 1917, and 462,801 in 1916; total to end of 1917 reported as 4,799,233 tons.

BROTHERTON IRON MINING CO. **MICHIGAN**

Office: C. H. Munger, mgr., Sellwood Bldg., Duluth, Minn. **Sales agents:** Pickands, Mather & Co., Cleveland, Ohio.

Property: the Brotherton mine on the Gogebic range.

Ore: Bessemer and non-Bessemer hematite, carrying 49.83 to 53.37% iron, 0.024 to 0.073% phosphorus and 11.75 to 15.86% silica. Mining by underground method to depth of 1,342′.

Production: 55,947 tons in 1918 and 2,559,733 tons to date.

BUFFALO IRON MINING CO. **MICHIGAN**

Office: Buffalo, N. Y.

Officers: T. H. Wickwire, Jr., pres.; Harry Yates, treas.; E. L. Bowers, sec.-gen. mgr., Iron River, Mich.

Cap., $200,000; $25 par.

Property: the Homer mine, Iron River, Iron county. Shaft 458′ deep.

Production: in 1917, 202,592 tons compared with 156,528 tons in 1916, and 102,511 tons in 1915, when first shipment was made.

CASCADE MINING CO. **MICHIGAN**

Address: 709 Security Bld., Minneapolis, Minn.

Officers: Fred B. Snyder, pres.; J. F. VanDerlip, sec.; R. M. Bennett, treas.; O. B. Warren, gen. mgr., Minneapolis, Minn; T. J. Nicholas, supt., Palmer, Mich. Pickands, Mather & Co., Cleveland, Ohio, sales agents. Operated as a close corporation.

Property: Isabella mine, Marquette county, developed by 930′ shaft, drifts and raises. The ore is mined by the square set and stoping systems. Deposit occurs in jasper, in contact with diorite dike.

Production: 80,691 tons in 1918, compared with 67,708 tons in 1917; 98,683 tons in 1916, and 36,225 tons in 1915. The product is a Bessemer and non-Bessemer iron ore.

CHARCOAL IRON CO. OF AMERICA **MICHIGAN**

Address: H. H. Binham, sec., Detroit, Mich. W. E. McRandle, supt., Bessemer, Mich.

Property: the Yale mine on Geogebic range.

Ore: 3 grades, all soft red, one a Bessemer, the second non-Bessemer and the third silicious hematite. The best ore contains 52.6% iron, 0.043% phosphorus and 5.43% silica.

Development: by 1,200′ shaft. Ore mined by caving to a depth of 1,780′. It was reported that new machinery for both underground and surface work had been installed.

Production: 149,155 tons in 1916; 73,633 in 1917, and 1,013,486 to beginning of 1918.

CLEVELAND-CLIFFS IRON CO., THE **MICHIGAN**

Office: Cleveland, Ohio. M. M. Duncan, mgr.

Officers: W. G. Mather, pres.; M. M. Duncan, v. p.; G. G. Heer, treas.; S. L. Mather, sec., with T. H. Newberry, C. W. Benham, Samuel Mather, J. H. Wade, H. A. Raymond and B. F. Bourne, directors; E. H. Jaynes, asst. sec.; and C. D. Mason, auditor.

Inc. in West Virginia. **Cap.,** $10,000,000; $100 par; 995,740 issued. Funded debt, authorized, $3,500,000, issued; $1,575,000 outstanding May, 1919; $1,050,000 first collateral trust gold 6s.

Statement for 1918 shows an income from all sources of $5,778,449, of which $4,147,324 was profit. **Dividends:** 2½% per quarter.

Property: iron mines in Michigan and Minnesota that yielded 3,465,715 tons in 1918. For the Minnesota properties, see Cleveland-Cliffs Iron Co., Minnesota. The principal Michigan mines are:

Mine	Range	Mining System	Ore	Approx. Iron Content, Per Cent.	Shipments 1918 Tons
Angeline	Marquette	Underground	Bessemer	60.02	50,947
Austin	"	Caving	B. and non-B.	.....	8,533
Athens	"	Caving	non-B.	.....	20,923
Bunker Hill	"	Caving	"	.....	2,173
Cliff Shaft	"	Open stope, room Caving	"	59.20	332,809
Francis	"	and pillar	"	.....	30,774
Gwinn	"	Caving	B. and non-B.	.....	182,540
Holmes	"	Caving	"	.....	117,960
Jackson	"	Open pit	non-B.	.....	15,879
Lake	"	Caving	B. and non-B.	51.33	399,929
Maas	"	Caving	"	53.14	360,897
Morris-Lloyd	"	Open pit, caving, shrinkage stoppage	"	52.28 to 46.14	315,541
Negaunee	"	Caving	"	53.59	528,701
Republic	"	Open and shrinkage stoping	"	62.25	151,170
Salisbury	"	Caving	"	52.20	221,802
Stephenson	"	Caving	"	51.88	75,164
Spies	Menominee	U'rground milling	non-B.	.....	48,782

The above figures represent the season's shipments, May 1 to December 1, or the season of Lake navigation. Actual production goes on all the year, and the ore is stocked at the mines. It frequently happens that in one year production figures are considerably larger than shipments; and in other years the reverse.

The McClure power project was completed 1919, after 2 years' work, commenced in August, 1917. The dam on the Dead River, 7 miles west of Marquette, Mich., is the largest hydro-electric project in northern Michigan. The dam is 500′ long, spillway 200′ long, height 50′ from foundation, and base 50′ wide, tapering to 4′ at top of spillway. It is of concrete construction throughout. A pipe-line 13,600′ long connects with the power-house; 10,000′ of this is of a fir wood-pipe 7′ in diameter, the remaining 3,600′ is steel, 7′ in diameter.

The power-house built at the junction of Rainy creek and Dead river, is 90′ long, 45′ wide and 25′ high. Two 5,000 Kva. generators are coupled to 7,000 h. p. turbines. The transformers are outside the building; the current is received at 2,000 volts and stepped up to 30,000 volts for distribution throughout the company's mines.

This plant is described in the "Eng. and Min'g. Jour.," Sept. 13, 1919.

DAVIDSON ORE MINING CO. **MICHIGAN**

Office: 403 White Bldg., Buffalo, N. Y. **Mine office:** Iron River, Mich.

Officers: F. N. Beagle, pres.; Geo. Davidson, v. p.; T. F. Hildreth, sec.-mgr.; L. R. Davidson, treas. Rudolph Ericson, supt.

Inc. 1910, in Michigan. **Cap.,** $500,000; shares $25 par; 400,000 shares outstanding.

Property: 160 acres, includes the Davidson No. 1, 2 and 3 mines, near Iron River. **Ore** is a non-Bessemer limonite.

Development: by 2 vertical shafts 550′ and 230′ deep and a 252′ incline shaft.

Equipment: includes 3 hoists, 2 compressors and steam shovel.

DUNN IRON MINING CO. **MICHIGAN**

Office: First National Bank Bldg., Milwaukee, Wis.

Officers: E. G. Wilmer, pres.; C. N. Turner and M. T. MacLaren, v. p.; H. J. Schlesinger, treas.; W. Saeger, sec.; E. L. Cullen, mgr. A. D. Chisholm, supt.

Inc. April, 1895, in Wisconsin. **Cap.,** $25,000; shares $25 par.

Property: about 160 acres, at Bessemer, Menominee Range, Mich. Early in 1919, mine was reported closed.

HANNA & CO., M. A. **MICHIGAN-MINNESOTA**

Office: 1300 Leader-News Bldg., Cleveland, Ohio.

Partners: L. C. Hanna, M. Andrews, H. M. Hanna, Jr., F. B. Richards, Wm. Collins, R. F. Grant, J. D. Ireland and L. C. Hanna, Jr. Operated as a partnership and does not furnish reports for publication.

Agents for the following operating companies: Virginia Ore Mining Co., Virginia, Minn.; Consumers Ore Co., Buhl, Minn.; La Rue Mining Co., Nashwauk, Minn.; American-Boston Mining Co., Diorite, Mich.; Richmond Iron Co., Palmer, Mich.; Hollister Mining Co., Crystal Falls, Mich.; Wakefield Iron Co., Wakefield, Mich.; Hanna Ore Mining Co., Virginia and Hibbing, Minn. Also operates vessels of 8,915 average tonnage on the Great Lakes.

Company is sales agents for the following:

Company	Mine	Range	Tons 1918	Tons 1917	Total to date
Algomah Steel Corp	Magpie	Mes	.....	.....	.....
American-Boston Mng. Co.	American	Gog	120,756	142,526	1,576,025
Bates Iron	Bates	Men	98,194	141,890	.....
Butler Bros	Ann		.....	.....	.....
" "	Kevin		21,602	35,846	.....
" "	Lamberton	Mes	655	20,187	.....
" "	Margaret	"	43,933	.....	.....
" "	Patric	"	236,776	95,888	.....
" "	Smith	"	39,292	253,223	.....
Consumers' Ore	Hanna A	"	111,212	136,114	1,521,956
" "	Hanna B	"	.....	.....	.....
" "	Frantz	"	169,777	78,302	.....
Donner, W. H.	Cohoon		.....	.....	.....
Dunn Iron Mng	Anvil	Gog	674,460	481,465	.....
" " "	Palms	"	14,131	54,407	.....
Empire Iron	Empire	Mar	45,947	38 392	.....
Florence Iron	Florence	Men	97,322	47,193	.....
" "	Ernst	"	173,155	70,416	.....
Hanna Ore Mng. Co.	Brunt	Mes	257,597	112,289	1,478,680
" " "	Dale	"	.....	10,423	.....
" " "	Harold	"	280,495	145,966	.....
" " "	Hobart	"	.....	.....	.....
" " "	Pilot	"	.....	.....	.....
" " "	Thorne	"	44,904	74,997	.....
" " "	Uno N	"	82,954	117,028	.....
" " "	Uno S	"	130,483	99,992	.....
Hollister Mng	Carpenter	Men	384,148	269,387	.....
" "	Monongahela	"	27,739	.....	.....
" "	Ravenna	"	.....	37,848	.....
La Rue Mng	La Rue	Mes	295,916	330,349	2,693,705
Loretto Iron	Loretto	Men	155,891	193,950	2,262,294
Mahoning O. & S.	Mahoning	Mes	2,024,595	2,524,110	.....
Maitland Mng	Maitland	Mar	19,625	.....	.....
Newport Mng	Keweenaw	Gog	142,037	130,374	441,563
" "	Newport	"	1,041,697	1,003,229	14,615,506
Penn Iron Mining	Penn Group	Men	210,632	459,784	11,780,108
Pitt Iron Mng Co	Miller	Mes	329,151	312,875	3,717,445
" " "	Wacootah	"	174,342	73,908	.....
Republic O. & S.	Bessemer	"	.....	.....	1,238,546
" "	Cambria	"	143,305	114,031	3,163,068
" "	Kinney	"	203,542	184,591	4,247,265
" "	Pettit	"	258,174	192,920	1,887,410
" "	Schley	"	.....	777	.....
Richmond Iron	Richmond	Mar	144,104	148,834	.....
Virginia Ore Mng	Sliver	Mes	119,023	168,953	.....
Wakefield Iron	Wakefield	Gog	1,130,432	1,144,411	4,316,186

HAYES MINING CO. **MICHIGAN**

Office: First National Bank Bldg., San Jose, Cal. **Mine office:** Ironwood, Mich.

Officers: E. A. Hayes, pres.; J. O. Hayes, sec.-treas.; with M. B. Hayes, C. L. Hayes, directors. Robt. King, supt.; L. R. Davidson & Co., White Bldg., Buffalo, N. Y.

Inc. 1899, in Wisconsin. **Cap.,** $1,000,000; $25 par; all issued. No bonds. Annual meeting in May. Transfer office: San Jose, Cal. Dividends to March, 1919. Total, $266,600, or $66.65 per share.

Property: the Ashland mine, 120 acres, at Ironwood, Mich., first opened in 1884. Developed by inclined shaft 2,120′ deep, with many miles of workings.

Ore: two grades of red hematite are produced, known as Globe, a hard and soft non-Bessemer and Ashland, a soft Bessemer ore. Average analyses for 1916, of all shipments, samples dried at 212° Fahr. Ashland ore: iron, 62.10; phos., .042; silica, 9.24. Globe ore: iron, 60.0; phos., .067; silica, 9.54. Shipments 1884-1916, 6,312,600 tons.

Ore is shipped by boats to Ashland, Wis., thence by boats to the lower lake ports.

Ref. Iron Ores of Lake Superior, 1917, Crowell & Murray.

HEMLOCK RIVER MINING CO. **MICHIGAN**

See Pickands, Mather & Co., in Minnesota.

Office: Western Reserve Bldg., Cleveland, Ohio.

Officers: H. G. Dalton, pres.; Wm. McLaughlin, v. p.; A. S. Mather, sec.; E. P. Williams, treas.; C. A. Munger, mgr., and C. E. Lawrence, Palatka, Mich., supt.

Inc. April, 1884, in Michigan. **Cap.,** $500,000; $25 par.

Property: the Warner mine, 80 acres, near Alpha, Iron county, said to show ore containing 54.46% iron. Company estimates ore reserves at 224,000 tons. Developed by 743′ shaft.

Production: in 1918, 78,855 tons. Total, 187,420 tons.

INDIANA MINE **MICHIGAN**

Address: John M. Thomas, owner, Milwaukee, Wis.; G. A. Richards, supt., Iron Mountain, Mich.

Is an iron property producing ore carrying 40.4% iron and 0.007% phosphorus. Uses electric hoist, pump, tram and steam driven compressor.

Production reported as 52,570 tons, 1915; 44,162 tons 1916; 46,479 tons, 1917.

JONES AND LAUGHLIN ORE CO. **MICHIGAN**

Office: 3rd Ave. and Try St., Pittsburgh, Pa.

Property: the Forbes mine, in the Iron River district, Iron county, contains a yellow, non-Bessemer hematite. Developed by 275′ shaft. First opened in 1912, shipments commenced 1913. Reported to have produced 298,020 tons up to January, 1917.

The Rolling Mill mine, Marquette county, yields a soft-brown non-Bessemer hematite. Shaft is 786′ deep; shipping since 1872. Total production to 1917 was 1,552,617 tons.

Company is developing the South Agnew mine in Hibbing county, Mesabi range, Minnesota.

JUDSON MINING CO. **MICHIGAN**

Address: Alpha, Mich. M. E. Richards, gen. mgr.; T. D. Held, pres., Chicago; Cavour Hartly, v. p., Duluth, Minn.; W. L. Anderson, sec. See Nevada Mining Co.

Inc. 1912, in Michigan. **Cap.,** $750,000; shares $10 par; all issued.

Property: Judson mine with 80 acres iron ore land having 2,000,000 tons hematite ore blocked out. Ore runs 50½% iron and 0.5% phosphorus.

Development: by 580′ incline shaft and 6,000′ of workings.

Equipment: includes hoist, 2,200 cu. ft. compressor, 1,000 gal. electric pump, motor tramway and a steam shovel.

Production: from 100,000 to 500,000 tons annually.

LAKE SUPERIOR IRON & CHEMICAL CO. **MICHIGAN**

Described Vol. XIII. Name changed to Charcoal Iron Co. of America, which see.

LORETTO IRON CO. **MICHIGAN**

Office: 1400 Fulton St., Chicago, Ill.

Officers: J. Ward Amberg, pres.; D. F. Brenner, v. p.; J. H. Amberg, sec.; T. J. Amberg, treas.; C. H. Baxter, supt., directors.

Inc. in Illinois. **Cap.,** $400,000; $10 par; all issued. Is a close corporation.

Property: 280 acres leasehold on Menominee range at Loretto, Dickinson county, Mich., opened up in 1892. Main orebody averages 10-40′ in width and is about 1,000′ long with an overburden of above 25′. Ore varies greatly in iron content.

Development: to vertical depth of 800′.

Production: 174,173 tons in 1916; 193,949 tons in 1917; 155,891 tons in 1918.

MARQUETTE IRON CO. **MICHIGAN**

Name changed from Breitung Iron Co., July, 1918.

Office of president: 5 Nassau St., New York, N. Y.

Officers and directors: R. S. Child, pres.; C. B. Dunster, v. p.-gen. mgr.; W. A. Hamilton, sec.-treas., with E. N. Breitung and E. B. Boies. W. B. Pattison, supt., Negaunee, Mich.

Inc. May 4, 1917, in Delaware, as Breitung Iron Co. **Cap.,** common stock, 150,000 shares, no par value, and preferred stock, $3,000,000, 7% cumulative, par value $100. Outstanding: common, 90,000 shares; preferred, $2,000,000. The preferred is convertible share for share into common stock at option of holders. Redeemable at option of corporation at $110 per share and accrued dividends. Privilege of conversion up to thirty ays, prior to date fixed for redemption. No bonds, but $1,036,500 first lien, convertible 7% secured notes were outstanding Nov., 1918. The unissued common stock, 60,000 shares, is reserved to provide for conversion of the first lien 7% notes and preferred stock. After July, 1921, 10% of surplus earnings, (pfd. dividends having been paid for each year) shall be applied to the redemption of preferred stock at $110 and accrued dividends. Quarterly dividends payable on first of Jan., April, July and October.

The various subsidiary companies and their locations are given below, together with the percentage of capital stock of each one held by the Marquette Iron Co., other than directors' qualifying shares.

Names of Subsidiary Operating Companies	Location	Iron Ore Range	% Capital Stock Owned
Mary Charlotte Mng. Co.	Negaunee, Mich.,	Marquette Range	95%
Breitung Hematite Mng Co.	" "	" "	95%
Juliet Iron Co.	" "	" "	100%
Lucky Star Mng Co.	" "	" "	70%
Washington Iron Co.	Humboldt, "	" "	51%
Hopkins Mng Co.	Ironton, Minn.,	Cuyuna Range	100%
Clifford Ext. Iron Co.	Iron Mtn., Mich.,	Menominee Range	80%
Breitung Iron Co.	Wilde, Ont., Can.	Algoma Range	90%

Under date of April 1, 1917, the American Appraisal Co. of 120 Broadway, New York, N. Y., appraised the properties of the subsidiaries, as follows: Property assets: permanent equipment and development: $1,227,563; mineral lands and leases, $7,078,250; investment in ships, $325,259; total, $8,631,073. Current assets, $1,324,698. Less: current liabilities, $428,978; Bonds and long term notes of two subsidiaries (less sinking fund for retirement of bonds, $95,950), $1,104,050. Total net assets, exclusive of good will, going value, etc., $8,428,743. The Appraisal company states that these values are very conservative.

The Marquette Co. reports that since this appraisal was made the ships have been sold for more than the amount carried on the books, the bonds and notes of subsidiaries reduced, Jan. 1, 1919, to $700,000, and that through a subsidiary, it has acquired by deed and stock ownership title to 95% of the lands occupied by Mary Charlotte Mining Co., Breitung Hematite Mng. Co. and Juliet Iron Co.

Property: over 1,300 acres in one solid tract in the Negaunee district of the Marquette Iron Range in the Lake Superior region, and properties in other districts.

Subsidiary Properties.

Mary Charlotte Mining Co. holds leases on 120 acres of iron ore lands estimated to contain over 4,000,000 tons of high-grade Bessemer and Mary ores, disclosed by development work and drilling; and large tonnage of lower grade ores. Ore assays from 54.50 to 59% iron and 0.095% phosphorus. Mine has operated since 1903 and has produced over 3,000,000 tons Production averages 300,000 tons per year.

Breitung Hematite Mining Co., Ltd., has 50-year leases on more than 175 acres of iron ore lands estimated by development and drilling to contain 4,000,000 tons of high grade Bessemer and non-Bessemer ores assaying 63% iron and 0.023% phosphorus. Property comprises: Breitung No. 1 mine on which company has spent in recent years about $400,000 for new shaft and development; has produced, since 1911, about 700,000 tons The No. 2 mine, producing non-Bessemer ore since 1906, has shipped 800,000 tons.

Juliet Iron Co. holds 50-year lease on 960 acres in the Negaunee Basin iron formation and adjoins the Breitung No. 1 mine on the south, and almost surrounds the Breitung Hematite No. 2 mine and the Mary Charlotte; practically undeveloped except by shallow workings that show producing prospects, From one tract of 80 acres, known as the Milwaukee-Davis, 400,000 tons were produced. Mine idle since 1916, but company plans comprehensive drilling and developing in near future.

Lucky Star Mining Co. owns in fee 50 acres northeast of Breitung Hematite; property is crossed by a very rich orebody. Drill holes show more than 4,000,000 tons. A shaft has been sunk to within 200′ of the ore, and company reports that it should soon be producing.

Washington Iron Co. owns in fee and operates the Barron mine in the Humboldt district of the Marquette range. Has 4 grades of hard, gray non-Bessemer specular and magnetite ores, which are concentrated before shipment. No. 2 ores assays 56.83% iron, 0.136% phosphorus and 15.47% silica. Since 1908 property has produced 350,000 tons. There are 1,120 acres situated in the iron formation with considerable reserves showing in the small portion prospected.

Hopkins Mining Co. holds 46-year lease on 80 acres in Cuyuna range near Ironton, Minn. Drilling in 1914 showed 468,566 tons of Bessemer and manganiferous ore. Later work in that section indicated a larger tonnage. At present time shaft has been sunk 145′. During 1918, 50,000 tons of iron produced.

Clifford Extension Iron Co. holds a 24-year lease on 80 acres in the Menominee range where ore bodies are known to go to great depth. Above the 135′ level 2,500,000 tons are estimated with large reserves below that level. Property is being opened up by a shaft and ore will be mined by open pit milling method. Ore is Bessemer grade of specular hematite.

Breitung Iron Co., the Loon Lake property owned in fee, about 1,000 acres in the Algoma Iron Range, 20 miles north of Sault Ste. Marie, Ontario. Property being prospected. Company incorporated in Michigan.

McKINNEY STEEL CO. **MICHIGAN—MINNESOTA**

Office: Perry Payne Bldg., Cleveland, Ohio. **Mine office:** Virginia, Minnesota.

Officers: Price McKinney, pres.; J. E. Ferris, sec.; E. D. McNeal, gen. mgr.

Currently believed to be a re-organization of Corrigan, McKinney & Co., which was dissolved in 1917. Said to be operating the following properties:

Baker Mine.

Located in Sec. 31, T. 43, R. 34, Iron county, Mich. Ore: soft, red, non-Bessemer hematite. First opened in 1909.

Production: totals about 267,107 tons.

Colby Mine.

Located in Sec. 16, T. 47, R. 46, Gogebic county, Mich. Ore: soft, blue Bessemer and non-Bessemer hematites, assaying 53.79 to 53.98% iron, 0.039 to 0.047% phosphorus and 5.89 to 6.15% silica. Mined by underground method.

Production: 423,553 tons in 1916; 353,880 in 1917; total, 4,613,007 tons.

Commodore Mine.

Located Sec. 9, T. 58, R. 17, near Virginia, St. Louis county, Minn. Ore: soft, blue Bessemer and non-Bessemer hematites, assaying 51.83 to 57.32% iron, 0.048 to 0.032% phosphorus and 7.67 to 6.01% silica. Mined by open pit system.

Production: 1916, 579,285 tons.

Ironton Mine.

Located in Sec. 17, T. 47, R. 46, Gogebic county, Mich. Ore: soft, red Bessemer and non-Bessemer hematites, assaying about 51.38% iron, 0.248% phosphorus and 4.96% silica. Ore mined by underground system. First shipment, 1886.

Production: 1916, 148,200; 1917, 244,517; a total of 1,805,382.

Richards Mine.

Located in Sec. 36, T. 43, R. 33, Iron county, Mich. Ore: soft, brown non-Bessemer hematite, assaying 51.22% iron, 0.566% phosphorus and 6.47% silica. Mined by underground system. First shipment, 1914.

Production: 1914, 7,069 tons; 1915, 92,807 tons; 1916, 29,381 tons; 1917, 43,890 tons; total, 173,147 tons.

Stevenson Mine.

Leased from Great Northern Iron Ore Properties, Minn.

Located in Secs. 7, 8 T. 57, R. 15, near Hibbing, St. Louis county, Minn. Ore: soft, blue Bessemer and non-Bessemer hematites, assaying about 54.73% iron, 0.047% phosphorus and 7.19% silica. Mined by open pit system. First shipment, 1900.

Production: 349,960 tons in 1916; 345,265 tons, 1917; 323,514 tons, 1918. Total to date, 11,527,385 tons.

St. James Mine.

Located in Sec. 3, T. 58, R. 15, near Aurora, St. Louis county, Minn. Ore: soft, blue non-Bessemer hematite, showing 50.88% iron, 0.068% phosphorus and 7.90% silica. Mined by underground system.

St. Paul Mine.

Located in Sec. 24, T. 57, R. 22, near Keewatin, Itasca county. Minn. Ore: soft, blue non-Bessemer hematite, assaying about 50% iron, 0.50% phosphorus and 7.58% silica. Mined by open pit system.

Production: 181,400 tons. No shipments reported since 1913.

Tobin Mine.

Located in Sec. 30, T. 43, R. 32, Iron county, Mich. Ore: soft, red, non-Bessemer hematite, assaying 52.75% iron, 0.470% phosphorus and 6.31% silica. Mined by underground system. First shipment, 1901.

Production: 1916, 146,113 tons; 1917, 188,590 tons; totaling 2,831,897 tons.

Tully Mine.

Located in Sec. 36, T. 43, R. 35 W., Iron county, Mich. Ore: soft, red, non-Bessemer hematite, assaying 55.60% iron, 0.347% phosphorus and 5.50% silica. Mined by underground system. First shipment in 1910.

Production: 1916, 236,300 tons; 121,426 tons in 1917; totaling 690,887 tons.

MINERAL MINING CO. **MICHIGAN**

Office: 910 Wells Bldg., Milwaukee, Wis. **Mine office:** Iron River, Mich.

Officers: G. D. Van Dyke, pres.; W. D. Van Dyke, v. p. and treas.; E. F. Brown, mgr. and sec.; above are directors.

Inc. May 7, 1904, in Wisconsin. **Cap.,** $100,000; shares $100 par; 90,000 issued. Annual meeting, first Tuesday in May. Company is a close corporation.

Property: the Osana, Wauseca, Nanaimo and Breen iron mines near Iron River, Mich., the Osana worked up to 1918 and the Wauseca worked up to 1917. No later information obtainable.

Production: capacity: 500,000 tons yearly. Output of "James" (or Osana), ore averages 55.3% iron and 0.45% phosphorus, with a production up to 1918 of about 1,020,000 tons.

MUNRO IRON MINING CO. **MICHIGAN**

Office: Iron River, Mich.

Officers: W. A. Rogers, pres.; Hugh Kennedy, v. p.; W. S. Rogers, sec., Erie county Bank Bldg., Buffalo, N. Y. G. L. Woodworth, mgr. Is a close corporation.

Property: 4 mines, about 560 acres. The Hiawatha mine located one mile S. of Iron River; the Rogers, 3 miles E. of Iron River; the Chicagoan, 6 miles E. of Iron River, and the Munro at Norway, Mich. Mines show iron ore in lenses. Assays average 53% iron, 0.4% phosphorus, 9% silica and 9% manganese.

Development: by shafts, 400 to 1,200′ deep and about 3,000′ workings.

Production: 1913, 316,019 tons; 1914, 293,296 tons; 1915, 323,464 tons; 1916, 427,182 tons; 1917, 426,819 tons; 1918, 376,988 tons. Company reports about 1,000,000 tons of ore blocked out.

NEGAUNEE MINE **MICHIGAN**

Address: M. M. Duncan, mgr.; G. R. Jackson, supt., Ishpeming, Mich. **Sales agents:** Cleveland-Cliffs Iron Co., and Pickands, Mather & Co., Cleveland, Ohio.

Property: in sections 5, 6, T. 7, R. 26, in Marquette county, Mich. has been worked since 1887.

Development: ore mined by caving system to vertical depth of 1,180′.

Ore: two grades; Negaunee, a soft, red, Bessemer hematite, containing 52.04% iron, 0.083% phos., and 6.72% silica; and Negaunee Bessemer, assaying 53.59% iron, 0.053% phos., and 6.72% silica. Moisture is 12% in both. Cargo analyses in 1916 averaged 59.20 to 60.90% iron, 0.094 to 0.060% phos., 7.65 to 7.12% silica, and 0.31 to 0.27% manganese.

Production: 573,760 tons in 1917; 528,701 tons in 1918, with a total production of over 7,000,000 tons to date. See Cleveland-Cliffs Iron Co.

NEVADA MINING CO. **MICHIGAN**

Address: M. E. Richards, gen. mgr., Alpha, Mich.

Inc. 1916, in Michigan. **Cap.,** $2,500,000; $10 par; all issued. Same officials as Judson Mining Co.

Property: about 80 acres in Sections 22, 23, T. 44, R. 33, in Iron county, Mich., includes the Amasa Porte mine, which carries a typical replacement iron ore deposit in slate, that is reported to average 55% iron.

Development: by 700′ vertical shaft, with 4,000′ of workings, said to contain 700,000 tons or ore, with 200,000 tons blocked out.

Equipment: includes hoist, compressor, steam pump and 600-ton mill.

Production: to Jan. 1, 1919, was 272,792 tons.

NEWPORT MINING CO. **MICHIGAN**

Office: E. L. Cullen, mgr., First Nat'l Bank Bldg., Milwaukee, Wis.

Officers: A. A. Schlesinger, pres.; H. J. Schlesinger, v. p.-treas.; E. G. Wilmer, v. p.; H. H. Springford, sec., with F. Schlesinger, directors. E. L. Cullen, mgr., Ironwood, Mich.

Property: at Ironwood and Bessemer on the Gogebic range, Michigan.

Ore: soft red Bessemer and non-Bessemer hematite, carrying up to 55.45% iron, 0.08% phosphorus and 10.58% silica. Ore is mined by subslicing method to 2,274′ depth.

Production: 1,315,980 tons in 1916; 986,853, 1917; 1,002,243, 1918. Total output, 14,559,680 tons.

NORRIE-AURORA MINE — **MICHIGAN**

Address: Oliver Iron Mining Co., Ironwood, Mich. J. H. McLean, mgr.; O. C. Davidson, gen. mgr.

Property: in Gogebic county, Mich., was first opened in 1885, and developed to 2,034′ vertical depth.

Production: 1,855,863 tons in 1916; 1,646,606 tons in 1917, making a total production of about 35,000,000 tons since 1885. Ore is of 5 grades, all soft reddish brown Bessemer hematites, and one grade of non-Bessemer hematite. Average in mine is 54.31% iron, 0.036% phosphorus, 6.21% silica, and 10.86% moisture.

PENN IRON MINING CO. — **MICHIGAN**

Address: Vulcan, Mich.

Officers: A. C. Dinkey, pres.; J. C. Agnew, v. p.; D. B. Gehly, sec.-treas., with Wm. Kelly, directors. Wm. Kelly, mgr.

Inc. in Michigan. **Cap.,** $150,000; $25 par; all issued.

Property: in Menominee range, Dickinson county, includes the Cyclops, Norway, East and West Vulcan, Brier Hill and Curry mines. Developed to depth of 1,600′ by vertical shafts. Ore: Bessemer and non-Bessemer hematite, 56.77% iron. Reserves estimated by company at 1,200,000 tons, January, 1919.

Production: at the rate of 350,000 tons iron ore per year, a total to date of 11,780,168 tons.

PEWABIC CO. — **MICHIGAN**

Office: 910 Wells Bldg., Milwaukee, Wis.

Officers: G. D. Van Dyke, pres.; W. D. Van Dyke, sec.-treas., with N. P. Hulst, J. H. McLean and D. G. Kerr, directors. E. F. Brown, mgr.; W. G. Monroe, supt.

Inc. Jan. 1, 1887, in Wisconsin. **Cap.,** 8,000 shares; $25 par, all issued. Is a close corporation.

Owns the Pewabic and Walpole iron mines at Iron Mountain, Dickinson county, Mich. On April 1, 1918, operations were suspended until more favorable conditions permit mining the low grade ore.

PLYMOUTH MINING CO. — **MICHIGAN**

Address: Cleveland: Ohio. L. M. Hardenburgh, gen. supt.; A. Matthews, Jr., Verona, Mich., local supt. Under direction of Pickands, Mather & Co., 600 Western Reserve Bldg., Cleveland, Ohio.

Property: owns and operates a lease on the Plymouth mine, an iron property on the Gogebic range near Wakefield, Gogebic county. Property carries soft, non-Bessemer hematite, containing 53% iron, 0.069% phosphorus, and 4.34% silica.

Development: by open-pit system. In May, 1919, company was employing 355 men.

Production: started in 1916; totaled 330,427 tons; 1917, 656,473; 1918, 821,867 tons.

REPUBLIC IRON & STEEL CO. — **MICHIGAN**

See same title under U. S. section of this book.

RICHMOND IRON CO. — **MICHIGAN**

Address: Palmer, Mich. J. D. Ireland, mgr.; John Huhtala, supt., M. A. Hanna Co., Cleveland, Ohio, sales agents.

Property: the Richmond mine, on Marquette range, Marquette county, Mich. Ore is a silicious, hard, red-hematite assaying 38.98% iron, 0.048% phosphorus, and 36.81% silica. Property worked by open pits.

Production: since 1896, about 1,700,000 tons.

SPRING VALLEY IRON CO. **MICHIGAN**

Address: E. H. Willis, mgr., Wellston, Ohio. J. E. Looney, supt.

Property: on the Menominee range, Iron county, Mich., opened in 1907. **Ore:** a soft, red, non-Bessemer hematite, assaying 51.75% iron, 0.461% phosphorus, and 6.3% silica. Ore is mined by top slicing system to depth of 350'.

Production: 145,716 tons in 1916; total production up to 1917 was 916,661 tons. The Zimmerman mine opened by this company in 1907 was taken over by the Tod-Stambaugh Co., of Minnesota, in 1918.

SUNDAY LAKE IRON CO. **MICHIGAN**

See Pickands, Mather & Co., Minnesota.

Address: L. M. Hardenburgh, gen. supt., Hurley, Wis., or W. J. Davies, local supt., Wakefield, Mich.

Property: the Sunday Lake mine, on Gogebic range, Michigan. **Ore:** hard, purple Bessemer and non-Bessemer hematites, assaying 58.90 to 59.70% iron, 0.032 to 0.089% phosphorus, and 0.20 to 0.35% manganese.

Production: 131,425 tons in 1918. Total, 2,476,395 tons.

VERONA MINING CO. **MICHIGAN**

See Pickands, Mather & Co., Minnesota.

Office: Sellwood Bldg., Duluth, Minn.

Officials: C. H. Munger, gen. mgr.; W. P. Chinn, asst. gen. mgr.; W. A. Rose, chief mng. engr.; W. H. Gallagher, chief mech. engr.; C. E. Lawrence, gen. supt., Palatka, Mich.; W. G. Hanson, Palatka, Mich., supt. of Baltic, Bengal and Caspian mines; A. Matthews, Jr., Verona, Mich., supt. of Mikado mine.

Property: the Baltic, Bengal and Caspian iron mines on Menominee range and the Mikado mine on the Gogebic range.

Mine	Depth feet	Men employed May, 1919	Tons, 1918	Total tons
Baltic	653	Idle	166,882	2,659,934
Bengal	376	260	303,788	733,539
Caspian	389	365	346,028	3,432,542
Mikado	...	Idle	.....	1,140,623

WAKEFIELD IRON CO. **MICHIGAN**

Address: J. D. Ireland, Leader-News Bldg., Cleveland, Ohio. E. E. Hunner, mgr., Duluth, Min.; W. C. Hart, gen. supt., Wakefield, Mich. Sales agents, M. A. Hanna & Co., Cleveland, Ohio.

Property: the Wakefield mine, at Wakefield, Mich., on Gogebic range, Gogebic county, Mich., first opened in 1913. Ore: two grades of ore, the "Andrews," a soft, red non-Bessemer hematite, carrying iron natural 52.50%; phosphorus, .073%, and silica, 3.62%; 2nd, the "Duane," a dark brown to blue-black hematite carrying iron natural, 50.28%; phosphorus, .077%; silica, 4.08%, and manganese, 2.25%.

Mining is by open pit and by underground work to depth of 400'.

Production: 1913, 15,260 tons; 1914, 313,050 tons; 1915, 651,300 tons; 1916, 1,061,730 tons; 1917, 1,144,411 tons; 1918, 1,130,432 tons. Total, 4,316,-183 tons.

WICKWIRE MINING CO. **MICHIGAN**

Address: E. C. Bowers, Buffalo, N. Y. H. Duff, supt., Iron River, Mich. J. M. Riddell, engr.

Property: the Virgil and Wickwire iron mines on the Menominee range, Iron county, Mich. **Ore:** yellow-brown and red-brown non-Bessemer hematite, the former containing 51.04% iron, 0.396% phosphorus and 6.32% silica. Ore mined by sub-stoping, to 273' in the Virgil and slicing and caving to 313' in the Wickwire.

Production: (tons)	1916	1917	To'l to date.
Virgil	36,307	...	42,220
Wickwire	13,265	242	128,869

MINNESOTA

The four iron ranges of this State supply 60% of the annual production of America, the total for 1918 being over 43,000,000 tons. The Mesabi is the most important area; its ores are mostly soft and hydrated hematite and limonite, and are found in shallow deposits in greenstone, but few mines being over 300 feet deep. Some of the mines are very large, yielding annually over 1,000,000 tons each.

In the Cuyuna range the iron-bearing formation rests on slate, under which is quartzite. Mining is done to a depth of below 1,400 feet. The ores are hard blue and red hematites in part manganiferous. The two latter ranges produce over 1,500,000 tons each yearly.

ADRIATIC MINING CO. **MINNESOTA**

Office: 811 Sellwood Bldg., Duluth, Minn., R. M. Sellwood, mgr.

Property: the Adriatic mine, on Mesabi range, St. Louis county, Minn.; opened in 1906. **Ore:** soft, red, non-Bessemer hematite, containing 49.31% iron, 0.067% phosphorus and 10.48% silica. Ore is mined by underground slicing to depth of 180'.

Production: 220,818 tons in 1916, which made a total of 1,041,268 tons.

ALGOMA MANGANESE CO. **MINNESOTA**

See Onahman Iron Co.

Address: Ferguson Bldg., Duluth, Minn. W. A. McClaren, mgr.

Inc. Nov. 14, 1916. **Cap.,** $500,000. Reported Oct., 1917, that company sold its property to the Onahman Iron Co. for $530,000.

Property: Algoma mine, in Sec. 33, T. 47, R. 29, Crow Wing county, developed to vertical depth of 100', the ore averaging 29.13% iron, 19.50% mang. and 0.81% phos.

AMERICAN MANGANESE MFG. CO. **MINNESOTA**

(Said to be a consolidation of the Cuyuna-Mille Lacs Iron Co. and Cuyuna-Duluth Iron Co.)

Office: 352 Bullitt Bldg., Philadelphia, Pa.

Officers: E. E. Marshall, pres.; Wm. Selfridge, v. p.-sec.; W. H. Locker, treas., with W. E. Arnold, Reiner Hoch, W. A. Powell, R. L. Taylor, M. E. Keith, D. F. Bush and A. G. Dickinson, directors.

Inc. 1913, in Pennsylvania. **Cap.,** $6,000,000 common, and $6,000,000 6% cum. preferred; par $50, all outstanding. In 1917, $1,250,065 com., and $2,189,410 preferred shares, also $1,021,000, 5% notes were issued to pay for purchase of the Costa Rica Manganese Mining Co. properties (see Vol. XIII). Funded debt, exclusive of above notes, outstanding on Dec. 31, 1918, totaled $1,287,634.

Company manufactures products, such as ferro-manganese and manganese pig-iron.

Property: the Mille Lacs mine, Cuyuna range, Minn.; and several thousand acres of mineral lands, including four developed mines producing manganese ores in Costa Rica; also 375 acres of coal lands in Connellsville district, Fayette county, Pa.

Ore: at the Mille Lacs is a hard manganiferous, non-Bessemer hematite carrying 37.31 to 40.02% iron, 8.96 to 21.22% manganese, 11.46 to 22% silica and 0.051 to 0.096% phosphorus, mined by underground methods to 205' vertical depth.

The Mille Lacs mine was closed down in Feb., 1919.

Production: 90,564 tons in 1916, which made a total of 203,137 tons.

ARTHUR IRON MINING CO. **MINNESOTA**

Owned by the Great Northern Iron Ore Properties, which see.

Office: E. E. Hunter, supt., St. Paul, Minn.

Property: the Leonard mine on the Mesabi range. Ore is a non-Bessemer averaging 51.61% iron, 0.057% phosphorus and 5.51% silica. Mined by open pit and underground methods to 253' depth. Leased in 1917 to the Hanna Ore Mining Co.

Production: 316,589 tons in 1916; 305,416 tons in 1917; 737,674 tons in 1918. Total to date, 9,822,212 tons.

ASH IRON CO. **MINNESOTA**

Office: Duluth, Minn. **Mine office:** Riverton, Minn.

Inc. in 1917, by W. B. Congdon, J. Wanless, C. A. Humbert, D. T. Adams and K. Todd. **Cap.,** $500,000.

Property: operating the Congdon-Adams property in Sec. 19, T. 46, R. 29, near Riverton, which is said to contain manganiferous ore.

BALKAN MINING CO. **MINNESOTA**

Address: C. H. Munger, mgr., Sellwood Bldg., Duluth, Minn.

Officers: D. B. Cavan, supt., Belgrade mine, Gilbert, Minn. E. W. Leach, supt.; Danube mine, Bovey, Minn.; W. J. Pekins, supt., Balkan mine, Crystal Falls, Mich.

Property: the Belgrade mine, Mesabi range and the Balkan mine, Menominee range. In 1917 company acquired the Washoe property, 1 mile N. of Bovey, Minn., and N. E. of the Walker and Canisteo mines, Mesabi range, from the No. Pacific Ry. Co. Property was renamed the Danube mine.

Production: see under Pickands, Mather & Co.

BANGOR MINING CO. **MINNESOTA**

Controlled by Pickands, Mather & Co., Cleveland. Ohio.

Office: C. H. Munger, Sellwood Bldg., Duluth, Minn.

Property: Bangor mine on Mesabi range, opened in 1910.

Ore: soft, red, non-Bessemer hematite, assaying 49.39% iron, 0.059% phosphorus, and 9.10% silica. Mined by underground slicing to 307' vertical depth.

Production: 223,576 tons in 1916 and 276,611 tons in 1917, which totaled 1,274,668 tons. Mine was idle in 1918-'19.

BENNETT MINING CO. **MINNESOTA**

Is controlled by Pickands, Mather & Co., Cleveland, Ohio.

Officers: F. P. Botsford, gen. supt., and A. E. Schneider, local supt., Keewatin, Minn.

Property: the Bennett mine, formerly owned by the Keewatin Mining Co., in Sec. 24, T. 57, R. 22, Itasca county, Minnesota, developed to 137' depth. The mine was opened in 1912. Product is a Bessemer hematite and a non-Bessemer hematite carrying about 2% manganese. Company employed 330 men in May, 1919.

Production (tons):

1913..... 88,931	1915..... 50,475	1917..... 733,942
1914..... 25,868	1916..... 672,572	1918..... 872,421

BUTLER BROS. **MINNESOTA**

Address: 1002 N. Y. Life Bldg., Duluth, Minn.

Producers of Bessemer and non-Bessemer iron ore from following mines on Mesabi range: Ann, Harrison, Kevin, Margaret, North Harrison, Patrick, Quinn and South Lamberton.

Analysis: Bessemer; 53-57% iron; 0.015-0.045% phosphorus; silica under 10%; non-Bessemer, 51.50% iron and silica under 10%.

Sales agent: M. A. Hanna & Co., which see.

CLEVELAND-CLIFFS IRON CO., THE **MINNESOTA**

(See Cleveland-Cliffs Iron Co., Mich.)

The principal properties in Minnesota are:

Mine	Range	Mining System	Ore	Approx. Iron Content	Shipments, 1918, tons
Crosby	Mesabi	Open pit and side slicing	Bessemer	56.89%	185,558
Fowler	"	Caving	Non-Bess.	52.07%	42,752
Helmer	"	Open pit and underground	"		207,498
Meadow		Top and side	"	49.90%	52,515
Wade	"	Open pit and underground	"		67,576
	"				

In Feb., 1918, the Helmer mine, near Buhl, St. Louis county, Minn., was acquired from Swallow & Hopkins, Chicago, Ill.

COATES & TWEED **MINNESOTA**

Office: 307 Lonsdale Bldg., Duluth, Minn.

Company explores, operates and is sales agent for mines in the Mesabi, Cuyuna and Gogebic ranges in Minnesota and Michigan.

In September, 1919, company was interested in the following mines: York, Seville, Julia, Hillcrest, Portsmouth and Townsite, producing Bessemer and non-Bessemer ores and mined by both open pit and underground mining systems.

COLBY MINE **MINNESOTA**

See McKinney Steel Co., Mich.

COMMODORE MINE **MINNESOTA**

See McKinney Steel Co., Mich.

CONS. VERMILLION AND EXTENSION CO. **MINNESOTA**

Office: 312 Sellwood Bldg., Duluth, Minn.

Officers: T. J. Walsh, pres.-treas.; J. M. Christie, v. p.; A. M. Oullette, sec., the president, M. C. Williams and Angus Cameron, directors.

Inc. Sept., 1911, in Minnesota. **Cap.,** $900,000; $2 par; $620,000 outstanding, no bonds. Stock transferred at Company's office. No dividend.

Property: consolidation of the Vermillion Steel and Iron Co. and the extension of the Vermillion Steel and Iron Co. Operates under 50-year leases.

Company estimated, June, 1917, 20,000 tons of ore in stockpile with production of about 200 tons a day. Developed tonnage, claimed, 1917, to be 600,000 tons at a depth of 440′. A sample from stockpile was said to assay 69.85% iron and 0.76% manganese. No recent returns received.

CONSUMERS ORE CO. **MINNESOTA**

Address: C. E. Hunner, gen. mgr., Fidelity Bldg., Duluth, Minn.

Operating two mines, the Hanna "A" and the Hanna "B" on Mesabi Range, St. Louis county, Minn.

Ore: non-Bessemer hematite, assaying in "A", 48.80% iron, 0.064% phosphorus and 5.65% silica; in "B," iron 47.14%, .047% phosphorus and 9.65% silica. "A" mine is worked by open pit system to depth of 175′. At the "B" mine ore is mined by a steam shovel in an open pit.

Production: started on "A" 1909, and amounted to over 1,200,000 tons in 1917; "B" started 1913.

CORSICA IRON CO. **MINNESOTA**

Controlled by Pickands, Mather & Co., Cleveland, Ohio. D. B. Gavan, supt., Gilbert, Minn.

Property: the Corsica mine, on Mesabi range, Minn., opened in 1901.

Ore: soft, red Bessemer and non-Bessemer hematite, assaying 52.74 to 47.47% iron, 0.043 to 0.056% phosphorus, and 7.76 to 7.27% silica. Mined by underground slicing system to 248′ vertical. Employed 225 men, May, 1919.

Production: 384,692 tons in 1918, and a total of 2,725,252 tons.

CRETE MINING CO. **MINNESOTA**

Address: C. H. Munger, mgr., Sellwood Bldg., Duluth, Minn.; Robert Murray, gen. supt., Hibbing, Minn.

Property: Albany mine on Mesabi range, opened in 1903. Also leasing the Utica mine from the Great Northern Iron Ore Properties.

Ore: soft, yellow, non-Bessemer, soft, red Bessemer, and soft, blue, non-Bessemer hematite, assaying from 46.81 to 53.52% iron, 0.015 to 0.047% phosphorus and 6.25 to 3.71% silica. Mined by milling and underground slicing systems to 260′ vertcal.

Production: See under Pickands, Mather & Co.

CUYUNA DULUTH IRON CO. **MINNESOTA**

Address: W. H. Locker, Duluth, Minn.

Inc. 1911, in Minnesota. **Cap.,** $1,000,000; shares, $1 par, 756,000 outstanding.

Property: iron-ore leases in Crow Wing Co., Minn. Reported taken over by the American Manganese Mfg. Co., which see.

CUYUNA MILLE LACS IRON CO. **MINNESOTA**

Office: W. H. Locker, pres., 505 Lonsdale Bldg., Duluth, Minn.

Property: the Mille Lacs mine, on Cuyuna range, near Ironton, Crow Wing county, Minn. **Ore:** hard, manganiferous non-Bessemer hematite. Ore mined by underground system, to 205′ depth.

Production in 1918, 175,000 tons.

Company reported merged into American Manganese Mfg. Co., which see.

CUYUNA MINNEAPOLIS IRON CO. **MINNESOTA**

Office: Ironton, Minn. W. H. Fetzer, mgr.; P. C. Merrill, supt.

Property: leased on S. W. ¼ S. E. ¼ sec. 23-47-29, known as the Ida May mine, on Cuyuna range, Minn. **Ore:** non-Bessemer and manganiferous showing 40% iron, 0.20% phosphorus and 16% manganese. Ore is mined by underground system.

Production: 20,000 tons in 1918, which was the first output.

FEDERAL CONSOLIDATED MINING CO. **MINNESOTA**

Office: 327 Palace Bldg., Minneapolis, Minn. L. F. Lammers, sec. and purch. agt.

Property: the Ajax mine, near Biwabik, on Mesabi range, Minn. **Ore:** a non-Bessemer showing 58.46% iron, 0.08% phosphorus and 1.61% manganese, is mined by underground system.

Production. to date, 200,000 tons, none in 1918. Company expects to ship 100,000 tons in 1920.

FEIGH MINE **MINNESOTA**

Address: Carl Zapffe, supt., Brainerd, Minn.

Property: on Cuyuna range, Crow Wing county, first opened in 1917, is a subsidiary of the Northern Pacific Ry. Co. Ore is a hematite.

GORDON MINING CO. **MINNESOTA**

See Hill Mines Co. and Hillcrest Mining Co.

Office: Hill Bldg., Saginaw, Mich. **Mine address:** Crosby, Minn.

Officers: A. B. Coates, pres.; R. R. Hill, v. p.; G. P. Tweed, sec. and treas.

Took over the Portsmouth mine, June, 1918, which was leased and explored by the Hill Mines Co.

Property: S. W. ¼ of S. W. ¼ Sec. 2-46-29, Crow Wing county, Minn.

GORHAM-GARBETT CO. **MINNESOTA**

Office: 627 First Ave., Minneapolis, Minn.

Officers: J. Pye, pres.; S. H. Wood, v. p.; C. F. W. Carlson, sec.-treas.; above with S. Bailey, S. F. Grover and R. W. McGarry, directors.

Inc. January, 1908, in Minnesota. **Cap.,** $1,000,000; $1 par; 924,792 issued.

Dividends: 2% 1917, and 1918 5½%.

Property: 360 acres of iron and manganese ore land on Cuyuna range, Crow Wing county, Minn., all leased on royalty plan. Lessees are the Iron Mtn. Mng. Co., Onahman Iron Co., Chas. W. Potts and associates.

GREAT NORTHERN COPPER CO. **MINNESOTA**

Idle since 1911. **Office:** 504 Globe Bldg., Minneapolis, Minn. Mine at Hinckley, Pine county, Minn. Fully described Vol. XI. Copper Handbook.

GREAT NORTHERN IRON ORE PROPERTIES **MINNESOTA**

Offices: First Nat'l Bank Bldg., St. Paul, Minn., and 32 Nassau St., New York City. G. R. Martin, compt.

Inc. Dec. 7, 1906. Is a trust created by directors, and approved by shareholders of the Great Northern Railway Co. Trustees: Louis W. Hill, James N. Hill, Ralph Budd and E. T. Nichols. Transfer office: 32 Nassau St. New York City. Bankers' Trust Co., New York City, registrar. Listed on New York Stock Exchange.

Shareholders of the Lake Superior Co., Ltd. (a subsidiary created to hold various securities and properties of the Great Northern Ry Co.), trans-

ferred to the trustees of the Great Northern Iron Ore Properties, shares in 10 iron ore mining companies, conservatively worth $1,738,400. Any dividends declared by the Allouez Bay Dock Co., or by Duluth, Superior & Western Terminal Co., up to Dec. 31, 1912, were to be paid to the trustees, to be applied by them to the uses of the trust.

When the trust was created, the trustees issued certificates of beneficial interest, amounting to 1,500,000 shares, to stockholders of the Great Northern Ry. Co., at the rate of one share of "Trustee's Certificates" for each share of stock of Great Northern Ry. Co. The trustees' income has come from dividends from stocks held and from interest earned. This revenue, less administration expenses, is distributed as dividends to holders of Certificates of Beneficial Interest.

Income Account—Years ended December 31:

	Receipts, Divid's etc.	Administr. Expenses	Distr'n to cert. hold'gs	Bal. for yr.	Prev. Bal.	Total Surpl.
1918.....	$4,594,725	$72,222	$6,000,000	$1,477,496(a)	$2,079,775	$602,279
1917.....	90,958	101,366	2,250,000	2,260,408(a)	4,340,183(b)	2,079,775
1916.....	2,178,548	89,663	1,964,663	213,884(b)	4,126,299(b)	4,340,183

(a) deficit. (b) surplus.

Stocks held by Trustees, December 31, 1918:

Arthur Iron Mining Co.(a).....	$50,000	Polk Iron Mining Co.(a).....	$50,000
Fillmore Iron Mining Co.(a).....	50,000	Tyler Iron Mining Co.(a).....	50,000
Grant Iron Mining Co.(a).	12,000,000	Van Buren Iron Mg. Co.(a).....	500
Harrison Iron Mg. Co.(a).....	50,000	North Star Iron Co. of W. Va.(b)..	587,900
Jackson Iron Mg. Co.(a).....	50,000	Leonard Iron Mining Co.(c).....	100,000

(a) Entire issue. (b) Over 90.6% of entire issue. (c) 50% of entire issue.

The charter of the West Missabe Land Co., expired in 1917, and the Grant Iron Mining Co., was organized June, 1917, to acquire its properties.

Dividends: holders of Certificates of Beneficial Interest received per share in 1907, 1908 and 1909, $1 each; 1910, $1.50; 1911, 1912, 1913, 1914, 1915, 50c. each; 1916, $1.25; 1917, $1.50; 1918, $4; April, 1919, $2; Oct., 1919, $2; total to October, 1919, $26,625,000.

Balance Sheet—Years ended December 31:

Assets	1918	1917
Current	$7,862,488	$9,660,723
Securities	4,994,847	5,107,501
Mine expenses	181,433	511,796
Mineral lands and leases.....	84,929,483	74,170,608
Advances	3,675,623	4,150,422
Deferred accounts	1,053,905	702,248
Office, res., equip., org. exp.....	36,144	13,269
North Star Mine.....	978	.....
Totals.....	$102,734,911	$94,316,568

Liabilities	1918	1917
Capital stock.....	$12,988,400	$12,988,400
Current liabilities	638,466	633,442
Deferred accounts	1,135,006	715,162
Surplus	87,973,039	79,979,565
Totals.....	$102,734,911	$94,316,568

Property: 65,091 acres of iron ore land in the Mesabi district, Minn. through leases made in 1917 and in previous years, the proprietary companies have disposed of their developed mines, except interests in the North Star, Hill and Walker mines, now idle. The principal leases were

with the Interstate Iron Co., a subsidiary of Jones & Laughlin Steel Co., and with the Hanna Ore Mining Co. The Interstate Iron Co. lease cover 3 mines, the net royalties ranging from 30c to 75c per ton of ore extracted the 1918 minimum was 924,000 tons. The Hanna Ore Mng. Co. lease covers 10 mines, and royalties range from 40c to $1.15 a ton. Leases call for mining operations on an increasing scale each year. Since July, 1917, the proprietary companies have withdrawn from active mining operations.

Production—shipments and receipts are as under:

From Old Leases:	1918	1917	1916	Total since 1907
Shipments, tons	2,734,678	3,284,469	3,207,091	31,211,190
Receipts	$392,680	$505,506	$562,706	$4,910,864
From Arthur Iron Mining Co.: (a)				
Shipments, tons		150,996	617,287	1,092,825
Receipts	$127,385(b)	$308,771	$544,944	$1,204,735
From New Leases, 1913 and subsequent years:				
Shipments, tons	3,136,749	2,247,634	1,215,776	7,754,993
Receipts	$1,817,207	$1,637,051	$984,968	$4,772,081

(a) includes the following mines: Harold, Leonard, North Uno, South Uno, Thorne and Wentworth. All business of a general character is carried on in the name of Arthur Iron Co., which company has been made the agent of each of the other proprietary companies in all matters of finance and operation.

Mining operations by the Arthur Mining Co. ceased June 30, 1917, on account of its having leased all its operating properties. The companies had on hand in stock piles, 1,380,082 tons of ore to be disposed of. In 1917, 388,412 tons, and in 1918, 633,913 tons were disposed of from the stock pile by lessees, which yielded $646,501 and $1,340,770 respectively.

(b) receipts are additional on account of ore sold in previous years.

HALE DEVELOPMENT CO. **MINNESOTA**

Office: 408 Exchange Bldg., Duluth, Minn.

Officers: F. A. Day, pres.; A. E. Brown, v. p.; H. W. Cheadle, sec.-treas.

Inc. in Minnesota. **Cap.**, $150,000; $10 par; 5,000 shares issued. Is a holding corporation.

Dividends: at rate of 50c per share, quarterly. On August 2, 1917, an extra dividend of 10c per share was paid. Company had no indebtedness in 1917. Later returns unavailable, as, "company has a most retiring disposition and does not care for any notices."

Property: 360 acres on Cuyuna range, Crow Wing county, Minn. Only 80 acres have been thoroughly explored, which portion is included in the Wilcox mine. These 80 acres have been leased on a royalty basis to the Division Co. of Minneapolis, Minn. The Minnesota State Tax Commission estimates these 80 acres to have 637,811 tons of iron ore.

HALE MINE **MINNESOTA**

Name changed to Hector Mine, which see.

HANNA & CO., M. A. **MINNESOTA**

See same title under Michigan iron mines.

HANNA ORE MINING CO. **MINNESOTA**

Office: Duluth, Minn.

Officers: E. E. Hunner, mgr.; C. E. Hendrick, gen. supt., Eastern Mesabi; F. H. Cohoe, gen. supt., western Mesabi. Company is a subsidiary of the M. A. Hanna Co., operating leases on Great Northern ore lands at Buhl, Virginia, Hibbing and Chisholm, Minn.

The mines included in the leases are: the Fay, Leonard, Missabi Chief, L & W, Enterprise, Harold, North Uno G. N., South Uno G. N., Wabigon No. 1, Wabigon No. 2, and Thorne.

Production:	1918 tons	1917 tons	Total tons (a)
Harold	279,987	146,485	1,807,334
Thorne	29,484	75,024	204,436
Fay	.....	.....	609,528
Leonard	737,674	305,416	9,922,212
Missabi Chief	.....	.....	.....
L & W	12,576	12,792	72,849
Enterprise	.....	.....	.....
North Uno G. N.	1,892	.....	1,318,216
South Uno G. N	17,650	.....	1,251,403
Wabigon No. 1	.....	.....	.....
Wabigon No. 2	15,549	.....	15,549

(a) Mines were leased to Hanna Ore Mining Co. in 1917; the total production includes tonnage mined under Great Northern Ore Properties management.

HECTOR MINE **MINNESOTA**

Formerly known as Hale Mine, located on Mesabi Range in Sec. 1, T. 58, R 16, St. Louis county, Minn. First opened 1893. Produced total of 521,353 tons. Closed down 1911. Produced soft, yellow, non-Bessemer hematite. Mine exhausted.

HELMER IRON MINE **MINNESOTA**

Formerly owned by Swallow & Hopkins, Duluth, Minn., sold 1918 to Cleveland Cliffs Iron Co., which see.

Mine address: Kinney, St. Louis county, Minn.

Produced 207,498 tons of iron ore in 1918.

HILLCREST MINING CO. **MINNESOTA**

(See Hill Mines Co., and Garden Mining Co.)

Office: Hill Bldg., Saginaw, Mich. **Mine address:** J. W. Van Evera, mgr., Crosby, Minn.

Officers: A. B. Coates, pres.; R. R. Hill, v. p.; G. P. Tweed, sec.-treas.

Property: E. ½ S. E. Sec. 9-46-29; W. ½ N. W. ¼ of S. W. ¼ Sec. 10 and W. ½ S. W. ¼ of N. W. ¼ sec. 10, T. 46, N. R. 29 W., Crow Wing county. In April, 1919, company took over the Hillcrest mine on Cuyuna range formerly operated by the Hill Mines Co., Minn., first opened in 1918. Mine shows a soft, red, non-Bessemer hematite, assaying 50.59% iron, 0.208 phosphorus and 4.80% silica.

Development: by open pit and hydraulic stripping.

Production: approximately, 320,000 tons to Jan. 1, 1919; most of this ore was produced in 1917 and 1918.

HILL MINES CO. **MINNESOTA**

Office: Hill Bldg., Saginaw, Mich.

Officers: Roger R. Hill, pres.-treas.; J. G. Williams, v. p.; J. J. Quinn, sec.

Inc. Jan. 14, 1914, in Maine. **Cap.,** $5,000,000, increased in 1917 from $500,000; $10 par; $1,177,840 issued.

Property: 2 iron mines, one on Cuyuna range, near Crosby, the other on the Eastern Mesabi, near Aurora, Minn. Ore is hematite in schist, in a deposit reported to be 200′ wide. Average assays, 58% dry, 50.58% natural.

The Portsmouth mine formerly leased to this company was taken over, June, 1918, by the Gordon Mining Co., and the Hillcrest mine was taken over by the Hillcrest Mining Co., April, 1919.

Equipment: includes 2 compressors, pump, 2 steam shovels, electric power and 2 locomotives.

HOBART IRON MINING CO. **MINNESOTA**

Officers: C. H. Munger, mgr., Duluth, Minn.; D. B. Cavan, Gilbert, Minn. and F. A. Kelley, Calumet, Minn., supts. Pickands, Mather & Co., sales agents, Cleveland, Ohio.

Property: Elba mine on Mesabi range, Minn., opened in 1889, and the Majorca mine, Mesabi range, opened in 1906.

Ore: at Elba, soft, red, Bessemer hematite, containing 53.79% iron, 0.04% phosphorus and 6.24% silica. At Majorca; a soft, red non-Bessemer hematite. Company employs 210 men.

Production: in 1918, at Elba, 154,030 tons, making a total of 3,096,249 tons and at Majorca 251,707 tons, making a total of 364,101 tons.

HOCH MINING CO. **MINNESOTA**

Company out of business, mine now owned by Onahman Iron Co., which see.

Operated the Iron Mountain mine afterward called the Hoch mine, but now Algoma mine.

INLAND STEEL CO. **MINNESOTA**

Office: 38 S. Dearborn St., Chicago, Ill.

Officers: A. W. Thompson, pres.; G. H. Jones, v. p.; P. D. Block, v. p.; R. J. Beatty, v. p.; L. E. Block, treas.; E. M. Adams, sec.; E. J. Block, pur. agt. and asst. treas.; with Elias Colbert, H. C. Jones, D. P. Thompson, Saml. Deutsch and R. J. Beatty, directors. W. D. Truesdale, auditor.

Inc. Feb. 6, 1917, in Delaware, as successor of an Illinois corporation of same name. **Cap.,** $30,000,000; $100 par; $25,019,500 issued. First Trust & Savings Bank, Chicago, transfer agent, Continental & Commercial Trust & Savings Bank, Chicago, registrar.

Bonded debt: $1,400,000, first mortgage, 6% gold bonds of old company being balance of $3,000,000 issue; due $150,000, each April 1st to 1928; also $4,320,000 extension and ref. mtgs., 6s, due July 1, 1942. Authorized $10,000,000, issued $4,500,000, of which $180,000 had been cancelled to January 1, 1919.

Income Account—Years ended December 31:

	Total Inc	Int.	Deprec. & Deplet.	Fed. Tax Reserve	Divid.	Surplus for Year
1918	$14,473,512	$353,250	$1,953,713	$7,000,000	$2,001,060	$4,407,316(a)
1917	21,240,784	436,550	1,769,167	8,500,000	1,999,820	8,535,247
1916	11,365,477	375,450	539,240	.....	799,908	9,650,879

(a) Includes $1,241,827 surplus adjustments.

Balance Sheet, December 31:

Assets:	1918	1917
Land, buildings, etc	$36,955,179	$33,312,755
Investments	8,647,982	7,250,000
Current assets	15,635,488	16,696,266
Deficient charges	130,198	154,870
Totals	$61,368,849	$57,413,890

Liabilities:	1918	1917
Capital stock	$25,019,500	$24,997,000
Bond. debt	5,820,000	6,030,000
Current liabilities	2,705,193	2,813,327
Interest accrued	22,500	24,750
Federal taxes	7,000,000	8,500,000
Reserves	6,499,683	5,154,156
Surplus	14,301,972	9,894,656
Totals	$61,368,849	$57,413,890

Dividends: on stock of former company for 1911, 1912 and 1913, 10% per annum (i. e. 7% regular and 3% extra); 1914, 6¼% plus a stock dividend of 25% paid September, 1914; 1915, 6%; 1916, 8%; 1917, 11%; 1918, 8% or at rate of 2% per quarter from June, 1917, to date.

Property: valuable ore leases on 5 producing mines in Minnesota, two, the Grace mine, near Chisholm and the Laura, near Hibbing, on the Mesabi range; three, the Thompson, Armour No. 1 and Armour No. 2 on the Cuyuna, at Crosby, Minn. with 30 years' ore reserves at each mine. Furnaces are at Indiana Harbor, Ind., and Chicago Heights, Ill.

In 1917, company purchased 2,000 acres of coal land near Dorseyville, Pa., and a lease on further ore lands from the Great Northern Iron Ore Co.

INTERNATIONAL HARVESTER CO. **MINNESOTA**

See Wisconsin Steel Mines, Minnesota.

INTER-STATE IRON CO. **MINNESOTA**

Subsidiary of Jones & Laughlin Steel Co.

Office: Mark Elliott, supt., Jones & Laughlin Bldg., Pittsburgh, Pa.

Property: the Lincoln mine on the Mesabi range. Ores are both Bessemer and non-Bessemer containing 45.75 to 56.60% iron, 0.025 to 0.053% phosphorus and 6.94 to 9.20 silica. Ore mined by top slicing and caving to depth 237'. Leased the South Agnew, Mississippi and the Hill Annex mines from the Great Northern Iron Ore Properties in 1917.

Production:	1918 tons	1917 tons	1916 tons	Total tons
South Agnew.....	.....	.....	.....	.....
Mississippi	187,115	98,683	.....	1,554,412
Hill Annex.....	559,129	251,024	.....	815,849
Lincoln	.....	.....	286,128	3,894,178

J. BENNETT SMITH MINING CO. **MINNESOTA**

Company now entirely in hands of R. D. Lacoe of Oceanside, San Diego county, Cal., who advanced most of the money for development. Former office Kingston, Pa. Mine address: Pine City, Pine county, Minn.

Property: 500 acres of copper-bearing ground, along Snake river, a mile below Cross lake, in Pine county, Minn. The lands show the western extension of the Keweenawan copper-bearing beds of Lake Superior, the bedded formation having a strike of about N. 20° E., with dip of about 72° S.-E., showing the beds to be on the northern fold of the syncline.

Development: includes 560' shaft; also several shallow pits and shafts. Several of the amygdaloidal and conglomerate strata, showing native copper, have been proven by test pitting and diamond-drill borings. Company reports having expended about $50,000 on exploratory and development work since 1879. No recent returns available.

JOAN MINING CO. **MINNESOTA**

General office: 106 Providence Bldg., Duluth, Minn. **Mine office:** Ironton, Minn.

Officers: G. M. Fay, pres.-supt. S. J. Fay, v. p.; Marcus Fay, sec.-treas., directors.

Inc. 1916, in Minnesota. **Cap.,** $50,000; shares, $100 par.

Property: 4 mines, the Joan Nos. 1, 2, 3 and 4, in the Cuyuna range, Crow Wing county, Minn.

Development: by shafts and tunnels. Ore contains 27% iron, 0.120% phosphorus and 23% manganese. Reported to have shipped by rail during winter of 1917-1918 from one mine and expected to ship from three mines during 1919.

JUNE LAKE IRON CO. **MINNESOTA**

Office: 22 Columbia Bldg., Superior, Wis. E. L. Johnson, gen. mgr., sec.-treas.

Inc. 1910, in Minnesota. **Cap.,** $50,000; shares $10 par.

Property: 70.90 acres in Lot 3 and N. W. of S. W. Sec. 9, T. 46, R. 29, Crow Wing county, Minn. Mine undergoing exploration, said to contain iron and manganese.

LEETONIA MINING CO. **MINNESOTA**

Subsidiary of Jones & Laughlin Steel Co.

Office: Mark Elliott, supt., Jones & Laughlin Bldg., Pittsburgh, Pa.

Property: the Leetonia mine, leased from the Great Northern Iron Ore Properties, on the Mesabi range. First opened in 1902. Ore: soft, red, non-Bessemer hematite assaying 50.3% iron, mined by top slicing and caving and steam shovels to 182' depth.

Production: 656,823 tons in 1916; 402,894 tons in 1917; 230,865 tons in 1917; 230,865 tons in 1918. Total to date 6,550,482 tons.

LIBERTY MINING CO. **MINNESOTA**

General office: 106 Providence Bldg., Duluth, Minn. **Mine office:** Ironton, Minn.

Officers: M. L. Fay, pres.; C. E. Schulze, v. p.; G. M. Fay, sec.-treas. **Inc.** 1917, in Minnesota. **Cap.**, $100,000; $100 par.

Property: the Bonnie Belle iron mine, near Ironton, Cuyuna range, Minn., producing a high-grade non-Bessemer ore, assaying 60% iron, 0.115% phosphorus and 0.66% manganese.

Production: in 1918, 1,636 tons; to Sept., 1919, 33,276 tons. Company ships by rail to Duluth, Minn.

LONGYEAR, E. J. & CO. **MINNESOTA**

Office: Minneapolis, Minn.

Principally an exploration company. Owns the orebody under Bennett Park, near Hibbing, Mesabi range, Minn. and had drills at work in 1918 testing the orebody. Company owns the Mace No. 2 mine at Nashwauk, operated by Butler Bros. from which 250,000 tons annually are mined. Company also has a large tract near Sudbury, Ont., on which carefully planned exploration by diamond drilling proved up an orebody of nickel copper ore, 7,500′ long, and 10′-120′ thick in a mineralized zone 11,200′ long and extending downward to a maximum depth of 1,000′.

LYCOMING CO. **MINNESOTA**

Office: 708 Lonsdale Bldg., Duluth, Minn. Was a securities-holding company. Inactive and no assets.

MACE IRON MINING CO. **MINNESOTA**

Office: 709 Security Bldg., Minneapolis, Minn.

Officers: R. M. Bennett, pres.; O. B. Warren, sec. and gen. mgr.; J. A. MacKillican, supt., Hibbing, Minn. Pickands, Mather & Co., Cleveland, Ohio., sales agents. Operated as a close corporation.

Property: Mace No. 1 mine on Mesabi range, in St. Louis county, Minn., producing a high grade, direct shipping. Bessemer iron ore, and developed by shaft 120′ deep, operated by steam hoist.

Mace No. 2 mine, on Mesabi range, in Itasca county, Minn., producing high grade, concentrating Bessemer iron ore, and developed by open pit system, worked with steam shovels and locomotives, etc.

Production: Mace No. 1, 1915, 120,888 tons; 1916, 163,352 tons; 1917, 122,500 tons; 1918, 66,405 tons. Mace No. 2, 1916, 307,496 tons; 1917, 251,280 tons; 1918, 247,590 tons. Ore from Mace No. 2 is concentrated at Harrison Plant.

MAHNOMEN MINING CO. **MINNESOTA**

Address: Clement K. Quinn, 1107 Alworth Bldg., Duluth, Minn. E. P. Scollon, supt.

Property: on the Cuyuna range, first opened in 1915. The ores assay from 40 to 57.5% iron, and 0.8 to 14% manganese. Mining is done by underground (250′ deep) and open-pit methods.

Production: 800,000 tons in 1918.

MAHONING ORE AND STEEL CO. **MINNESOTA**

Office: W. C. Agnew, Hibbing, Minn.

Property: Mahoning mine on Mesabi range, Minn.

Ore: soft, blue Bessemer, and soft, brown non-Bessemer hematite, containing 57.18% iron, 0.037% phosphorus, and 2.39% silica. Mined by open pit system to 200′ vertical depth.

Production: 2,215,788 tons in 1916; 2,525,144 tons in 1917; 2,024,676 tons in 1917; 2,024,676 tons in 1918; totaling 28,382,706 tons.

MANGAN IRON & STEEL CO. **MINNESOTA**

Office: 805 Lonsdale Bldg., Duluth, Minn.

Officers: A. F. Gress, pres.; P. Martin, v. p. and treas.; W. G. Whitney, sec.-mgr., with F. J. Sensonbrenner and C. A. Babcock, directors. Wm. Pascoe, supt., Ironton, Mich., E. Schramm, pur. agt.

Inc. 1913, in Minnesota. **Cap.**, $500,000; $1 par; non-assessable; outstanding $238,053.

Property: 80 acres, including Mangan mine on Cuyuna range, Minn., producing manganiferous ore, containing 40% iron, 0.150% phosphorus and 15% manganese. Developed by two shafts, 200′ deep.

Equipment: 2 hoists, compressor, 3,000-gal. pump.

Production: 1917, 50,000 tons, 15% manganese; 1918, about 75,000 tons, 17% manganese. Company reports ore reserves of 500,000 tons. Mine closed down May, 1919, waiting improved market conditions.

McKINNEY STEEL CO. **MINNESOTA**

See under Michigan.

MERRIMAC MINING CO. **MINNESOTA**

Office: Crosby, Minn. Said to be controlled by the John A. Savage Co.

Property: operates the Croft mine, near Crosby, Cuyuna range, Minn.

Ore: a soft, reddish blue Bessemer hematite assaying 54.61% iron, 0.039% phosphorus and 9.21% silica.

In 1918 it was reported, that company had taken a lease and option on 180 acres of iron ore lands, near the Croft mine. Fee owners said to be A. M. Chisholm and J. G. Williams, of Duluth, Minn. and B. McGoffin, of Deerwood, Minn.

MERRITT DEVELOPMENT CO. **MINNESOTA**

Office: 514 Plymouth Bldg., Minneapolis, Minn. Franklin W. Merritt, pres. and gen. mgr.

Property: operating Merritt mines, No. 1 and No. 2, in Cuyuna range, Minn., containing manganiferous ores showing 25 to 40% iron, 0.080% phosphorus and 12 to 25% manganese. Ore is mined by underground method.

Company can produce 150,000 tons of ore per year that will average 50-51% metallic iron and manganese.

MESABI IRON CO. **MINNESOTA**

Offices: Hayden, Stone & Co., 25 Broad St., New York; and 808 Sellwood Bldg., Duluth, Minn.

Officers: Charles Hayden, chairman of directors; D. C. Jackling, pres.; with J. D. Ryan, W. E. Corey, P. A. Rockfeller, C. M. MacNeill, Sherwood Aldrich, W. H. Smith, A. C. Dinkey, S. W. Mudd, H. V. Winchell, K. R. Babbitt, W. G. Swart (metallurgist) and J. C. Agnew, directors. Dwight E. Woodbridge, cons. eng.

Inc. 1920. **Cap.,** $3,000,000 of 8% cumulative convertible preferred shares, $100 par, and 150,000 common shares of no par value. No public offering is to be made until property is at productive stage.

Property: lands carrying low-grade iron-ore (magnetite) deposits in the eastern part of the Mesabi range, Minnesota.

Preliminary investigations were started in 1913, and by 1915 a syndicate was formed to drill, develop, and make metallurgical tests on the ore. A 100-ton concentrating plant was completed at Duluth by mid-1916, and operated until the end of 1918, producing several thousand tons of high-grade iron concentrate, desired by smelters. The Syndicate has spent $750,000 on this work, and finds that the problems resemble those of the disseminated (porphyry) copper deposits. A 3000-ton daily mill is being erected near the mines on a branch of the Duluth & Iron Range Railroad, and it is hoped to start marketing an agglomerated concentrate, carrying 60% iron, and low in phosphorus, early in 1921.

This appears to be a big and sane project, backed by men experienced in the treatment of low-grade copper and gold ores, and is not likely to share the fate that befell the Edison process in New Jersey and Norway.

MESSABA-CUYUNA IRON LAND CO. **MINNESOTA**

Office: 313 Sellwood Bldg., Duluth, Minn.

Officers: D. D. Murray, pres.; C. W. Stilson, v. p.; P. L. DeVoist, sec.; J. Oreckoosky, treas., with W. B. Patten, directors.

Inc. 1912, in Minnesota. **Cap.,** $250,000; $1 par; outstanding, $218,084. **Dividend:** April, 1918, 10%.

Property: 2,200 acres, on Mesabi and Cuyuna ranges, in St. Louis, Cook, Aitkin, Crow Wing and Cass counties, Minn., under lease to various com-

panies. No ore has been mined, but company received $11,750 for royalties on "minimum output" basis. Lands contain manganiferous and iron ores. Developed by 150′ shaft.

MONTREAL MINING CO. **MINNESOTA**

Office: E. W. Hopkins, mgr., Ironwood, Mich.

Ore: soft, red Bessemer and non-Bessemer hematites, assaying 55.46% iron, 0.041% phosphorus and 6.48% silica. Mined by slicing and caving method to 2,300′.

Productions: 530,813 tons in 1916 and a total of 4,662,938 tons to date. No recent returns available.

MUTUAL IRON MINING CO. **MINNESOTA**

Office: 519 Providence Bldg., St. Paul, Minn. **Mine office:** Geo. Reilly, supt., McComber, Minn.

Officers: J. Coates, pres.; G. H. Rowe, v. p.; J. L. Dorsey, sec.-mgr.; T. B. Schultz, treas., with E. O. Olund, A. H. Beyers, M. C. Welch, John Miller, I. F. Green, J. C. Houck and W. D. Limeman, directors.

Inc. in Minnesota. **Cap.,** $350,000; $1 par; outstanding 339,000.

Property: leased on the McComber mine, in St. Louis county, Minn., sub-leased September, 1918, to the National Mining Co., which see.

NATIONAL MINING CO. **MINNESOTA**

Address: McComber, Minn.

Officers: C. A. McCann, pres.; A. F. McBride, v. p.; C. S. Bunnell, sec.; J. B. Sullivan, sec.-mgr, with J. Hicks, directors.

Inc. 1918, in Minnesota. **Cap.,** $500,000; $1 par; all outstanding.

Property: leasing the McComber iron mine, in St. Louis county, Minn., developed by shafts 250′ and 400′ deep and by 700′ of tunnels.

Equipment: includes steam hoist, compressor and tramway.

Company recently commenced shipping; output to date about 25,000 tons of 60% ore.

NORTH AMERICAN IRON MINING CO. **MINNESOTA**

Ground transferred to a new company 1918, this company receiving $300.000 for a controlling interest.

Property: 160 acres, adjoining Minnesota mine, at Soudan, Minn., developed by a 400′ concrete shaft with about 1,300′ of workings. Main iron formation had not been cut, but the shaft workings are in quartz porphyry; 25,000 tons on the dump said to have assayed $10 in gold and $1 in silver per ton.

Equipment: included machinery and machine shop that cost $100,000. C. M. Simpson, of Shawnee, Okla., writes that fully $250,000 had been spent in development and equipment.

NORTHERN MINNESOTA ORE CO. **MINNESOTA**

Office: Deerwood, Minn.

Officers: C. W. Potts, pres.; L. Peterson, v. p.; C. M. Farney, sec. and treas.; with C. E. Updike, H. M. Miller, A. Murry, John Berg and R. S. Billingsley, directors. A. K. Knickerbocker, supt., Cuyuna, Minn.

Inc. March, 1917, in Minnesota. **Cap.,** $700,000; $1 par; outstanding $460,000.

Property: 12 fee interests, totaling 520 acres, and leases on 320 acres known as Northland mine, 2 miles north of Cuyuna on Cuyuna range, Minn. Ore assays: from Northland No. 1, iron, 36.30%, 0.140 phosphorus, 17.80% manganese and 12% silica; Northland No. 2, iron, 40%, phosphorus 0.140% manganese 14% silica 12%; Northland No. 3, iron, 54.10%, phosphorus 0.200%, manganese, 1% and silica 10%.

Development: by shaft 200′ deep and 200′ of workings. Method used, top slicing and selective stoping on manganese ore.

Equipment: includes two hoists, compressor and pump. Company expected to start shipping in 1919.

OLIVER IRON MINING CO. **MINNESOTA**

Company, a subsidiary of the U. S. Steel Corporation, is a close corporation, owning, controlling and operating mines in Michigan, Minnesota, and Wisconsin.

Office: Wolvin Bldg., Duluth, Minn.

Officers: W. J. Olcott, pres.; P. Mitchell, v. p.; G. D. Swift, sec.-treas.; J. H. McLean, genl. mgr.; O. C. Davidson, gen. supt., Eveleth, Minn.; L. D. Davenport, chief eng.; L. R. Salsich, mgr., Western Mesabi district, Hibbing, Mich.; A. Y. Petersen, gen. supt., Coleraine district, Minn.; F. R. Mott, genl. supt., Virginia district, Minn.; W. W. J. Croze, geologist.

Production: in season of 1918, was 338,344 tons from Marquette range; 1,147,127 tons from Menominee range, Mich.; 1,916,220 tons from Gogebic range, Mich.; 808,994 tons from Vermilion range, Minn.; and 21,461,223 tons from Mesabi range, Minn; a total of 25,671,908 tons. In 1917, the production was 28,453,154 tons; 1916, 29,927,767 tons; 1915, 21,079,224 tons; 1914, 14,586,454 tons; 1913, 26,037,585 tons.

The mines operated, include:

Mines	Range	Ore Bessemer or non-Bessemer	Content Dry Iron, 1918 %	Production 1917 Tons	Production 1918 Tons	Total Tons
Aragon	Menominee	B. & n-B.	57.94	301,934	296,426	8,116,478
Chapin	"	"	52.68	715,001	735,950	21,510,747
Riverton	"	n-B.	54.61	11,740	114,751	3,472,343
Davis	Gogebic	"	60.87	20,557	1,943	145,446
Geneva	"	B. & n-B.	63.36	122,193	114,472	412,560
North Newport	"	n-B.	57.59	5,772	29	94,933
Norrie-Aurora	"	B. & n-B.	58.61	1,633,503	1,483,545	36,892,419
Puritan	"	"	60.31	248,146	182,527	1,228,069
Royal	"	B.	60.72	48,897	17,208	110,594
Tilden	"	B. & n-B.	58.67	120,486	116,496	6,162,043
Lake Superior	Marquette	"	56.75	294,449	288,133	17,282,289
Queen	"	n-B.	.....	67,242	.....	8,195,123
Stegmiller	"	"	.....	30,325	.....	418,417
Adams, D. S. S. & A. Right of Way	"	"	59.08	99,744	50,211	350,852
Pioneer	Vermillion	B.	61.85	332,182	273,633	10,977,002
Sibley	"	B. & n-B.	64.26	193,834	155,626	2,925,155
Soudan	"	n-B.	64.77	145,338	140,707	9,211,158
Zenith	"	B.	61.86	368,453	239,028	5,514,532
Adams	Mesabi	B. & n-B.	59.19	1,549,658	1,096,466	21,033,510
Arcturus	"	"	58.02	314,073	295,546	609,619
Burt	"	"	58.80	695,663	749,884	15,643,741
Canisteo	"	"	55.22	1,643,226	1,426,465	13,426,652
Canton (Trespass)	"	.....	.....	.....	12,461	12,461
Chester	"	B. & n-B.	55.11	354,979	331,954	797,352
Chisholm	"	"	61.17	367,725	326,097	6,510,794
Clark	"	"	59.43	268,087	198,154	6,426,348
d'Autremont (Trespass)	"	"	.....	4,735	.....	7,923
Deacon	"	"	52.95	111,866	60,668	347,511
Duncans	"	"	53.62	.....	.....	83,701
Fayal	"	"	59.28	2,022,816	1,393,589	28,998,857
Genoa	"	"	57.74	171,504	181,224	8,693,241
Glen	"	"	59.62	443,446	618,571	3,917,345
Graham	"	n-B.	.....	238,904	.....	1,155,327
Hartley-Burt-Palmer	"	B. & n-B.	58.63	310,264	954,154	1,385,436
Holman	"	"	55.28	835,464	736,551	6,792,969
Hull-Rust	"	"	60.18	6,468,483	5,485,715	42,312,566
Judd	"	"	.....	50,278	.....	634,137
Kerr	"	"	62.72	1,586,409	2,027,589	4,153,673
Leonard-Burt (Trespass)	"	.....	.....	448	.....	988,487
Leonidas	"	B. & n-B.	56.27	782,343	664,605	4,182,515
Lone Jack	"	n-B.	46.80	.....	4,106	2,211,119
Mesabi Mountain	"	B. & n-B.	58.79	62,931	1,173,311	4,109,649
Minnewas	"	.....	.....	1,980	.....	162,374
Monroe-Tener	"	B. & n-B.	54.47	.....	.....	2,832,658
Morris	"	"	56.12	1,605,701	1,044,558	14,150,141
Myers	"	"	58.30	38,635	9,114	1,610,155
Norman	"	"	57.13	126,121	74,353	6,469,736
Ordean	"	"	59.53	383,968	100,517	880,076
Penobscot	"	n-B.	58.15	.....	519	706,794
Philbin	"	B. & n-B.	55.28	230,572	191,517	575,553
Sauntry-Alpena	"	"	56.70	605,223	511,918	9,342,812
Section 18, 58-16 (Trespass)	"	B.	60.80	.....	747	747
Section 19, 58-16 (Trespass)	"	"	60.80	.....	274	274
Sellers	"	B. & n-B.	58.05	1,575,057	865,211	8,686,782
Shaw	"	"	.....	1,841	.....	1,841
Shiras	"	"	54.44	193,592	123,348	552,242
Spruce	"	"	57.19	369,117	577,565	10,257,759
Wanless	"	"	55.70	180,721	182,009	596,905
Weed	"	"	55.06	80,639	42,463	320,575
Winifred	"	n-B.	.....	12,889	.....	758,089

OMAHA IRON CO. **MINNESOTA**

Address: 1019 Marquette Bldg., Chicago, Ill.

Officers: D. A. Dunn, pres.; W. A. McClaron, v. p.; L. M. Swindler, treas. Directors: W. P. Mars, D. A. Dunn, A. A. MacKay, W. A. McClaron and J. T. Paige. W. H. Squier, sec., mgr. and pur agt.

Inc. 1917, in Minnesota. **Cap.,** 100,000; par $10. Presumably controlled by stockholders of the Onahman Iron Co., which see.

Property: a lease on the Wilcox and Omaha mine, 240 acres, 7 miles N. E. of Brainerd, on South Cuyuna range, Minn. Mine has been developed by 5 miles of underground openings and is said to have reserves of about 4,000,000 tons of non-Bessemer ore that assays 50.34% iron; .228% phosphorus, and .30% manganese.

Production: 1918, 41,000 tons; total to date about 200,000 tons.

ONAHMAN IRON CO. **MINNESOTA**

Office: 1019-20 Marquette Bldg., Chicago, Ill.

Officers: C. L. Modesitt, pres.; W. A. McClaron, v. p.; W. H. Squier, sec.-treas., with R. Hoch, A. D. Dunn, M. F. Guyer, G. H. Pratt, A. E. Stocker and A. H. Farnsworth, directors. H. H. Hunner, supt.

Inc. 1913, in Nevada. **Cap.,** $1,250,000; $1 par; 1,060,000 issued.

Dividends: paid 3 dividends amounting to 15% during 1917. No further information securable. Gross earnings in 1918 were about $442,000, all from ore sales. Earnings to April, 1919, about $1,043,391 gross.

Property: 200 acres of manganiferous iron ore land on Cuyuna range, Crow Wing county, Minn., including the Ferro and Algoma mines, the latter purchased for $536,649 in 1917, when the Algoma Manganese Co. was merged with the Onahman Iron Co. Ore said to carry an average of 30% iron, and 20% manganese.

Development: by 200′ shaft with 5,000′ of workings, estimated by company to block out 1,000,000 tons of ore.

Equipment: includes electric hoist, 700 cu. ft. compressor and centrifugal pump.

Production: in 1918, 80,000 tons, and totaling about 94,000 tons.

ONEIDA MINES CO. **MINNESOTA**

Office: 207 Fargusson Bldg., Duluth, Minn.

Officers: A. C. Hoene, pres.; G. E. Waters, sec.-treas.; H. H. Bradt, manager.

Inc. 1918, in Minnesota. **Cap.,** $500,000; $1 par. Company was formed to take over all the assets and assume all debts, obligations and contracts of the Sultana Mines Co., issuing 301,070 shares to Sultana Mines Co., and offering Sultana holders 90,321 new shares, retaining in treasury 108,609 shares. The Sultana properties were appraised, 1918, at $309,710, as 903,210 Sultana shares were issued, the reorganization was equivalent to reducing outstanding shares to ⅓ the number.

Property: the Sultana mine, on Cuyuna range, in S. W. ¼ of S. E. ¼ of Sec. 3, T. 46 N, R. 29 W., Crow Wing county, containing ore suitable for basic pig iron and spiegeleisen. Dried samples assay 39.3% iron, 0.17% phosphorus, 8.45% silica and 13.43% manganese. Mined by sub-level slicing method to 130′ depth.

Company also owns a lease on the Clark mine, an undeveloped iron property in S. E. ¼ of N. W. ¼ Sec. 34, T. 47 N. R. 29 W., Crow Wing county, said to contain a high-grade manganiferous ore, low in phosphorus and suitable for ferro-alloy manufacture. Both mines reported closed down early in 1919, due to uncertain market and large stockpile.

Production: from Sultana, 35,169 tons in 1916; 63,000 tons, 1917.

ORIENTAL GRANITE & IRON CO. **MINNESOTA**

Office: 30 N. La Salle St., Chicago, Ill.

Officers: Edw. Romberg, pres.-treas.-mgr.; S. Romberg, v. p.; G. A. Hail, sec., with R. L. Benson, L. B. Lehman and H. J. Grannis, directors.

Inc. April, 1887, in Minnesota. **Cap.,** $80,000; shares $2 par, 38,000 issued.

Owns the Spring iron mine on Mesabi range, in St. Louis Co., Minn., and other unexplored iron lands. Ore of the Spring mine reported to assay 51% iron, .034% phosphorous and 22% silica.

PICKANDS, MATHER & CO. MINNESOTA

Offices: 600 Western Reserve Bldg., Cleveland, Ohio, and Sellwood Bldg., Duluth, Minn.

Officers: C. H. Munger, gen. mgr.; W. P. Chinn, asst. gen. mgr.; W. A. Rose, chief mng. eng.; W. H. Gallagher, chief mech eng.; C. P. McClure, purch. agt., Duluth, Minn.

Company owns or controls, or is selling agent for a great number of mines in the Lake Superior region. The ore mined is a hematite, equal in quality to the average standard of Lake Superior ore. The properties include:

Mine	Operating Company	General Supt.	P.O. Address	Production 1918, Tons	Production To date, Tons
Albany	Crete Mng.	R. Murray	Hibbing, Minn.	493,985	4,683,276
Balkan	Balkan Mng.	C. E. Lawrence	Crystal Falls, Mich.	262,293	896,786
Baltic	Verona Mng.	C. E. Lawrence	Palatka, Mich.	166,882	2,659,938
Bangor	Bangor Mng.	L. C. David	Gilbert, Minn.	idle	1,274,668
Belgrade	Balkan Mng.	L. C. David	Gilbert, Minn.	197,366	1,573,176
Bengal	Verona Mng.	C. E. Lawrence	Palatka, Mich.	303,788	773,539
Bennett	Bennett Mng.	F. P. Botsford	Keewatin, Minn.	872,421	2,494,003
Cary	Odanah Iron	L. M. Hardenburgh	Hurley, Wis.	231,523	4,457,370
Caspian	Verona Mng.	C. E. Lawrence	Palatka, Mich.	346,028	3,432,546
Corsica	Corsica Iron	L. C. David	Gilbert, Minn.	384,692	2,725,252
Danube	Balkan Mng.	F. P. Botsford	Bovey, Minn.	.....	.....
Elba	Hobart Iron	L. C. David	Gilbert, Minn.	154,030	3,096,249
Majorca	Hobart Iron	F. P. Botsford	Calumet, Minn.	251,707	364,101
Mikado	Verona, Mng.	L. M. Hardenburgh	Verona, Mich.	idle	1,140,623
Mohawk	Mohawk Mng.	L. C. David	Gilbert, Minn.	255,415	1,948,005
Plymouth	Plymouth Mng.	L. M. Hardenburgh	Verona, Mich.	821,867	1,810,550
Rowe	Pittsburgh S. Ore.	W. P. Chinn	Riverton, Mich.	109,435	657,005
Russell	Bennett Mng.	F. P. Botsford	Keewatin, Minn.	idle	.....
Scranton	Hoyt Mng.	R. Murray	Hibbing, Minn.	idle	521,841
Sunday Lake	Sunday Lake Iron.	L. M. Hardenburgh	Wakefield, Mich.	131,425	2,476,395
Utica	Pete Mng.	R. Murray	Hibbing, Minn.	282,854	3,673,186
Warner	Hemlock Riv. Mng.	C. E. Lawrence	Amasa, Mich.	78,855	187,420
Windsor	Odanah Iron	L. M. Hardenburgh	Hurley, Wis.	*	*

* Included in total of Cary Mine.

PITT IRON MINING CO. MINNESOTA

Address: C. E. Moore, gen. mgr., Virginia, Minn.; R. M. Rice, purch. agt.

Property: Miller and Wacootah mines on Mesabi range, St. Louis county, Minn. **Ore:** soft, brown, non-Bessemer hematites, containing in Miller, 49.28% iron, 0.07% phosphorus, 0.62% manganese; in Wacootah, 49.25% iron, 0.090% phosphorus and 0.69% manganese. Ore is mined by shafts to 212′ at Miller and stripping to 200′ at the Wacootah.

Production: in 1918, Miller, 333,728 tons; Wacootah, 171,663 tons. To September, 1919, Miller, 239,877 tons; Wacootah, 20,394 tons.

PITTSBURGH IRON ORE CO. MINNESOTA

Office: Virginia, Minn. J. D. Ireland, mgr. **Sales agents:** M. A. Hanna & Co., Cleveland, Ohio.

Property: the Brunt mine, on Mesabi range, St. Louis county. **Ore:** soft, red, non-Bessemer siliceous hematite, assaying 49% iron, 0.049% phosphorus and 8.50% silica. Mined by open pit method to 100′ depth.

Production over 1,000,000 tons since 1906.

PITTSBURGH STEEL ORE CO. MINNESOTA

Address: Riverton, Minn. J. C. Barr, mgh.; W. F. Slaughter, supt.; C. P. McClure, pur. agt., 700 Sellwood Bldg., Duluth, Minn.

Property: the Rowe mine, on Cuyuna range, Crow Wing county. Ore is a soft, brown non-Bessemer, requiring washing and crushing; assays 54% iron, 0.220% phosphorus and 0.37% manganese.

Development: property thoroughly explored: one drill hole being bottomed at vertical depth of 1,037′. Company strips overburden by use of two hydraulic giants, each requiring one 10″ clear water pipe, a 200 h. p. motor

driving a 10″ two-stage centrifugal pump for the clear water, a 12″ discharge pipe and a 250 h. p. motor driving a 12″ two-stage centrifugal sand pump.

Production: in 1919, about 1,300 tons daily. In 1918, 109,435 tons; total to date, 687,120 tons.

PROVIDENT IRON CO. **MINNESOTA**

Office: Duluth, Minn.

Officers: W. D. Edson, pres.; Herbert Warren, v. p.; T. A. Gall, sec.-treas., with W. B. Dunlop and D. J. Curry, directors.

Inc. 1913, in Maine. **Cap.,** $150,000; $10 par; 11,700 outstanding.

Property: a lease on 280 acres of iron lands on the Cuyuna range, Minn. The deposit of 58% ore, estimated to contain 1,500,000 tons, lies in slate and schist. No recent returns available.

QUINN, CLEMENT K. & CO. **MINNESOTA**

Office: Alworth Bldg., Duluth, Minn.

Officers: C. K. Quinn, pres., Duluth, Minn.; E. P. Scallon, supt., Crosby, Minn.

Property: the Quinn mine, on the Mesabi range, in Sec. 31, T. 57, R. 22, Itasca county, is worked by underground steam shovel and open pit systems. The product is Bessemer and non-Bessemer hematite.

Recent production: 49,251 tons in 1914; 91,007 tons in 1915; 226,360 tons in 1916, and 800,000 tons in 1918.

REPUBLIC IRON & STEEL CO. **MINNESOTA**

See same title in U. S. section of this volume.

ROGERS BROWN IRON CO. **MINNESOTA**

Address: W. C. Agnew, mgr., Hibbing, Mich.

Property: the Susquehanna iron mine, on the Mesabi range, Minn. Opened in 1906.

Ore: Bessemer and non-Bessemer, assaying 48-50% iron. Mined by stripping method.

ST. JAMES MINE **MINNESOTA**

See McKinney Steel Co., Mich.

ST. PAUL MINE **MINNESOTA**

See McKinney Steel Co., Mich.

SEAFIELD EXPLORATION CO. **MINNESOTA**

Office: Ironton, Minn.

Officers: Wm. Seafield, pres.; H. M. Stetson, sec.-treas.

Inc. March, 1908. **Cap.,** $8,000; $100 par.

Company does exploration work only.

SHADA MINING CO. **MINNESOTA**

Address: 1197 Alworth Bldg., Duluth, Minn. C. K. Quinn, mgr.

Property: the Shada iron mine, Sec. 2, T. 56 N. R. 23 W., on Mesabi range, Itasca county, Minn., carries a soft red Bessemer hematite, containing 54.01% iron, 0.036% phosphorous and 7.28% silica. The washed product from concentrators assays 59.35% iron, 0.04% phosphorous and 8% silica. Company was reported in 1917, to be operating the Pierson mine in Sec. 29, T. 57, R. 22, Mesabi range, Itasca county, which carries a soft brown Bessemer hematite. Mine had been idle since 1913.

Operates by steam shovel methods at the Shada; slicing and caving system at the Pierson.

SECTION THIRTY MINING CO. **MINNESOTA**

Address: Sellwood Bldg., Duluth, Minn.

Officers: G. A. St. Clair, mgr.; H. G. St. Clair, supt.

Property: iron mine in the Vermillion range, Lake county, Minn. Ore is a hard, blue Bessemer and non-Bessemer hematite, containing 59.85 and 55.67% iron, 0.044 and 0.080% phosphorous and 7.13 and 11.14% silica, respectively. Ore is crushed, and cargo analyses show 63% iron in Bessemer and 58.6% in non-Bessemer.

Worked by open pit and sub stoping methods to 650′ vertical.

Production: 868,826 tons from 1909 to 1916. No recent figures obtainable.

SHENANGO FURNACE CO. **MINNESOTA**

Address: E. J. Maney, Pittsburgh, Pa.

Property: Shenango, Tioga, Webb and Whiteside iron mines, on Mesabi range, St. Louis county, opened in 1904, 1916, 1905, and 1910, respectively.

Ore: all four produce soft, brown Bessemer and non-Bessemer hematites, containing 53.23, 50, 53.52, and 50.85% iron; 0.041, 0.039, 0.051, and 0.088% phosphorous; and 4.75, 10.97, 6.13, and 7.49% silica, respectively. Ore is mined by underground and open-pit methods to 300′ in the Shenango; underground to 200′ in the Tioga; underground and stripping to 250′ in the Webb mine, and underground to 250′ in the Whiteside. Company also owns the South Tener mine, an undeveloped property.

Production: company's average annual production is 1,100,000 tons. In May, 1919, the Shenango was reported closed.

SOUTH CHANDLER MINE **MINNESOTA**

Address: B. M. Pattison, lessee, Sellwood Bldg., Duluth, Minn. W. J. Mudge, supt.

Property: an iron mine on Vermillion range, St. Louis county, Minn., that was worked in 1888, abandoned 1905 and reopened 1913, mainly working ground already worked.

Ore: red Bessemer crushed hematite, containing 54% iron, 0.042% phosphorous, and 8.3% silica.

Mining by slicing system, to 800′ vertical.

STEVENSON MINE **MINNESOTA**

See McKinney Steel Co., Mich.

SULTANA MINES CO. **MINNESOTA**

Address: H. H. Bradt, mgr., 207 Fargusson Bldg., Duluth, Minn. A. R. McGuire, supt.

Company dissolved 1918, and all assets taken over by the Oneida Mines Co. The directors of the Sultana comprised the first directorate of the Oneida. The transaction was a reorganization, cutting down the outstanding stock to one-third. See Oneida Mines Co.

Property: the Sultana and Clark iron mines on Cuyuna range, Crow Wing county, Minn.

SYRACUSE MINING CO. **MINNESOTA**

Address: C. H. Munger, mgr., Sellwood Bldg., Duluth, Minn.; W. P. Chinn, supt.; Pickands, Mather & Co., sales agents, Cleveland, Ohio.

Property: the Hudson mine, on Mesabi range, St. Louis county. **Ore:** a soft, yellow, non-Bessemer hematite, assaying about 49% iron, .075% phosphorous and 7.7% silica. Mined by open pit system to 110′.

Production: about 1,500,000 tons since 1910.

TOD-STAMBAUGH CO., THE **MINNESOTA**

Address: C. A. Thompson, v. p., Cleveland, Ohio. J. S. Lutes, mgr. for Cuyuna range mines. Sales agents for the following iron mines:

Property	Range	Mining System	Ore	Iron Content %	Production* Tons
Biwabik	Mesabi	Open pit	Bessemer and non-Bessemer	55 to 50 52	428,944
Dean-Itasca	Mesabi	Open pit	Bessemer and non-Bessemer	51 50	797,933 600,000
Dunwoody	Mesabi	Open pit	non-Bessemer	50	623,556
Morton	Mesabi	Underground		50	44,940
North Eddy	Mesabi	Underground	non-Bessemer	49	104,710
Pennington	Cuyuna	Open pit	non-Bessemer	51	206,085
Warren	Mesabi	Open pit	non-Bessemer	52	300,000
Zimmerman	Menominee	Underground	non-Bessemer	51	225,000

* Approximate 1918 production.

The Biwabik, opened in 1893, has produced 11,559,883 tons; the Dean-Itasca, in 1915, 1,048,250 tons; the Morton, in 1912, 139,430 tons; the North Eddy, in 1915, 107,369 tons; the Zimmerman was opened in 1907 by the Spring Valley

Iron Co., and was taken over by the Tod-Stambaugh Co. in 1918; total production to December, 1918, about 3,000,000 tons.

UNION ORE CO. **MINNESOTA**

Address: Youngstown, Ohio. F. H. Webb, mgr.; William White, supt.

Property: the Union mine, on Mesabi range, St. Louis county. **Ore:** two grades, soft red and blue Bessemer and non-Bessemer hematites, assaying 43 to 55.50% iron, .040 to .070% phosphorous and 9.10 to 10.60% silica.

Production since 1900, when first opened, over 1,800,000 tons.

WAWBECK MINING CO. **MINNESOTA**

Office: Alworth Bldg., Duluth, Minn. C. K. Quinn, pres.

Company has warehouse, engine and boiler houses, office and blacksmith shop at its newly acquired mine near McKinley, Minn.

WHITE IRON LAKE IRON CO. **MINNESOTA**

Office: 526 Manhattan Bldg., Duluth, Minn.

Officers: J. P. Labrec, pres.; Jos. Trudel, treas., with C. M. Forest, F. P. Teepoorten, Jos. Lafortune, R. Hoch, directors. R. Belleperche, sec.

No details of property or production received as yet.

WILCOX MINE **MINNESOTA**

Owned by Hale Development Co., Minnesota, which see.

WISCONSIN STEEL MINES **MINNESOTA**

Owned by the International Harvester Co. **Office:** 606 Michigan Ave., Chicago, Ill. Mine office: Nashwauk, Minn.

Officers: H. F. Perkins, gen. mgr.; B. W. Batchelder, gen. supt.; J. H. Williams, chief eng.; W. B. Edgar, purch. agt.

Property: the Agnew mine at Hibbing; the Hawkins mine at Nashwauk; and the Sargent mine at Keewatin, Minn.

Agnew Mine: on Mesabi range, opened in 1902, and containing a soft, red, non-bessemer hematite assaying 58.34% iron and 0.057% phosphorous. Mined by underground system.

Production: 1918, totaled 97,933 tons.

Hawkins Mine: on Mesabi range, near Nashwauk. First opened 1902. Ore is a Bessemer hematite, assaying 58.73% iron, and 0.146% phosphorous. Mined by open pit system to about 200′ depth.

Production: in 1918, 613,325 tons; to date, 5,549,931 tons.

Sargent Mine: on Mesabi range, near Keewatin. Firs opened in 1918. Ore is a non-Bessemer hematite, assaying 57.61% iron and 0.065% phosphorous. Underground mining system used. The property has been explored by diamond-drilling which showed ore estimated at 10,000,000 tons. A 4-compartment shaft, 180′ deep, is planned.

WISTAR MINING CO. **MINNESOTA**

Address: McKinley, Minn. C. K. Quinn, mgr.

Operating 40 acres, known as the Wistar mine, near McKinley, Mesabi range. Property explored 1917, and development started in 1918.

YORK IRON MINING CO. **MINNESOTA**

Office: Nashwauk, Minn.

Officers: A. B. Coates, pres.; G. P. Tweed, sec.-treas.; C. A. Myers, mgr.; John Sandberg, supt.

Property: the York mine, on Mesabi range, containing Bessemer and non-Bessemer hematites. Ore mined by open pit system, shows 55% iron, .04 to .07% phosphorous and 7.7% silica.

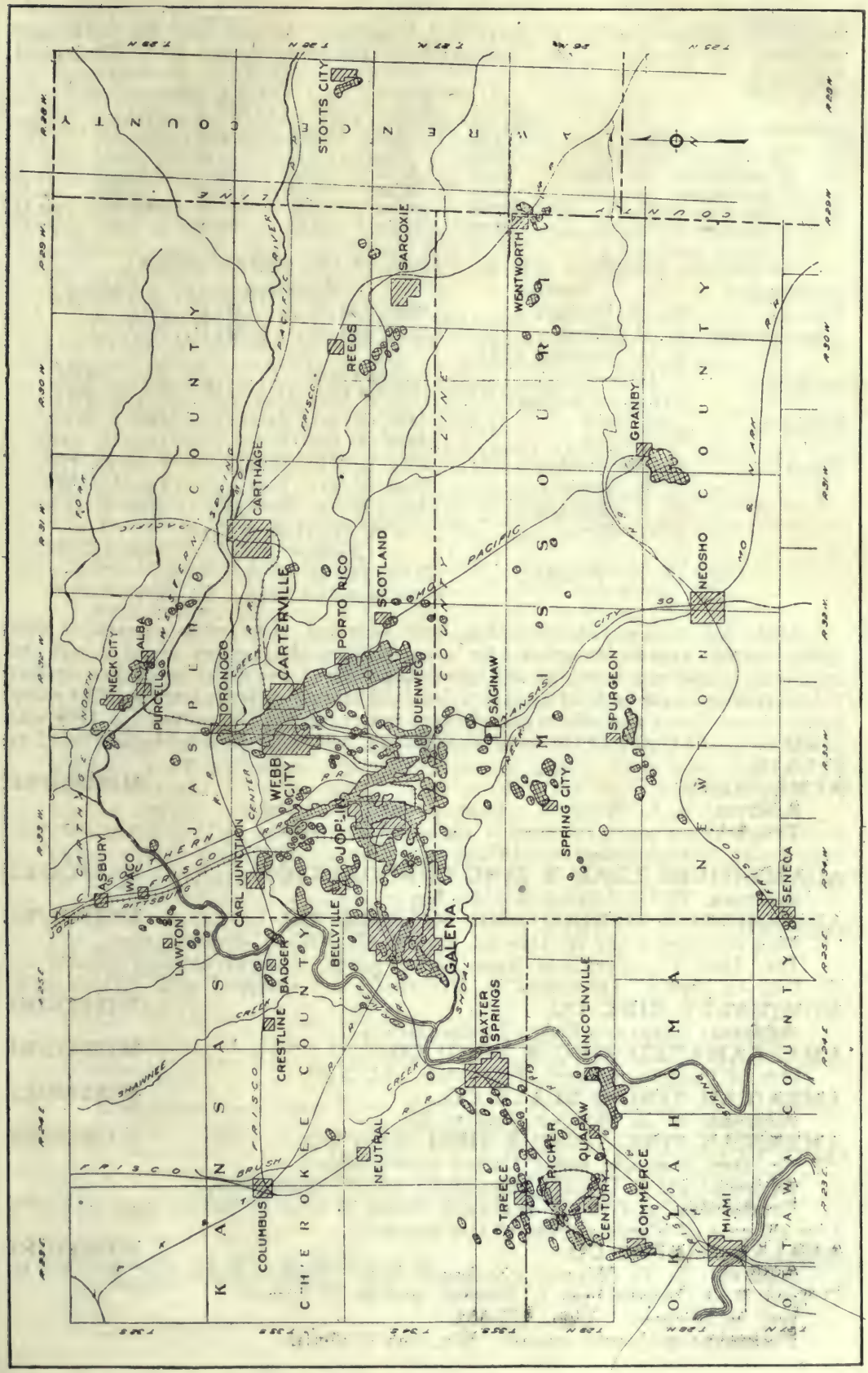
Development started 1917; no production figures received.

MISSOURI

The State contains two distinct metalliferous districts, namely, the Joplin and the Southeastern regions. These are described independently in two sections.

JOPLIN DISTRICT

Joplin, in southwestern Missouri, is the center of a district, covering 3,000 sq. miles, partly in Oklahoma and Kansas. The ore deposits are found at com-



MAP OF AREAS WHICH HAVE PRODUCED ZINC AND LEAD ORES IN THE JOPLIN, MISSOURI, DISTRICT OR TRI-STATE REGION.

paratively shallow depths, in chert and limestone, the ore carrying both zinc and lead. Production of the Missouri field, according to the U. S. Geological Survey, is:

	Soft ground			Sheet Ground		
	1916	1917	1918	1916	1917	1918
Crude ore, tons	4,711,700	3,447,850	1,710,900	8,848,700	7,688,250	1,903,300
Zinc, per cent	1.70	1.99	2.30	1.86	1.75	2.10
Lead, per cent	0.22	0.25	0.32	0.33	0.36	0.51
Lead in concentrates, per cent	78.00	76.10	77.40	76.50	75.90	77.40
Zinc in concentrates, per cent	58.10	58.20	58.60	59.20	58.60	57.70
Lead concentrates, per ton	$82.09	$97.94	$87.35	$85.62	$103.51	$91.32
Zinc concentrates, per ton	77.94	69.50	52.71	86.02	72.16	49.25

Publications describing mining practice in the district include:

Subject	Author	Publication	Date
Geology	H. A. Buehler	Bull. 130 of A. I. M. E.	1917.
Ore treatment	C. A. Wright	Bull. 130 of A. I. M. E.	1917.
"	R. W. Johnson and C. E. Heinz	Joplin Globe	Mar., 1919.
"	Temple Chapman	Eng. & Min. Jour	Oct. 6, 1917.
Markets	Otto Ruhl	Min. & Sci. Press	Jan. 5, 1918.
"	Otto Ruhl	Min. & Sci. Press	Jan. 18, 1919.
General	H. W. Kitson	Eng. & Min. Jour	Feb. 23, 1919.
"	A. E. Bendelari	Eng. & Min. Jour	Jan. 18, 1919.
"	T. A. Rickard	Min. & Sci. Press	Mar. 2, 1918.
"	L. V. Rice	For R. W. Hunt & Co., of Chicago	Sept. 15, 1917.
"	C. A. Wright	Bull. 154 of U. S. Bureau of Mines	1918.

Little information of value has been obtained from mine-owners of this State, despite repeated requests for same. From the figures given it will be seen that, in the aggregate, an enormous quantity of work has been done in this field. Owing to the lack of a market for lead and zinc concentrate in 1919 many mines closed down and others merely kept mines open. The output for 1919 was 55,692 tons of blende, 12,135 tons of calamine, and 6,715 tons of lead, valued at $3,169,140.

ACME MINE **MISSOURI**

Address: S. L. Hurlbut, owner, Houston, Texas.

Property: a mine on one of eight 40-acre tracts in the Waco district, near Joplin, mined to depth of 195′.

ADAMS-HICKS LEAD & ZINC CORPORATION **MISSOURI**

Address: B. D. Adams, Joplin, Mo.

ADIRONDACK MINING AND MILLING CO. **MISSOURI**

Mail returned from W. 11th St., Joplin, Mo. W. H. Roberts, mgr.

Inc. 1916, to operate a lease on 20 acres of mineral land owned by the City of Joplin. Developed by 200′ shaft, and equipped with 300-ton mill.

ADMIRALTY ZINC CO. **MISSOURI**

Address: Cosgrove Bldg., Joplin, Mo.

AMALGAMATED ZINC & LEAD CO. **MISSOURI**

Out of business, August, 1918. See Vol. XIII.

AMERICAN ZINC & SLATE CO. **MISSOURI**

Address: A. B. Borries, Joplin, Mo.

AMERICAN ZINC, LEAD & SMELTING CO. **MISSOURI**

See same company under United States section.

Address: H. I. Young, Johnstown and Granby, Mo.

Production: at Granby averaged about 33 tons of blende, and at Webb City 230 tons of blende weekly, at last accounts.

ANALEE MINING CO. **MISSOURI**

Address: J. C. Wyatt, Carthage, Mo. Others interested are C. B. Pollard, R. A. Mooneyham, C. Vernon, and W. C. Lucas.

Inc. in Missouri. **Cap.,** $75,000.

Property: in Jasper county, Mo., has 2 shafts.

ANNA D. MINE **MISSOURI**

Address: I. L. Burch, Joplin, Mo.

Property: at Stinsonville, Mo. Idle from 1907 to 1918.

ANNAPOLIS LEAD CO. **MISSOURI**

Address: A. J. Meir, mgr., Annapolis, Mo.

Principal shareholders: F. M. Strickland, St. Louis, Mo.; D. G. Cook and C. F. Dana of Vessie, Mo., and J. A. Nolan of Webster Groves, Mo.

Inc. in Missouri. **Cap.,** $2,500,000.

Property: on the Missouri Pacific R. R. near Annapolis, in Iron county. The sum of $50,000 is said to have been spent up to March, 1919. In November, a ¾-mile spur line was constructed and a shaft was to be sunk to open the lead ore revealed by 79 drill-holes. A 500-ton mill is contemplated.

ARISTOS MINING CO. **MISSOURI**

Address: W. J. Forbes, mgr., Sarcoxie, Mo.

Property: a lease on 140 acres, 5 miles west of Sarcoxie. A plant to treat old tailing and a 350-ton mill were proposed at last accounts.

ATHLETIC MINING & SMELTING CO. **MISSOURI**

Address: Webb City, Jasper county, Mo. Charles T. Orr, pres. and gen. mgr.; James B. Millar, treas; C. A. Rice, supt. Is under same control as Bertha A. and Wingfield companies. Formerly operated under name of Gopher M. & M. Co.

Property: 100 acres of the Jasper County Royalty Co.'s land at Duenweg, bought in 1915; purchase price said to be $150,000. Lead-zinc ore occurs in sheet ground at depth of 240′.

Development: by seven 240′ shafts. **Equipment:** includes a 1,500-ton concentrating mill and a smelter at Fort Smith, Arkansas.

Production: 402 tons of blende per week in Feb., 1918.

Also owns the Oronogo Mutual mine acquired from the Waring family in September, 1918, consisting of 40 acres of zinc-bearing land, and including the Old Judge mine on the Elliott land, the Hockaday tract, purchased from the American Z. L. & Sm. Co.; also mining rights on city lots at Oronogo. The Old Judge is developed by 2 shafts, 165′ and 170′ deep.

Equipment: includes 16 air drills, 2 electric hoists, 2 compressors, also crusher, a 500-ton electrically driven concentrating plant with 2 sets of jigs, slime tanks and 11 tables, and a steam power plant consisting of 2 boilers, condensing engine, and 2,600 cu. ft. compressor.

Production begun the latter part of 1914, was at the rate of 113 tons of blende and 87 tons of lead concentrate per week in 1918.

A. T. S. MINING CO. **MISSOURI**

Out of existence. See Vol. XIII.

A. W. C. MINING CO., INC. **MISSOURI**

Address: W. 7th St., Joplin, Mo.

Officers: W. O. Cragg, pres. and mgr.; Bert Lease, mine supt.; Jason Scott, mill supt.

Inc. in Maine. **Cap.,** $500,000.

Property: 280 acres at W. 7th St., Joplin, in center of sheet ground district. Ore carries 2½% zinc and lead. The deposit is 12′ thick. Five shafts are down 195′.

Equipment: includes three mills of 850 tons capacity per 24 hours; 2 on A. W. C. land and 1 on Expansion Co.'s land on the south end.

Production: in 1916, company is reported to have sold 2,435 tons of zinc concentrates, assaying 62% zinc for $245,520 and 477 tons lead ore for $40,914. The plant was closed down during 3 months. Lead concentrate assays 75% metal.

No recent returns.

BANKERS LEAD & ZINC CO. **MISSOURI**

Address: G. A. Morris, sec., Oklahoma City, Okla.; J. M. Boyd, Mo., manager.

Cap., $250,000.

Property: a lease on land near Chitwood, Mo., and at Picher, Okla. A 250-ton mill was to be built, at last accounts.

BARNETT MINING CO. **MISSOURI**

Judgment of $174,000 rendered against this and other defendants in favor of R. R. Conklin of New York, on ground of misrepresentation as to value of Porto Rico No. 1 mine, near Duenweg.

BEN B. MINING CO. **MISSOURI**

Address: Box 271, Joplin, Mo.

Officers: O. Longacre, pres. and mgr.; B. W. Brice, v. p. and supt.; G. J. Hiatt, sec.-treas.

Inc. Oct. 25, 1917, in Missouri. **Cap.,** $30,000; increased June 21, 1918, to $50,000.

Property: 80 acres, 2½ miles W. of Joplin, on 7th Street. Ore deposit is 20′ thick, opened to 145′ depth and carries 8% zinc.

Equipment: 150-ton mill with crusher, rolls, 2 jigs, tables and gas engines.

BERTHA A MINING CO. **MISSOURI**

Address: Chas. T. Orr, pres. and gen. mgr., Webb City, Mo.; Jas. B. Millar, treas.

Inc. in Missouri. **Cap.,** $10,000;

Property: a lease on 160 acres of mineral land, owned by the Newell-Morse Royalty Co., Webb City, Jasper county, Mo. Company is one of the largest producers of zinc and lead concentrates in the district.

Development: by 8 shafts to a depth of 221′ and equipped with 1,500-ton concentrator, electric hoist, pump, air compressor and drills. Company employs 125 men.

This company, together with the Athletic M. & S. Co., of Webb City, and the Wingfield Mining Co., near Picher, Okla., are operated jointly by Mr. Orr and associates. The three mills vary from 1,000 to 1,200 ton capacity per 24 hours, and their joint production in 1916, was 32,000,000 lb. zinc and lead of a value of $1,250,000. In February, 1918, the weekly output of blende was 250 tons.

B-G-M. MINING CO. **MISSOURI**

Address: J. B. Gibson, mgr., Carthage, Mo.

Officers: Z. A. Metzler, pres.; J. B. Gibson, v. p.; S. C. Boggess, sec.-treas.

Inc. in Missouri. **Cap.,** $100,000.

Property: 60 acres N. of Webb City, Mo. Ore carries 2% zinc and lead and is opened to depth of 180′.

Equipment: 800-ton mill (24 hours), containing crusher, rolls, jigs and sludge tables. Concentrate assays 59 to 61% zinc. Cost of mining and milling is $1.25 per ton.

No recent returns.

BIG BEN MINING CO. **MISSOURI**

Address: A. Baker, v. p., Springfield, Mo.

Property: 6 miles S. E. of Springfield. In 1919, mine was reported producing 6 tons of zinc and 2 tons of lead concentrates daily.

BLUE ROCK MINING CO. **MISSOURI**

Sold assets in 1917 to the Crescent Lead & Zinc Corporation, which see.

BONANZA MINING CO. **MISSOURI**

Address: Aurora, Mo.

Production: 60 tons of blende weekly.

BOSTON DUENWEG MINING CO. **MISSOURI**

Owns the property operated by the Wilson Mines Co., and the O. F. & L. Mng. Co., Jasper county, Mo.

In September, 1918, T. H. Noonan of Webb City, secured a lease on 230 acres of land, and sublet the ground on a 15% royalty basis. Developed to depth of 250′, but the deposits are thin. Lessees reported working at 150′ depth. The ore is cleaned by hand jigs.

BRADLEY LEAD & ZINC CO. **MISSOURI**

Address: 723 Frisco Bldg., Joplin, Mo.

Property: a lease on the St. Louis-Joplin Lead & Zinc Co.'s land, comprising part of the A. B. C. Mining Co's ground, and the Martha Ball mine, in the Chitwood district, near Joplin, Jasper county, Mo.

Ore: lead-zinc occurs in disseminated deposits in the A. B. C. and as sheet-ore, 20′ thick at depth of 200′, in the Martha Ball.

Development: by shafts. **Equipment:** 250-ton mill on Martha Ball ground. Active operations began March, 1915. Company operating a second 250-ton mill in the West Joplin district, at last accounts.

BEULAH MINING CO. **MISSOURI**

Address: Ed. James, Webb City, Mo.

BUMBLE BEE MINING CO. **MISSOURI**

Address: Joplin, Mo.

Production: 140 tons of blende per week during part of 1918.

BURTON MINING CO. **MISSOURI**

Probably dead, as letters were returned unclaimed in 1919.

Inc. in Missouri. **Cap.,** $10,000.

Property: two 20-acre tracts of J. I. Walker land in Jasper county, Mo.

Property: developed by 5 shafts, average depth 150′, and equipped with 150-ton concentrator. Output is zinc concentrate.

BUTLER BROS. MINING CO. **MISSOURI**

Address: Waco, Mo. A 250-ton mill was to be erected late in 1918.

BUTTE-KANSAS MINING CO. **MISSOURI**

Address: D. C. Connor, Acme mine, Waco, Mo.

CACTUS HILLS MINING CO. **MISSOURI**

Idle. **Address:** Box 201, Joplin, Mo.

Officers: Herman Schmelzer, pres.; J. H. Estes, v. p.; H. F. Hoffman, sec.-treas.; J. H. Moreland, mgr.

Inc. 1913, in Missouri. **Cap.,** $10,000.

Company operated the Lone Elm 150-ton custom mill, which was struck by lightning in August, 1918, and burned. Conditions did not warrant re-building.

CARL JUNCTION COMMUNITY DEVELOPMENT CO. **MISSOURI**

Address: Carl Junction, Mo.

Officers: D. G. Evans, pres.; C. M. Dawns, v. p.; C. W. Roney, sec.; C. W. Hilliker, treas., with J. A. Magoon, C. E. Hawk and J. B. Coons, directors.

Is a partnership of local business men, who each pay $10 monthly drilling ground a mile west of Carl Junction. When ore is found, the lease will be turned over to responsible operators for development. This is a well-directed effort to stimulate new interest in the Joplin field, now rather quiet.

CARMEAN & SQUIRES MINING CO. **MISSOURI**

Office: Room 14-16 Wagner Bldg., Webb City, Mo.

Inc. in Missouri. **Cap.,** $2,000.

Property: mines in S. W. Missouri, including Gwinn land, 2 tracts, one 20, the other 40 acres of Kelly land, all located in Jasper county, the old John L. mine, 20 acres, in the north Webb City sheet ground district, purchased for $30,000, in November, 1915, and the Old Virginia mine, near Carterville.

Development: the Gwinn tract has 2 shafts, depth 186′, and a 250-ton concentrator. The 20-acre Kelly tract is opened by 200′ shaft, and has a 150-ton concentrator; the 40-acre tract is opened by 180′ shaft and has a 200-ton concentrator.

Production: lead-zinc concentrates, not reported.

CAROLYN METAL CO. **MISSOURI**

Address: Nels Darling, Oklahoma City, Okla.

Property: that of Neosho Granby Metal Co., at Granby, bought in July, 1918. The 150-ton mill was remodeled to 250 tons capacity.

CAVE SPRINGS LEAD & ZINC CO. **MISSOURI**

Address: M. Grundler, supt., Cave Springs, Mo.

Property: a lease on 50 acres of land owned by the Kansas-Missouri L. & Z. Co., including the Grass Roots and Cave Springs mines, both old-time producers, at Cave Springs, west of Joplin, Jasper county, Mo.

Ore: contains zinc and lead sulphides. Developed by several shafts, deepest 260′, with levels at 130′ and 240′. This shaft was unwatered to the 240′ level in 1915. Ore in Grass Roots mine is taken out by open-pit work.

Equipment: 100-ton concentrating mill, centrifugal pumps, hoist, electric power and surface buildings.

CENTER CREEK MINING CO. **MISSOURI**

Office: O'Neill Bldg., E. Daugherty St., Webb City, Mo.

Officers: I. D. Snedeker, pres.; M. L. Sears, v. p.; with Mrs. A. V. Stewart, Thos. McCroskey and J. H. Capelli, directors. R. F. Stewart, sec.-treas. and gen. mgr.

Inc. 1889, in Missouri. **Cap.,** $200.000, reduced in July, 1919, from $1,500,000; shares, $10 par. Listed on St. Louis Stock Exchange.

Dividends:

Year	%	Year	%	Year	%
1917	3½	1911	2	1905	2
1916	6½	1910	2	1904	3
1915	4	1909	1	1903	3
1914	2	1908	1	1902	2
1913	3	1907	3	1901	3
1912	2½	1906	14	1900	3

Company does not carry on active mining operations, but leases its land to operators, among whom are S. Y. Ramage, C. D. & R. Mng. Co., Incline Mng. Co., J. R. Wisby, Twin Cities Mng. Co., Nearby Mng. Co., Rogey Mng. Co., Jewel Mng. Co., Carlatt Mng. Co., and the Good Shepherd Mng. Co., receiving royalty on all ore produced.

Property: 200 acres and mill-site between Webb City and Cartersville, Jasper county, Mo., developed by 13 shafts from 110′ to 165′ deep, producing both lead and zinc ore. Five mines and mills are operated.

Production (years ended March 31):

Year	Zinc, Pounds	Lead, Pounds	Value
1918	8,631,115	1,367,980	$353,281
1917	10,529,930	920,480	454,111
1916	15,250,870	1,107,547	.....
1915	6,823,320	1,993,180	.....
1914	11,223,690	4,438,410	.....

Total output from start of operations is valued at nearly $14,000,000.

CENTRAL ZINC MINING CO. **MISSOURI**

Address: Frank Danglade, supt., Waco, Mo.

A new mill was erected late in 1918.

CHICAGO MIAMI LEAD & ZINC CO. **MISSOURI**

Address: Box 573, Joplin, Mo.

CLEAR PEACHER MINING CO. **MISSOURI**

Address: Fletcher Clear, supt., Cunningham Bldg., Joplin, Mo.

Property: 3 miles E. of Joplin, is a zinc silicate (calamine) mine. An average of 28′ of ore was reported mined at depth of 107′. Has a 150-ton mill.

CHICAGO MINES CO. **MISSOURI**

Address: 301 Miners Bank Bldg., Joplin, Mo.

Property: 10 acres owned by the Conner Investment Co., near Webb City, Jasper county. Opened by two 200′ shafts, and equipped with a 200-ton mill.

CLEVELAND & AURORA MINERAL LAND CO. **MISSOURI**

Address: Aurora, Mo.

Officers: John T. Gill, pres.; H. J. Baldwin, sec.; J. J. Sullivan, treas.; C. C. Plank, supt.

Inc. in Illinois.

Property: company owns zinc and lead lands, which it leases to others.

C. M. & H. MINING CO. **MISSOURI**

Address: Burt Pitts, supt., 4th and Gray Ave., Joplin, Mo.

Property: leases on the Malloy tract just south of Duenweg. Drilling showed good disseminated ore at 86 to 165′ depth. A 150-ton mill was to be erected at last accounts.

COAHUILA LEAD & ZINC CO. **MISSOURI**

Mill office: Carthage, Mo.

Officers: C. F. Jennings, pres.; C. D. Smith, v. p.-mgr.; W. E. Parker, sec.-treas.

Cap., $300,000.

Property: operates a lease on 120 acres, owned by Amsden & Amsden, in the Carthage district, Jasper county, Mo. Ore occurs in sheet-ground and soft ground. Also owns land in Barry county, Mo., where several shafts have been sunk and ore discovered, but not worked at present.

Development: by 4 shafts, 160 and 180′ deep. **Equipment:** includes 2 mills.

In March, 1919, the No. 3 mine at Porto Rico was closed, due to low prices for ore and excessive water. From 1909 to 1916, company operated a 900-ton mill (24 hours), after which the 1,400-ton mill was started. (The latter made recoveries of 79%). In 10 years, 2,040,031 tons of ore was hoisted, 362,506 tons being in 1917. Total costs were from $1.16 to $1.25 per ton during the past 3 years.

Production: in 1918 was about 270 tons of blende concentrate weekly.

CONCORD MINING CO. **MISSOURI**

See Unity Mining Co., Missouri.

CONNECTICUT ZINC CORPORATION **MISSOURI**

Office: 500 Fifth Ave., New York.

Officers: Ross M. Turner, pres.; W. S. Hallowell, v. p., with P. W. Brooke, A. R. Turner, J. J. Coyle, A. H. Lippincott, W. S. Hallowell, W. H. Lyon and G. P. Smith, directors; Elwood Burdsall, treas.; M. A. Pappert, sec.

Inc. June, 1914, in New York, to hold securities of Oronogo Circle Mining Co., of which it owns the entire capital stock, and to operate zinc properties. In July, 1917, company took over leases and cancelled stock and charter of the Oronogo Circle Co., and now owns and operates this property. **Cap.,** authorized and outstanding, $1,000,000; $25 par. Fidelity Title & Trust Co., transfer agent, Stamford, Conn. Annual meeting second Monday in July. **Dividends:** paid quarterly at rate of 6% per annum.

Property: the Oronogo Circle mine near Joplin, Mo., has been a producer for 60 years.

Equipment: includes locomotives, 2½-ton dipper-shovel, 5-ton side-dump ore-cars, No. 8 McCully crusher on 240′ level (all underground); 3-compartment shaft, 5-ton skips, 2,500-ton storage-bin at surface, belt-conveyors, and 3,000-ton mill, with two 24-in. Webb City Carterville crushers, two sets of 60-in. rolls, four sets of 40-in. high-speed rolls, 8 Akins classifiers, various jigs, 27 sludge-tables, 5 Dorr thickeners, and complete oil flotation plant. The power plant consists of 900 h. p. of steam and 1,250 h. p. of connected load of electrical power, a 500-h. p. steam engine, and 5 Scotch marine boilers.

Production: 28,000 tons of blende (60%) per annum.

CONQUEROR ZINC CO. **MISSOURI**

F. H. Houk, sec., Joplin, Mo.

In liquidation at last reports.

CONSOLIDATED INTERSTATE MINING CO. **MISSOURI**

Address: Joplin, Mo.

Production: reported to be 40 tons of blende concentrate weekly.

CONSUMERS MINING CO. **MISSOURI**

Address: W. 7th St., Joplin, Mo.

Cap., $10,000.

Property: lease on 15 acres of mineral-bearing land near Joplin, formerly worked by Otis Mining Co.

Development: by 2 shafts to 185′ level.

Equipment: includes 300-ton concentrating mill, crusher, 8 tables, 11 air drills, 2 hoists and pump. Employs 80 men. Producing since 1914.

CONTINENTAL ZINC CO. **MISSOURI**

Office: 87 Milk St., Boston, Mass. **Mine office:** 7th and Harlem St. Joplin, Mo.

Officers: Jere A. Downs, pres.; J. B. Hardon, v. p.; F. H. Baird, sec.-treas., with F. T. Rubidge, Chas. Hayden, Galen L. Stone and R. F. Hoyt, directors.

Inc. April 4, 1902, in Maine, as successor to Continental Zinc Mng. & Sm. Co. **Cap.,** $550,000; $25 par; all outstanding. Reduced, 1916, to $110,000; shares $5 par. No bonded debt. Hayden, Stone & Co., Boston, transfer agent; Old Colony Trust Co., Boston, registrar. Annual meeting, first Tuesday in April. Listed on Boston Stock Exchange.

Dividends: formerly 8% per annum, quarterly, reduced to 2½ in 1908; 1909 and 1910 none; since 1910 to 1916 at the rate of 4% payments semi-annually, J. and J. 1; Dec. 31, 1915, $10 per share, in part liquidation. $2 in 1917, and 50 cents in 1918.

The profit and loss account for 1917 showed a total of $212,337, including surplus of $190,967 from 1916. After paying $22,000 in dividends, $35,883 for depreciation, etc., the surplus was $154,453. In 1918, the operating loss was $4,501. After paying $11,000 for dividends, allowing for loss, and writing down of the Litteral tract, the surplus was $124,522 at December 31, 1918.

Property: 2 tracts of land, 200 acres, at Joplin, Mo., the orebodies of which are fast becoming exhausted; the Kohinoor and Litteral tracts returned a profit of $37,364 in 1916, $20,317 in 1917, and $4,921 in 1918. One of the lessees in 1917, opened rich ore at 200′ in the Kohinoor, but the Litteral is about depleted. House lots continue to be sold on the Empire and Continental first addition and Continental Fourth street addition.

Continental Zinc must be considered a liquidating proposition.

COW CREEK MINING CO. **MISSOURI**

Address: W. H. Clark, supt., Carl Junction, Mo.

A 200-ton mill was to be erected at last report.

CRESCENT LEAD & ZINC CORPORATION **MISSOURI**

(Succeeds Blue Rock Mining Co., by purchase of assets in 1917.)

Office: 804 Grand Ave., Kansas City, Mo.

Officers: Lawrence E. Smith, pres.; Lewis H. Falley, v. p.-mgr.; W. R. Rowe, sec.; W. T. Grant, treas. Phillip Gatewood, mine supt.; Glenn Smith, mill supt.

Inc. March 21, 1917, in Missouri. **Cap.,** $500,000; 411,000 shares issued. To September, 1919, a total of $165,000 had been expended on the mine and machinery.

Property: the Blue Rock mine, 40 acres, in the new field at Waco, Mo. Also 480 acres of land at Sunnyside, Ottawa county, Oklahoma, 5 miles S. of Baxter Springs, Kansas. This property is sub-leased, and in May, 1919, there were 5 mills in operation.

The Blue Rock mine has 2 shafts opening up ore 10 to 30′ thick, that is of very high quality, assaying as high as 63% metallic zinc and averaging 7 to 10% actually recovered. Though the output is mainly blende, occasional pockets of lead ore are mined. The ore comes from depth of 165 to 240′.

Equipment: at Field shaft, 50 h. p. boiler, geared steam hoist, one 3″ and one 4″ double-action pump; at Mill shaft, first-motion hoist and 300-ton hopper. Power plant consists of 150 h. p. and 40 h. p. high-pressure boilers and steam-driven air-compressor.

The 250-ton mill at Waco, uses an 18″ crusher, 2 sets, each of 30 and 36″

rolls, 2 jigs, 2 separators and classifiers, three trommel screens and 5 tables. The power unit has 3 distillate engines, two of 80 and one of 50 h. p., and one 600 cu. ft. 2-stage compressor.

Concentrates will contain 61% zinc and the lead 80%. Costs are estimated to be $1.30 for mining and 55c for milling.

CULBERT LEAD & ZINC CO. **MISSOURI**

Address: Belville, Mo.

Production: said to be 22 tons of blende weekly.

CYGNI MINING CO. **MISSOURI**

Address: A. J. Burnham, mgr., Joplin, Mo.

Property: a lead-zinc mine near Prosperity; a veteran sheet-ground producer, yielding 1,000 tons per day of 2% ore in 1917. Mine has 3 shafts, operating one shift daily.

DALLAS MINING CO. **MISSOURI**

Probably dead, as mail is returned from Joplin, Mo.

Property: Little Bess mine, on the Knight land at Carl Junction, Jasper county, Mo.; also 20 acres of the Nilson land.

Development: on the Knight land, 2 shafts, deepest 170′. The Nilson land has a 195′ shaft.

Equipment: 300-ton concentrating mill and sludge mill for treatment of sand and slime from large mill.

D. C. & E. MINING CO. **MISSOURI**

Address: Box 224, Webb City, Mo.

Officers: E. M. Drummond, pres.; M. O. Curd, v. p.; R. C. English, treas.

Inc. in Kentucky. **Cap.,** $300,000; $1 par.

Property: 200 acres, 1 mile N. of Webb City. Shafts are 150′ deep.

Equipment: 500-ton mill treats 3% zinc-lead ore.

DELTA LEAD & ZINC CO. **MISSOURI**

Dead.

Inc. in Missouri. **Cap.,** $3,000.

Property: a lease on 40 acres of land belonging to the McCown estate in the Spring City-Beef Branch district, Mo.

Development: 3 shafts with average depth of 200′. Has 2 concentrators with a daily capacity of 250 tons. Output consists of galena concentrates and mixed blende and silicate concentrates, averaging 48-50% zinc.

DUQUESNE MINING CO. **MISSOURI**

Lease given up, 1916, and company out of business.

EAGLE-PICHER LEAD CO. **MISSOURI**

See same title under Oklahoma.

EAGLEWOOD MINING CO. **MISSOURI**

Address: Joplin, Mo.

Production: averaged about 27 tons of blende per week, at last report.

EDGAR ZINC CO. **MISSOURI**

Controlled by U. S. Steel Corporation, which owns the whole capital.

Office: Boatmen's Bank Bldg., St. Louis, Mo. Company has large zinc smelting works at Cherryvale, Mo., using natural gas. O. F. Garrison, mgr.

From 1907 to 1917, one furnace with 600 retorts, was in continuous operation, producing 29,136 tons of spelter.

The Glendale smelter, in the Carondelet section of St. Louis, was closed in April, 1918. This was one of the oldest zinc works in America, being in operation for 49 years.

At Donora, Pa., company has another large and modern smelter, using producer gas.

EDWARDS MINING CO. **MISSOURI**

Property: the McBride mine and mill, also the Joe-Bob and other leases, near Joplin.

ETHEL GRAY MINING CO. **MISSOURI**

Address: Joplin, Mo.

Production: averages 30 tons of blende weekly.

EVAND HALL SOY MINING CO. **MISSOURI**

Address: J. Manning, Duenweg, Mo.

FAIR HOPE MINING CO. **MISSOURI**

Address: M. L. Kline or E. D. James, Porto Rico, via Joplin, Mo.

Officers: Albert Boiling, pres.; D. M. Murphy, Greensburg, Ind., v. p., and W. E. Brown, Connersville, Ind., directors.

Property: 23 acres purchased in 1918 from Playter Bros., of Joplin, operated for a while by company, then leased, May, 1919, to E. D. James. A 200-ton mill is in operation.

FERCH MINING CO. **MISSOURI**

Property: company early in 1918 was operating on West Seventh street, Joplin, under a lease from the Continental Zinc Co. Good ore was opened at depth of 224'.

FIFTEENTH STREET MINING CO. **MISSOURI**

Property: on east 15th St., Joplin, Mo., was sold by O. W. Sparks, of Galena, Kansas, and associates, to H. C. Clinton of Clinton, Oklahoma, and others, for $100,000. Two shafts were sunk, opening rich ore and a mill built.

Production: 85 tons of blende per week.

FINK MINING CO. **MISSOURI**

Property: near Ozark, Mo.

Development: by 210' shaft and levels at 90, 135 and 175', all in pay-ore. The face is 20' thick. A 400-ton mill was in operation in 1918.

FLANNERY ZINC CO. **MISSOURI**

Address: W. F. Friday, Sarcoxie, Mo.

Property: the Boyd zinc mines at Sarcoxie, acquired in 1915, and $40,000 spent in rehabilitating mine and mill.

Equipment: includes a 1,000-ton concentrator and a Diesel engine. The ore is blende, but some calamine is also mined.

FRANKLIN MINING CO. **MISSOURI**

Address: Webb City, Mo., but company probably defunct, as letters sent there were returned in 1919.

Property: a tract of shet ground, carrying zinc ore at depth of 200'. Equipped with 880 cu. ft. air-compressor and a 600-ton mill.

FREEHOLD OIL, GAS & MINING CO. **MISSOURI**

Address: W. S. Marquis, Waco, Mo.

Property: several leases in the Waco field. Two mills are at work, producing 64% zinc concentrate, while a third was nearly ready by August, 1919. A fourth tract of 40 acres was being drilled with good results and another mill is planned if the zinc market improves.

GAGE MINING & MILLING CO. **MISSOURI**

Address: F. D. Gage, Joplin, Mo.

GEORGE BALL MINING CO. **MISSOURI**

Address: George Ball, supt., Webb City, Mo.

A 150-ton mill was proposed at last accounts.

GEORGETTE MINING CO. **MISSOURI**

Address: O. B. Henry, mgr., Wentworth, Mo.

Property: 400 acres in Newton county, Mo. Thirty-five drill holes showed ore 60' thick. Three shafts are in ore. Two mills were operating in 1918 producing 63% zinc concentrate from 7 to 10% ore.

GIBSON MINING CO. **MISSOURI**

Address: Joplin, Mo.

Production: 60 tons of blende per week.

GILT EDGE MINING CO. **MISSOURI**

Company held lease on zinc land, 2 miles E. of Tipton Ford, near Joplin, Mo. Lease transferred, June, 1916, to Wade Mining & Milling Co., which see. Probably dead.

GOLDEN RULE MINING & MILLING CO. **MISSOURI**

Address: Fred Kincannon, mgr., Granby, Mo.

Inc. in Missouri. **Cap.**, $8,000.

Company leases 30 acres of zinc-lead land at Granby, developed by 5 shafts, 100′ deep.

Equipment: 100-ton concentrating mill, compressor and steam power.

GOODEAGLE MINING CO. **MISSOURI**

Address: Frisco Bldg., Joplin, Mo.

GRACE MINING CO. **MISSOURI**

Out of business. Formerly operated at Joplin, Mo.

GRAYSON MINE **MISSOURI**

Address: H. H. Hughes, mgr., Joplin, Mo.

Property: a lease on Scotia tract, 5 miles S. W. of Joplin. An old shaft has been repaired, a new one sunk, and a 250-ton mill erected.

GREAT SCOTT MINING CO. **MISSOURI**

Organized January, 1918, with capital of $25,000, by E. A. MacBride, A. B. Munsey, and J. J. Johnston of Kansas City, Mo.

GRIFFITH LEAD & ZINC CO. **MISSOURI**

Address: Saginaw, Newton Co., Mo.

Company holds a lease from the Saginaw Mining & Leasing Co. on a 750-acre tract, and at last report was to erect a 350-ton mill.

GROUND HOG MINING CO. **MISSOURI**

Address: Walter Smith, Thomas Phelps, or A. Carney, Joplin, Mo.

Property: a 32-acre lease hold near Eighth and Indiana Ave.., Joplin. Good zinc-lead ore was opened at depth of 60′, and hand-jigs were used to clean the ore.

HARTFORD MINING CO. **MISSOURI**

Address: 305 Miners Bank Bldg., Joplin, Mo.

Officers: L. A. Barbour, pres., Hartford, Conn.; H. H. White, sec.-treas., Joplin, with S. B. Griswold, Carthage, Mo., and C. C. Spencer, Joplin, directors; H. H. White, gen. mgr., Joplin, Mo.; Geo. Elliott, supt., Galena, Kansas.

Inc. 1906, in Missouri. **Cap.**, $100,000; shares $100 par; all outstanding.

Output: zinc-lead concentrates; figures not available.

HEATON & HODGES MINE **MISSOURI**

Address: W. Heaton, supt., Granby, Mo.

Property: a tract in the sheet-ground area of Joplin district, in which the ore lies at depth of 210′. Reported that shafts were sunk and a mill erected in 1919.

HIGH FIVE MINING CO. **MISSOURI**

Address: Temple Chapman, or George Ball, mgr., Webb City, Mo.

Property: 80 acres in the Waco district, Mo., held under lease on a 10% royalty basis.

Development: 17 drill-holes cut good ore at depths of 135 to 150′. Two shafts were sunk.

Equipment: a motor-driven mill, finished in April, 1919, handles 300 tons per 10-hour day.

HILL LEAD & ZINC CO. **MISSOURI**

Address: H. B. Wolcott, Joplin, Mo.

Inc. 1918. **Cap.**, 300 shares; $100 par.

HURRY-UP MINING CO. **MISSOURI**

Address: Webb City, Jasper Co., Mo.

Property: in the North Webb City sheet-ground district, said to show lead-zinc ore occurring at depth of 200′. A 300-ton mill on the property, operating almost continuously for 10 years was to be dismantled and replaced by one of 400 tons capacity per 10 hours. Company hoists ore from the Florence shaft, 1,000′ N. E. of the mill.

HUTTIG LEAD & ZINC CO. **MISSOURI**

Address: Frisco Bldg., Joplin, Mo.

ICE PLANT MINING CO. **MISSOURI**

Out of business and dissolved. See Vol. XIII.

IMPERIAL ZINC CO. **MISSOURI**

Address: B. M. Robinson, Bell Center, Mo.

INCLINE MINING CO. **MISSOURI**

Property: a lease on part of the lands belonging to the Center Creek Mining Co., between Webb City and Carterville. Developed by 5 shafts to depth of 150', showing lead and zinc ore.

Equipment: included 2 concentrators of 500 tons capacity, pump, boiler and steam power.

JASPER COUNTY LAND & MINING CO. **MISSOURI**

Address: Frank Danglade, supt., Webb City, Mo.

Property: the McKinley mine, near Carterville, Jasper county, Mo., developed by 2 shafts, mining a large body of zinc blende and lead ore at depth of from 190-210'. A 350-ton concentrating mill, erected in 1914, started operations in April, 1915.

JOPLIN-KENTUCKY LEAD & ZINC CO. **MISSOURI**

Address: Joplin, Mo.

Inc. in Kentucky. **Cap.**, $50,000.

Property: a lease on 33 acres of mineral land owned by the St. Louis-Joplin L. & Z. Co., at Joplin.

Development: by 3 shafts to depth of 150'.

Equipment: includes 125-ton concentrating plant, 2 pumps, 3 drills, steam power, 3 hoists, crusher and 2 Wilfley tables. No production figures available.

JOPLIN ZINC METALS CORPORATION **MISSOURI**

Company dissolved; see description in Vol. XIII of this book.

JULIAN MINING CO. **MISSOURI**

Address: Charles McDonald, supt., Joplin, Mo.

A 150-ton mill was to be erected at last report.

KANSAS CITY-JOPLIN MINING CO. **MISSOURI**

Company probably dead, as letters were returned, 1919, from former office, West Fourth St., Joplin, Mo. Company reopened the Red Lion zinc mine at Joplin, Mo., on which there was a 200-ton mill.

KATY MINING & MILLING CO. **MISSOURI**

Address: J. R. Underwood, Granby, Mo.

KENEFICK ZINC CORPORATION **MISSOURI**

Office: 233 Broadway, New York.

Control acquired by United Zinc Smelting Corporation, by exchange of one share Kenefick for 1¼ shares U. Z. S. Corp. stock.

Inc. Feb., 1916, in New York. **Cap.**, 5,000, 7% preferred shares par $100, and 200,000 shares of common stock without par value; 100,000 of latter offered to subscribers at $12.50 a share in February, 1916; all common issued and $450,000 preferred outstanding. Stock listed on New York Curb. Empire Trust Co., New York, transfer agent; Bankers Trust Co., New York, registrars. Fifty per cent. of net earnings, after deducting dividends is applied to retirement of preferred stock.

Dividends: five of 10c each were paid on common stock to Aug., 1916, After payment of a 7% dividend on preferred and $1.20 annually on common stock, 50% of net earnings are to be applied to the retirement of the preferred stock at par.

Property: includes 5 producing zinc mines; the Airedale and Coyote mines at Joplin, the Media, Milan and Electrical at Webb City, and the Coronet mine at Baxter, Kan.

Company also owns one of the largest modern zinc mills in United States and 3 others fully equipped with total capacity of 4,200 tons.

Production: about 30,000 tons annually of high-grade zinc concentrates, assaying 60% zinc with only a small percentage of lead.

Control of U. Z. S. Corporation and this company was acquired by Chas. M. Schwab and associates December, 1919, who will, it is said, continue operations on same scale as before.

KIRKWOOD MINING CO. **MISSOURI**

Address: Webb City, Mo.

Production: said to be 80 tons of blende concentrate weekly.

LA NORA MINING CO. **MISSOURI**

Organized February, 1918, with capital of $48,000, by G. G. Bayless of Carterville and Phil Gray of Webb City.

LITTLE BILL MINING CO. **MISSOURI**

Address: W. J. Cochrane, mgr., Webb City, Mo.

Property: a lease west of Chitwood, adjoining on the south the property of the St. Regis M. & S. Co., also the St. Louis-Joplin Lead & Zinc Co., which, in March, 1919, filed suit for $25,000 against the Little Bill for alleged wrongful extraction of ore.

Development: drill-holes yielded up to 18% zinc and lead, and shafts were sunk to 180′ level. A 200-ton mill produces from 40 to 50 tons of concentrate weekly.

LITTLE MARTHA CORPORATION **MISSOURI**

Address: H. B. Wolcott, Joplin, Mo.

Property: N. of Chitwood, said to produce 75 tons of blende weekly. In July, 1919, property was assigned for the benefit of creditors to H. W. Blair, of Carthage, Mo. The entire holdings were valued at $10,000.

LITTLE MARY MINING CO. **MISSOURI**

Address: Webb City, Jasper county, Mo.

Cap., $100,000.

Property: a lease on 40 acres of mineral land, owned by D. S. Weaver. Developed by 3 shafts to depth of 175′.

Equipment: includes 500-ton concentrating mill, pumps, 3 drills, 2 hoists, steam power, and compressor. Employs 25 men. No record of production received.

LOG CABIN MINING CO. **MISSOURI**

Address: Duenweg, Mo.

Officers: L. P. Dixon, pres.; G. S. Parsons, v. p.; O. M. Long, sec.-treas.-mgr., with S. W. and C. Van Dyne, Z. W. Weldon and Sam Fulkerson, directors.

Property: the old Log Cabin mine near Duenweg, said to have yielded lead ore worth $1,000,000 from depth of 40′, all concentrated by hand-jigs, and whose tailings are to be re-treated. At depth of 175 to 200′ more ore has been found and a mill was erected in July, 1919.

LONE ELM DEVELOPMENT & MINING CO. **MISSOURI**

Address: N. of E. St., Lone Elm Road, Joplin, Mo.

Property: a lease on 240 acres of Granby land and 80 acres of Picher land, N. of Joplin, Mo. Company unwatered the ground, sublets its holdings in small tracts, and operates a 150-ton custom mill.

LONGACRE-CHAPMAN MINING CO. **MISSOURI**

Dissolved in June, 1917, and all profits distributed. Described Vol. XIII.

LOWER LEVEL MINING CO. **MISSOURI**

Address: Sarcoxie, Mo. Is a reorganization of the Bearcat Mining Co.

Directors: J. W. Boyd, J. J. Stephenson, Geo. Spiva, and Sam Tamblyn.

Property: the Cameron mine on J. W. Boyd land, at Sarcoxie, 20 miles E. of Joplin, Jasper county, Mo., is a zinc producer. Developed by 278′ and 200′ shafts.

Equipment: includes compressor, boilers and 400-ton mill.

LUCKY MINING CO. **MISSOURI**

Address: J. G. Marcum, sec and mgr., Joplin, Mo.

Company stated in 1918 that it had 8 active mines in the district, with the best equipment and costs lower than the average.

LUCKY BELL MINING CO. **MISSOURI**

Address: Webb City, Mo.

Production: 18 tons of blende weekly.

LUCKY TIGER MINING CO. **MISSOURI**

Property transferred, 1916, to Utah-Missouri Mines Co., which see.

M. & T. MINING CO. **MISSOURI**

Address: R. McGee, mgr., Duenweg, Mo.

Property: a lease on a tract near Duenweg, to which a mill from mine in Granby district was to be moved.

MAHATMAH MINING CO. **MISSOURI**

Address: E. D. Hornbrook, Webb City, Mo.

Production: about 83 tons of blende weekly during 1918.

MALCONA MINING CO. **MISSOURI**

Address: Joplin, Mo.

Production: 32 tons of blende weekly.

MANSFIELD MINING & DEVELOPMENT CO. **MISSOURI**

Address: J. R. Sardage, supt., Mansfield, Mo.

Property: 1,712 acres in Wright county. The ground was drilled, and a 250-ton mill was to be erected in September, 1918.

McBRIDE MINING CO. **MISSOURI**

Address: R. E. McBride, mgr., S. L. Kenney, supt., Joplin, Mo.

Property: 37-acre lease of the Conner land in the North Chitwood field. Out of 15 drill-holes put down, 12 showed ore, 6 of them exposing 12 to 15% ore beginning at depth of 85′. A 150-ton mill concentrates the ore.

MEDIA MINING CO. **MISSOURI**

Address: N. Allen St., Webb City, Mo.

Property: a lease on Guinn land, north of Webb City, covering the site of the old Hold Out mine.

Ore: zinc sulphide, in sheet-ground formation at a depth of 230′, with ore faces 9′ high. Company has one of the largest mills in the Missouri-Kansas-Oklahoma district, capacity 600 tons per 10 hours.

Equipment: mill includes two 18″ crushers, 3 sets of 42″ rolls, two 48 by 96″ trommels, jigs and tables. Mill can treat 2% ore profitably. Concentrates assay about 59% zinc, with only a trace of lead. Steam power is used.

No record of production.

MIAMI-WACO LEAD & ZINC CO. **MISSOURI**

Mail returned, 1919, from last address: W. P. Cunningham, supt., Waco, Missouri.

A 250-ton mill was to be erected, at last accounts.

MISSOURI COPPER MOUNTAIN MINING CO. **MISSOURI**

Office: Room 4, Pehl Bldg., Sedalia, Mo. **Works office:** Sullivan, Franklin county, Mo.

Officers: S. Urban, pres.; F. Maerschel, v. p.; Peter Pehl, treas.; J. W. Graham, sec., with H. H. Graham, C. C. Kelly, and F. T. Mulcahy, directors.

Inc. Jan., 1903, in Arizona. **Cap.,** $1,500,000; shares $1 par; issued, $1,396,000.

Property: about 7,000 acres in Crawford and Washington counties, Missouri, including some farm lands. The Copper Hill mine, 32 acres, worked in a small way before 1850, shows an orebody with a good gossan in manganese limestone.

Development: by a 50′ shaft and about 200′ of tunnels. No recent returns.

MISSOURI LEAD & ZINC CO. **MISSOURI**

Office: 805 Frisco Bldg., Joplin, Mo. W. L. Chambers, mgr.

Inc. in Missouri.

Property: 1,100 acres in Joplin, Jasper county, Mo. Ore carries blende, calamine and galena.

Development: by shafts from 40′ to 200′ deep. **Equipment:** included three mills. The property is operated by lessees on a royalty basis. In April, 1919, company advertised railroad tracks, sites for warehouses and dwellings for sale, and offered for lease the zinc and lead ground drained by company.

MISSOURI ZINC MINES CO. **MISSOURI**

Office: 608 Sellwood Bldg., Duluth, Minn. and 422 Frisco Bldg., Joplin, Mo. Albert M. Plumb, mgr., Platteville, Wis.

Officers: E. A. Lamb, pres.; H. J. Kruse, v. p. and gen. mgr.; B. F.

Osborne, sec.; W. W. Fegan, treas.; Guy E. Neault, mine supt.; David Shoemaker, mill supt.

Inc. July, 1916, in Delaware. **Cap.**, $500,000

Ore sales in 1916 amounted to $155,000, and operating expenses to $55,000. Dividends earned in 1916 and 1917 were 30% and total, $500,000.

Property: 78 acres at Neck City, Mo., including the Quick Seven, Teximo and 1909 mines.

Ore: carries high-grade zinc blende and no lead The deposit is 900 by 400′ and is opened by 8 shafts to 160′ depth.

Equipment: includes three 250-ton mills using crushers, rolls, jigs, screens, etc.

Production: from one mill was 500 tons of 60% zinc concentrate per month, at last accounts. Cost of mining by open pit was 50c per ton.

M. K. & T. MINING CO. **MISSOURI**

Address: S. J. Williams. pres., or C. A. Davis, mgr., Granby, Mo.

Property: at Granby. Ore is mined at depth of 240′ and treated in a 500-ton mill.

NAPOLEON MINING CO. **MISSOURI**

Address: Joplin, Mo.

Inc. in Missouri. **Cap.**, $10,000.

Property: a lease on 40 acres of mineral land owned by E. N. Perry at Joplin, Jasper county, Mo. Developed by 2 shafts to depth of 200′. Production in 1915 came from the 180′ level.

Equipment: includes 250-ton concentrating plant, 450′ aerial tram, steam power, pump and hoist. Output is lead-zinc concentrate.

NATIONAL ZINC & LEAD CO. **MISSOURI**

Company probably dead, as letters were returned, 1919, from 53 State St., Boston, and from 420 Main St., Joplin, Mo.

Officers: W. R. Brown, pres.; F. G. Wright, sec.; J. J. Hammers, treas.

Cap., $500,000; shares $1 par; 300,000 shares issued. Stock is listed on New York and Boston Curbs. Company has paid dividends of 42%, or $126,000, from November, 1915, to May, 1917.

Property: at Dixie, Neck City, and Webb City, Mo., developed by shafts, 85′-225′ deep, sunk in pay ore. Company operates four large mills on ore from its mines, also the Slim Jim zinc mine in the Picher district of Oklahoma, showing rich ore at 227′. One of the mills was moved from Missouri to this mine, probably that now worked by the Carnegie Mining Co., which see.

NEARBY MINING CO. **MISSOURI**

Address: Webb City, Mo.

Production: 23 tons of blende a week.

NECK CITY MINING CO. **MISSOURI**

Address: B. C. Burgess, mgr., R. R. 5, Joplin, Mo.

Inc. 1919, in Missouri. **Cap.**, $150,000.

NEW ENGLAND ZINC CORPORATION **MISSOURI**

Inactive; mail returned from former address: Belle Center, Joplin, Mo.

Inc. in Connecticut. **Cap.**, $100,000.

Property: a lease on 160 acres of mineral land owned by C. W. Edwards, Joplin, Jasper county, Mo. Developed by 3 shafts to depth of 150′.

Equipment: includes 150-ton concentrating plant making a recovery of from 20-25% zinc; pumps, air drills, steam hoists, and compressor. Company also reported to have had a lease on the Leckie land at Klondike, Mo. Output is lead-zinc concentrates.

NEW GERONIMO MINING CO. **MISSOURI**

Address: Joplin, Mo.

Production: 31 tons of blende per week.

NORTH AMERICAN ZINC CO. **MISSOURI**

Property sold and company out of business, March, 1919. See Vol. XIII of this book.

NYMO ZINC & LEAD CO., INC. **MISSOURI**

Office: 34 Wall St., New York.

Officers: at last accounts, Benj. L. Love, pres.; John L. Morrison, principal owner, v. p. and sec., Germantown, Phila., Pa.; above with W. H. Johnson, Douglas Fenwick and Hugh T. Halbert, directors; E. R. Cowan, treas.

Inc. Feb. 25, 1916, in New York. **Cap.**, $100,000; $5 par; outstanding, $50,000. Douglas Fenwick & Co., 34 Wall St., New York, transfer agent. Franklin Trust Co., New York, registrar. Stricken from New York Curb, August 1, 1918. Dividends: 1% paid April, 1916.

Financial statement of April 21, 1916, showed cash, $1,865. Gross receipts from ore sales, $7,004; cost of production, $3,523.

Property: formerly known as the Brattleboro mining lease, 6 acres, in East Joplin mining district, has lead-zinc ore occurring at 65'-86' in depth, said to be proven by 6 drill holes.

Development: a shaft with drifts east and west for only 30'.

Equipment: includes hoist and 2 boilers.

O. F. & L. MINING CO. **MISSOURI**

Address: Duenweg, Jasper county, Mo. Probably dissolved 1919.

Inc. in Missouri. **Cap.**, $30,000. Operated a lease near Duenweg, on property of the Boston-Duenweg M. Co.

Development: by two 200' shafts. **Equipment:** includes 250-ton concentrating plant, boiler, pump, steam power. Was a steady producer.

Company's former holdings in Sec. 3 were sold to the Baltic Mining Co.

OKLAHOMA MINING CO. **MISSOURI**

Address: C. T. Jacobs, Seneca, Mo.

A mill costing $75,000 was to be built in 1918-19.

ONAMENA MINING CO. **MISSOURI**

Plant sold in 1918, and company out of business. See Vol. XIII of this book.

ONCE MORE MINING CO. **MISSOURI**

Out of business. See Vol. XIII of this work.

ORANGE MINING & MILLING CO. **MISSOURI**

Address: F. C. Wallower, Carterville, Mo.

ORONOGO CIRCLE MINING CO. **MISSOURI**

Stock and charter cancelled, July, 1917. Property now owned by Connecticut Zinc Corp'n., which see.

ORONOGO MUTUAL MINING CO. **MISSOURI**

Property sold September, 1918, to the Athletic Mining & Smelting Co., which see.

OSAGE MINING CO. **MISSOURI**

Offices: 306 Commerce Bldg., Kansas City, Mo.; and Damsel, Mo.

Officers: L. W. Jefford, pres.; H. B. Williamson, v. p.; H. L. Cheatham, sec.; J. F. Cave, treas.; also directors, with W. P. Lewis, A. R. McCreary, and E. E. Hernter, trustees. F. E. Small, con. eng.

Inc. "under common law" Oct. 10, 1917. **Cap.**, $500,000; $1 par; 285,000 issued. Annual meeting, second Tuesday in July. Expenses since organization to March, 1919, were $14,000.

Property: 340 acres, 300 under perpetual lease, 40 owned, at Damsel, Camden county, Mo., 15 miles from Bagnell, the nearest rail point. The owner receives 10% of net proceeds of all gas, oil, lead, zinc, etc., extracted.

Development: a churn-drill hole cut a 14' strata at 174 to 189', averaging 12.9% in lead and zinc, overlaid by a strata rich in iron. At 200' the drill found a 7' opening filled with natural gas. Immediately below this, rose quartz was entered, the first 4' said to assay $84 per ton. To a depth of 229', the same rock was cut, the lowest assay being $2.50. Several other holes showed lead and zinc. A 2-compartment shaft to open this orebody was started early in 1919.

Equipment: boiler, hoist, engine and compressor, drills, pumps, exhaust fan, blacksmith shop, etc.

The presence of high gold values in the 4' rose quartz cut by the drill hole, was considered by company to warrant shaft sinking to determine its extent. Past experience with similar cases in Missouri, leads us to put more confidence in the lead-zinc deposit cut by the drill hole, than in the gold values.

Company appears to be making an honest effort to develop a producing property.

Production of lead ore, of milling grade, about 4,000 tons, up to January 1, 1920.

OTIS MINING CO. **MISSOURI**

Property operated by the Consumers Mining Co., which see.

OWOSSO MINING CO. **MISSOURI**

Address: H. H. Culver, mgr., 1409 Wall St., Joplin, Mo. The mine is owned by J. L. Harris, Daniel Fisher, Jas. Fisher, Jr., T. G. Shubert, all of Hancock, Mich., and H. H. Culver.

Property: a 10-year lease on 1 claim, 40 acres, on Baker land, Jasper county, Mo., carrying lead and zinc ore in sheet-ground formation. This is a virgin mine in the sheet-ground field in Duenweg, between the Lincoln and Coahuila mines.

Development: by 2 shafts, deepest 242′ in sheet-ground, with 20′ ore face.

Equipment: includes compressor, 8″x8″ steam hoist, 3 pumps and 200-ton concentrating mill with jigs, crusher, rolls and tables. Plan reconstructing 200-ton mill at Duenweg, which will double capacity.

Production: begun in Sept., 1915, amounted to 4,240 tons of ore, or $9,872. Concentrates averaged 58% zinc and 78% lead. No recent information.

PARAGON MINING CO. **MISSOURI**

Address: Joplin, Mo.

Production: 31 tons of blende per week.

PERUVIAN MINING & DEV. SYNDICATE, LTD. **MISSOURI**

Office: Republic Bldg., Kansas City, Mo.

Officers: S. S. Ott, pres.; R. W. Street, v. p.; R. M. Sanford, sec.-treas. and mgr.; G. B. Peters, asst. sec., and C. J. Price, cons. eng.

Inc. 1915, in Arizona. **Cap.,** $5,000,000; $100 par.

Company organized to acquire and develop mining properties, and then form subsidiaries for their operation. 20 acres of ground, secured in Chitwood hollow, near Joplin, exploration revealed an orebody from 39 to 60′ thick and 168′ wide, carrying 10 to 25% blende. A 200-ton mill was to be erected.

PFAEFFLE-KELLY MINE **MISSOURI**

Address: F. Pfaeffle, Joplin, Mo.

A small mill was erected and started in May, 1919.

PHOENIX MINING CO. **MISSOURI**

Address: E. N. Cunningham, mgr., Joplin, Mo. Not incorporated.

Property: 40 acres in Jasper county, Mo., carries lead-zinc ore in a soft limestone formation.

Development: by 176′ vertical shaft and total workings of 600′.

Equipment: includes steam power, hoist, pump and 150-ton concentrating mill.

Production: in 1913, was 3,222.450 lb. zinc and 1,003,450 lb. lead; in 1914, 5,524,310 lb. zinc and 428,080 lb. lead.

Mine has been idle from October, 1914, save for some diamond-drilling done in 1916.

PICHER LEAD CO. **MISSOURI**

Merged, June, 1916, with the Eagle White Lead Co., of Cincinnati, and a new company organized called the Eagle Picher Lead Co. (Okla.), which see.

PLAYTER BROS. MINING & REALTY CO. **MISSOURI**

Office: 201 Pearl St., Joplin, Mo. C. C. Playter, pres.; Geo. H. Playter, sec.-treas.

Inc. 1914, in Missouri. **Cap.,** $30,000. Company engages in prospecting and development and when ore is opened and mining started, operations are then controlled by separate organizations.

In 1918, a 40-acre tract and partly-developed mine, 5 miles W. of Baxter, Kansas, was sold to A. M. Brannon, of Oklahoma City, for $150,000, and a 400-ton mill erected thereon.

PLEASANT VALLEY MINING CO. **MISSOURI**

Address: W. M. Graves, supt., Carthage, Mo.

Property: 100-acre leases, 3 miles S. W. of Carthage. Ore is mined at depth of 100′, through 2 shafts.

Equipment: hoist, 400 cu. ft. compressor, 1,200-gal. pump, 3 engines, drills, and 100-ton mill, employing 90 h. p. gas engine, 30-in. rolls, 14-in. crusher, rougher and cleaner jigs. Concentrate assays 62% zinc, no lead, and under 1% iron. Twenty-four men employed in 1919.

PORTO RICO MINING CO. **MISSOURI**

See Barnett Mining Co.

QUEEN ESTHER MINING CO. **MISSOURI**

Address: Webb City.

Production: 85 tons of blende per week.

PROSPERITY MILLING CO. **MISSOURI**

Address: Joplin, Mo.

Property: a lease on 40 acres of mineral-bearing land belonging to W. E. Saum, in Jasper county, Mo.

Development: by 5 shafts to depth of 175′.

Equipment: includes 150-ton concentrating plant, 3 air drills, steam power, crusher and air compressor. About 25 men employed, at last report.

QUICK SEVEN MINING CO. **MISSOURI**

Letters unclaimed, 1919, from Alba, Mo.

Inc. in Missouri. **Cap.,** $105,000.

Property: a lease on 78 acres of mineral-bearing land owned by J. Richardson, in Jasper county, Mo.

Development: by 3 shafts to depth of 150′. Equipped with 200-ton concentrator, pumps, drills, compressor and steam power.

RAMAGE MINES **MISSOURI**

Address: Frisco Bldg., Joplin, Mo.

RASHGO MINING CO. **MISSOURI**

Address: W. M. Randell, supt., Joplin, Mo.

A 150-ton mill was to be built at this mine in the Leadville area, at last accounts.

RED WASP MINING CO. **MISSOURI**

Address: Aurora, Mo.

Production: 90 tons of blende per week in 1918.

REINDEER LEAD & ZINC CO. **MISSOURI**

Address: O. B. Munson, supt., Joplin, Mo.

A 150-ton mill was erected in June, 1918.

ST. GEORGE MINING CO. **MISSOURI**

Address: Warren H. Eaton, Neosho, Mo. With C. O. Hodges, of Dallas, Texas, owners.

Property: 40 acres in Newton county, 2 miles S. of Granby, Mo. Ore occurs in a sheet formation carrying blende and lead under 200′ of limestone. Drill-cores assayed 9.65%.

Development: by a 274′ shaft, sunk in 1919.

ST. REGIS MINING AND SMELTING CO. **MISSOURI**

Address: Duenweg, Jasper county, Mo. E. R. McClelland, pres.-treas.

Inc. in September, 1915. **Cap.,** $100,000.

Property: company took over the 40-acre lease of the old American Beauty mine, N. W. of Duenweg, which had been idle for some time owing to low price of spelter, and unwatered it.

Development: by two 208′ shafts in sheet-ground formation; said to have a 20′-25′ ore face.

Company also has a mine at Douthat, Okla.

Equipment: include 350-ton concentrator, 4 gas engines, 2 compressors, two 100 h. p. boilers and a change-house.

Production: 103 tons of blende per week.

SCHOOL HOUSE MINING CO. **MISSOURI**

Address: Joplin, Jasper county, Mo.

Inc. in Missouri. **Cap.**, $100,000.

Property: 40 acres of lead-zinc land near Carterville.

Development: by 3 shafts, average depth 167′. Equipped with 800-ton concentrator. Does not reply to requests for information.

SCOTT MINING CO. **MISSOURI**

Address: D. L. Argyle, supt., Duenweg, Mo. Haywood Scott, pres.

Property: in Duenweg district. The 500-ton mill was destroyed by fire in 1917. No recent returns.

SEA BEE MINING CO. **MISSOURI**

Address: Sam Smith, Carterville, Mo.

SHAWGO MINING CO. **MISSOURI**

Address: Webb City, Mo.

Production: 7 tons of blende weekly.

SHORT CREEK ZINC & LEAD CO. **MISSOURI**

Out of business. Described Vol. XIII.

SPIRAL LEAD & ZINC CO. **MISSOURI**

Letters returned, 1919, from Joplin, Mo. J. S. Mullen, pres., Ardmore, Okla.

Property: the Martha Ball mine, bought for about $30,000; a sheet-ground mine W. of Chitwood, S. W. of Sparkler mine and E. of La Nora B. mine, with ore 195′ deep.

SQUARE DEAL MINING & ROYALTY CO. **MISSOURI**

Address: F. S. Dodge, 938 Landers Bldg., Springfield, Mo.

Property: a lease on the Bain land, in Elk Valley, 2 miles S. E. of Ozark. A shaft opened ore at 25 to 51′, and a mill was planned, at last report.

SULLIVAN ZINC MINING CO. **MISSOURI**

Dead. See Vol. XIII of this work for data.

SWARTZ MINING CO. **MISSOURI**

Address: Joplin, Mo.

TAR CREEK MINING CO. **MISSOURI**

Address: O. Longacre, Jr., Alba, Mo.

TENNESSEE ZINC & LEAD CO. **MISSOURI**

Office: 220 Miners Bank Bldg., Joplin, Mo. P. H. Corbett, pres.

Inc. 1916, in Missouri. **Cap.**, $100,000. Gross income from Jan. 1, 1917, to October 31, 1917, was $100,426; expenses were $41,325.

Property: 62 acres, 8 miles N. W. of Joplin, Mo. Ore carries zinc blende from 3 to 20%, the average being 7.15%. The deposit is 12′ thick, 600′ long and is opened by 92 and 123′ shafts.

Equipment: includes 100-ton mill, using rolls, crusher, jigs, screens and tables.

Production: (1917) 70 to 335 tons of 63% zinc concentrate, with up to 0.16% lead per month. Costs were $1.90 for mining, 32.9c for milling, a total of $2.23 per ton. Good profits were made in 1917 and 1918.

TULSA-PITTSBURG MINING CO. **MISSOURI**

Address: Mrs. George O'Connor, Pittsburg, Kansas; A. Rowe, supt.

Property: a lease on the Missouri side of the Waco district, tract carrying 17 to 30% ore at depth of 160 to 175′. Three shafts have been sunk, machinery installed, and a 250-ton mill erected, 1920.

TWIN CITIES MINING CO. **MISSOURI**

Address: Geo. Moore, mgr., Webb City, Mo.

Inc. in Missouri. **Cap.**, $50,000. Is a merger of the Laura Alice and Ben Franklin mining companies.

Property: lands leased from Daugherty & Davey, in Jasper county, on Center creek, between Webb City and Carterville, using the 175-ton Davey No. 1 mill. Developed by two shafts, steam power being used.

UNION METAL MINES CO. **MISSOURI**

Address: P. B. Butler, mgr., Frisco Bldg., Joplin, Mo.

Property: 40-acre lease in Waco field, Mo., partly in Kansas, in which several shafts have been sunk.

Equipment: includes 3 mills, No. 3 expected to be completed by Oct.,

1919, will concentrate 1,000 tons in 20 hours. A mixed-pressure steam turbine produces power.

U. S. LEAD & ZINC CO. **MISSOURI**

Promoted by C. L. Glass & Co., Vandergrift Bldg., Fourth Ave., Pittsburgh, Pa.

Directors: P. S. Chambers, D. A. Rees, and W. S. Maxey.

Inc. in Delaware. **Cap.**, $600,000; $1 par.

Property: one 20-acre lease in Joplin district, opened by 190′ shaft and several drifts, and one 24-acre lease opened by two 120′ shafts, two 50′ shafts, and drifts, all in high-grade ore.

Equipment: each mine has a 150-ton mill for concentrating the zinc-lead ore.

UNITED ZINC SMELTING CORP. **MISSOURI**

Office: 233 Broadway, New York.

Officers: B. Lissberger, pres.; Otto Proeless, v. p., and H. W. Lohman, treas.

Inc. May 1, 1916, in New York. **Cap.**, 600,000 shares without par value, but offered for subscription at $12.50 per share in April, 1916; 565,684 outstanding. Bonded debt: about $350,000 of 8% serial notes. Bankers Trust Co., New York, transfer agent; Equitable Trust Co., New York, registrar. Listed on New York Curb.

Company produces about 60,000,000 lb. of spelter annually.

Controls, through stock ownership, all of the assets of the Pearlman Co., Inc., which, in turn, owns the Clarksburg Zinc Co., and 98½% of common shares of the Kenefick Zinc Corporation, which see.

The Pearlman Co., Inc., owns a large zinc mill and refining plant at Clarksburg, W. Va., comprising 3,648 retorts with capacity of 30,000,000 lb. of spelter per year; a pottery plant with a capacity of 500 retorts per day; a power plant and a refining plant with a capacity of 15,000,000 lb. of spelter per year; owns patents, controls brands and trade-marks.

United Zinc has at Moundsville, W. Va., one Hegeler roaster, 1,728 retorts, pottery, gas producers, nitric acid works, plant producing 50 tons of 60° sulphuric acid daily, and power plant.

The Kenefick Zinc Corporation is said to be the largest producer (excepting perhaps the Connecticut Zinc Corporation, the Oronogo Circle) of zinc concentrates in the Joplin, Mo., district, the capacity of its mines and mills being 25,000 to 30,000 tons of concentrate per year. The United Zinc Corporation offered to exchange 1¼ shares of its stock for each common share of the Kenefick Zinc Corporation until July, 1916, afterwards, share for share.

Properties operated by the Kenefick, Electrical Zinc & Lead Mining Co. and Milan M. Co., north of Webb City; the Coyote Mining Co., and Airedale Mining Co., west of Joplin, and the Coronet mine at Baxter, Kansas.

At the Media mine, ore occurs in 17 acres of land, and the mill, in 1917, was treating 1,500 tons daily. The Milan produced the highest grade ore in the district, and treated 600 tons daily. The Electrical yielded 600 tons of ore daily, and since 1904 has not varied 0.25% in its zinc recovery. At the Coyote the ore deposit is 18′ thick, supplying 800 tons daily. In 8 acres the Airedale has 18′ of ore, yielding 700 tons daily.

No financial statement is available since that of the year ended April 30, 1917, when consolidated income account (including subsidiaries) showed gross earnings of $807,026; operating expenses, $51,342; depreciation, $116,727, and $638,957 net profit. In August, 1919, company wrote that "we do not care to issue statements." In justice to our readers we have made needed corrections and present the matter as near correct as possible.

On December 13, 1919, it was reported that Charles M. Schwab, of Bethlehem Steel fame, had purchased control of United Zinc. Like the U. S. Steel Corporation, Bethlehem Steel finds it advisable to have direct control of zinc smelters.

UNITY MINING CO. **MISSOURI**

Address: Phil Gray, Webb City, Mo. Robert Helm, supt., and C. E. Crane, pres.

Property: the Unity, N. of Webb City, and Concord, S. of Carterville, Mo. Both are sheet-ground mines, yielding high-grade concentrates in 2 mills.

Production: in 1917 the total output of concentrate was 5,559 tons. In 1918, the Unity yielded 43 tons and the Concord 78 tons of blende a week. Operations at the latter were suspended for some time during 1919.

UTAH-MISSOURI MINES CO. **MISSOURI**

Probably dead. Former address, Neck City, near Joplin, Mo.

Property: the Big Four and Lucky Tiger mines, the latter transferred from a Utah company early in 1916.

Development: at Big Four by 2 shafts to 315′, yielding sphalerite; and at Lucky Tiger by 2 shafts to 276′.

Equipment: at the Lucky Tiger is a 250-ton mill, etc., which treats ore from both mines. Property is fully equipped.

VACATION MINING CO. **MISSOURI**

Address: Bud Craig, Duenweg, Mo.

Property: a 40-acre lease 2 miles E. of Duenweg. Seventeen drill-holes cut ore from 90 to 123′ depth, averaging 15% blende and lead. A mill was to be erected at last accounts.

VESUVIUS MINING CO. **MISSOURI**

Operations stopped and charter surrendered. Described, Vol. XIII.

WACO MINING CO. **MISSOURI**

(Subsidiary of Bamsdell Corporation of New York). **Address:** Box 235, Joplin, Mo.

Officers: Robert Law, Jr., pres.; P. B. Butler, v. p.; mgr.; J. A. Dunn, sec.-treas.; F. H. Minard, gen. mgr.; R. S. Butler, asst. mgr.; Clarence Mostaugh, mine supt., and James Henson, mill supt. at No. 1 mine, and C. A. Smith and Claude Russell at No. 2 mine.

Inc. in Missouri. **Cap.,** $500,000; shares $1 par.

Property: the details can be best shown by tables.

	No. 1	No. 2
Area, acres	40	66
District	Waco	Waco
Ore	Zinc blende	Zinc blende
Average per cent	5.9	6.3
Mill, daily capacity, tons	300	500
Concentrate output, monthly, tons	400	700
Zinc in concentrate, per cent	62	62
Sales of ore in 1918	$136,881	$340,945
Operating expenses	74,115	164,445

According to S. L. Hurlbutt, drilling reveals richer ore at lower depths in the Waco field. The Waco M. Co., in January, 1920, had finished putting down 65 holes on 40 acres. In five of them there was continuous mineralization, or an average of 240′ in each hole. Assays showed ore to be from 4 to 19% blende in 25 holes, from 3 to 35.5% in 28 holes, and from 3 to 15% in others.

WADE MINING & MILLING CO. **MISSOURI**

Offices: St. Louis, and 620 Joplin St., Joplin, Mo.

Officers: C. E. Brenton, pres.; Frank Boehm, v. p.; St. Louis; and E. W. Buskell, treas., Joplin.

Property: a lease formerly held by Gilt Edge Mng. Co., on the Wade farm, 120 acres, 3 miles W. of Diamond and 3 miles E. of Tipton Ford, Mo. The proportion of metal in the ore is 33% lead and 66% zinc. Two shafts, drifts, and drill-holes have been opened. Ore is treated in a 150-ton mill.

WALLOWER MILL **MISSOURI**

A 300-ton (10 hours) plant built in 1914 by F. C. Wallower, 100 Neill Bldg., Joplin, Mo., to treat lead and zinc ores of Prosperity, Joplin district.

Equipment: includes 100-h. p. electric motor, 16″ crusher, rolls, screens, jigs, classifiers, tables, and slimers. Operated steadily in 1916-'17.

WASHINGTON LAND & MINING CO. **MISSOURI**

Address: W. Maclay, mgr., Bliss, Mo.

Officers: A. L. Shapleigh, pres.; J. D. Filley, v. p.; R. W. Shapleigh, sec.; the foregoing are directors.

Inc. about 1880, in Missouri. **Cap.,** $50,000; $100 par; all issued.

Owns 6,250 acres lead and baritic lands in Washington county, operated on royalty basis.

WEBB CITY-CARTERVILLE DEVELOPMENT CO. **MISSOURI**

Address: G. J. Kusterer, chairman, Webb City, Mo.

Organized March, 1919, by local business and mining men to raise $100,000 and drill for new ore deposits in this district. It was proposed to elect 21 directors. Shares will be issued at $1 par. No work was to be commenced until $50,000 is raised.

WHAT CHEER MINING CO. **MISSOURI**

Address: Duenweg, Mo.

Production: 32 tons of blende per week.

WINGFIELD MINING CO. **MISSOURI**

Address: Webb City, Mo.

Inc. in Missouri. **Cap.,** $32,000; investment, $48,222.

Operates, under lease, 50 acres sheet-ground lands of Scott, Bowman & Ware, workings through 3 shafts. Capacity, 1,000 tons daily. Mill equipment includes crusher and 4 tables.

WINNIE-LAWSON ZINC CO. **MISSOURI**

Letters returned unanswered. Highly advertised in the Joplin papers, January, 1916, as an "investment offering of great significance and importance." The company claimed to have under lease, 270 acres of land in the "most promising portions of the southwest lead and zinc district," and that it had let a contract for a 400-ton mill. Edward Lawson was the promoter. No reports of big undertakings on the part of this company have come from other sources.

YALE MINING CO. **MISSOURI**

Address: E. C. Hornbrook, Webb City, Mo.

SOUTHEASTERN MISSOURI

The mining district in St. Francois county is the most important lead region of the United States and probably of the world. The district is 70 miles south of St. Louis, with Bonne Terre and Flat river as the principal centers. Over 20,000 tons of ore is treated daily. Deposits consist of ore in dolomite averaging 4% to 6% lead. All concentrating mills employ flotation methods.

Production:

	1916	1917	1918
Crude ore, tons	5,467,500	5,887,900	5,532,600
Lead, per cent	3.68	3.47	3.39
Lead, in concentrates, per cent	65.66	66.70	66.80
Lead concentrate, value per ton	$67.47	$98.01	$75.53

Publications describing the district include:

Subject	Author	Publication	Date
General	H. W. Kitson	Eng. & Min. Jour.	June 29, 1918
Geology	H. A. Buehler	Bull. 130 of A. I. M. E.	1917
Mining	H. A. Guess	Trans. of A. I. M. E.	1917
Ore treatment	A. P. Watt	Bull. 130 of A. I. M. E.	1917

BAKER LEAD CO. **MISSOURI**

Address: Leadwood, St. Francois county, Mo.

Property: the old John Day tract of the St. Francois Lead Co., at Leadwood and the Jones tract at Elvins. Ore carrying 8 to 12% lead is concentrated in a 500-ton mill at Leadwood.

Idle in 1919.

BOSTON-ELVINS LEAD CO. **MISSOURI**

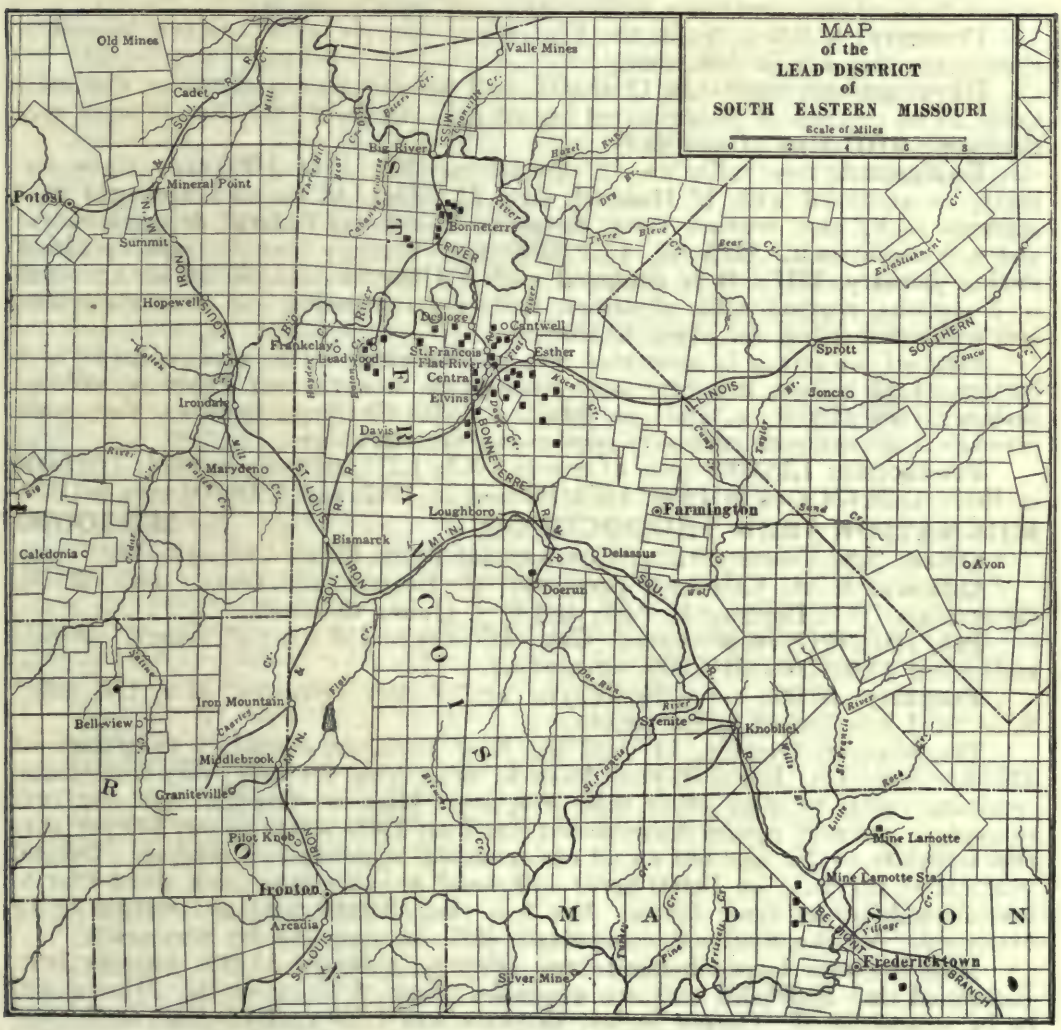
Address: Elvins, St. Francois county, Mo.

Property: 40 acres at Elvins, on Flat river. Main shaft was completed in 1916, but mining has only been carried on for two short periods up to early 1919 on account of water. In 1917, about 10,000 tons of ore was shipped to the St. Louis Sm. & Ref. Co.'s plant at St. Francois.

Idle.

CENTRAL LEAD CO. **MISSOURI**

Entire capital stock owned by American Smelters Securities Co .



Property: 1,603 acres in Flat River mining district, Saint Francois county, Mo.

DESLOGE CONSOLIDATED LEAD CO. **MISSOURI**

Address: Desloge, St. Francois county, Mo.

Inc. in Missouri. **Cap.**, $1,000,000, with almost $2,000,000 invested in land and plant.

Property: 4,704 acres, developed by several shafts, 2 of which are 300′ deep and another 500′ deep. Two of the shafts are near Desloge, but No. 4 is near Leadwood.

Equipment: a 3,000-ton concentrator equipped with Wilfley vanners, rolls, Chilean mills, and a 780-k. w. steam turbine; also a smelter equipped with

reverberatory furnaces. Flotation is employed in the mill, and a Lowden drier used for dewatering flotation concentrate. Employs about 500 men.

DOE RUN LEAD CO. **MISSOURI**

Absorbed by the St. Joseph Lead Co., 1916.

FEDERAL LEAD CO. **MISSOURI**

Address: Flat River, Mo. H. A. Guess, pres.; H. G. Washburn, mgr. Subsidiary of American Smelters Securities Co.

Inc. in Delaware. **Cap.,** $2,000,000; shares $10 par. The lead-smelting and refining plant, at Federal, Ill., near Alton, comprises 302.5 acres. The plant is a custom smelter, and has a daily capacity of 540 tons of ore.

Property: 13,690 acres in the Flat River district, southeastern Missouri, containing lead ore in limestone.

Development: mine has 12 shafts, and prospecting is done by diamond drills, as no outcrop of disseminated ore occurs. In Dec., 1919, No. 12 shaft was producing 3,000 tons of ore daily.

Equipment: two mills are in operation. No. 3, of 5,000 tons daily capacity, is equipped with 12 Hancock jigs, 72 tables, 18 vanners arranged in 2 sections each; also regrind rolls, elevators, Esperanza-Federal drag classifiers and a flotation unit. Mill No. 4 of 3,000 daily capacity was put into operation during January, 1917. It is equipped with 6 Hancock jigs, 40 tables arranged in 2 sections, regrind rolls, elevators, mills for regrinding and drag classifiers, and a flotation plant for slime treatment.

Most of the power is generated at a central plant. This plant consists of a battery of 12 boilers, equipped with chain-grate stokers, two 750-k. w. vertical turbines, two 2,000-k. w. and one 800-k. w. Allis-Chalmers turbines, four compressors, together with necessary condensing equipment, etc.

Production: 1,163,000 tons of ore in 1913; 1,212,000 tons in 1914; 1,355,000 in 1915; 1,328,474 tons in 1916; 1,870,000 tons in 1917, and 1,905,000 tons in 1918.

MID-NATION IRON PRODUCTS CO. **MISSOURI**

Office: 2082 Continental & Commercial Bank Bldg., Chicago, Ill.

Officers: E. A. Clemons, pres.; W. R. Leeper, sec.-treas., with W. C. Groetzinger, J. F. Lindsay, E. Abby and F. J. Quinn, directors.

Inc. Jan., 1917, in Missouri. **Cap.,** $2,000,000; $10 par; all issued. Bonds authorized $1,000,000; $160,000 outstanding.

Property: 88,000 acres in Wayne and Butler counties, Mo., 150 miles S. of St. Louis, owned in fee simple.

The Missouri Ore Co., 14 Wall St., New York, presumably a subsidiary of Midvale Steel Co., has a 99-year lease to mine iron ore only, the Mid-Nation retaining rights to mine other than iron ore. Missouri Ore Co. had one year to explore and take up one lease on not less than 5,000 acres; to pay $40 per acre and a royalty of 25c. per ton on all ore removed, regardless of analysis. Second year called for lease on 10,000 acres additional at same price; and third year to lease remainder at same figure. Not less than 300,000 tons per annum to be extracted. All ore that will concentrate 48% or over can be removed.

Mine contains brown hematite and limonite, assaying 53.48% metallic iron. Estimated that 50,000,000 tons are available. Four drills at work. Mining will be by steam-shovel. Output in last 15 years was 1,500 carloads; no production 1917-19. The old Iron Mountain mine, 80 miles S. of St. Louis, was reported to have been sold to people connected with this company for $750,000. A shaft is being sunk on a drill-hole that revealed an extensive deposit of high-grade hematite.

MINE LA MOTTE CO. **MISSOURI**

Name changed Nov. 1, 1916, to Missouri Metals Corp., which see.

MISSOURI COBALT CO. **MISSOURI**

Address: Thos. J. Mateer, mgr., Fredericktown, Mo.

Officers: M. J. O'Brien, pres.; J. A. O'Brien, v. p.; S. F. Kirkpatrick, mng. director; C. T. Smith, sec.-treas.; R. F. Taylor, asst. mgr.

Inc. in Missouri.

Property: that of old North American Lead Co. at Fredericktown. Ore

occurs in limestone and contains sulphides of copper, iron, cobalt, nickel, and lead. Developed by shafts.

Equipment: includes 500-ton mill completed in August, 1917, employing flotation process.

The mill produces lead concentrates and a copper cobalt nickel product.

The 577,665 lb. of copper produced in Missouri during 1918 almost all came from this mine.

MISSOURI METALS CORPORATION **MISSOURI**

Inc. in Maine, as the Mine La Motte Co., 1914; name changed, 1916.

Offices: 1945 Railway Exchange Bldg., St. Louis, Mo.; 52 Vanderbilt Ave., New York. **Mine office:** Wm. G. Dooley, asst. treas., Mine La Motte, Missouri.

Officers: A. J. Meier, pres.; A. W. McLimont, v. p.; F. E. Butcher, sec.; with W. S. McCall, G. G. Moore, A. J. Drexel, Jr., Hamilton Fish, and J. E. Liggett, directors; R. Morrison, Jr., treas.

Inc. Nov. 1, 1916, in Missouri. **Cap.,** $5,000,000; shares $100 par; all issued. Security Transfer & Registrar Co., New York, transfer agent. Equitable Trust Co., New York, registrar.

Bonds: $1,000,000 1st refunding gold 6s, due Nov. 1, 1926. Coupon, $1,000. Empire Trust Co., New York and S. H. West, St. Louis, Mo., trustees. Is first lien, subject to $330,000 prior lien, retired by this issue. Offered Feb., 1917, at 96½.

Net earnings (applicable to interest) $169,432 for year ended June 30, 1916; quarter ended Sept. 30, 1916, $53,438.

Property: 37,614 acres of mineral and farm lands in Madison and St. Francois counties, Mo. Lands have produced since 1723, over $20,000,000, mostly lead. For geology, see Kemp's "Ore Deposits," p. 228, also Mo. Geol. Survey, Vol. IX, Report 4, p. 48.

Development: by a number of shafts, average depth 125′. The shallow surface diggings, which were first worked, were followed down 100-125′ and from this level the ore has been coming that for 50 years has supplied the mill and smelter. In recent years the copper and nickel cobalt sulphide ores, which occur in bunches and masses in the lead ore, have not been mined, owing to the difficulty of smelting them. In 1915 four shafts were operated, and much of the ground was re-worked with steam-shovels, the only mine in S. E. Missouri to be so worked. Much carbonate of lead is recovered.

Reserves are reported to be equal to 3,000,000 tons yearly for 60 years, half of which can be mined by open-cut methods.

Equipment: 19 miles of railway, 1,000-ton ore concentrator with 350-ton flotation unit, 1,000-ton tailing plant, Diesel engine power-plant, etc.

Mine was closed during 1919, and company is in litigation.

SAINT FRANCOIS LEAD CO. **MISSOURI**

Property sold to the Baker Lead Co., which see.

ST. JOSEPH LEAD CO. **MISSOURI**

Offices: 61 Broadway, New York, and Bonne Terre, Mo.

Officers: Clinton H. Crane, pres. and chairman ex. comm.; Hugh N. Camp, Jr., v. p. and treas.; Irwin H. Cornell, v. p. and sales mgr.; L. H. Besson, sec., with Daniel K. Catlin, Firmin Desloge, Max Kotany, M. F. Watts, all of St. Louis, Gust. Setz, San Antonio, Charles M. Chapin, F. W. Shibley, New York, and E. C. Smith, Vermont, directors. C. J. Adami, gen. mgr.; L. A. Delano, mill supt.; W. A. Smith, mgr.; E. C. Hickman, asst. mgr. of Herculaneum plant.

Inc. March 25, 1864, in New York. **Cap.,** $20,000,000; shares $10 par; outstanding $1,464,798. Annual meeting, third Monday in Feb. Transfer office: 61 Broadway. Registrar: New York Trust Co. Stock traded in on New York Curb. Bonded debt retired Jan. 1, 1916.

Subsidiary bonds: Miss. River & Bonne Terre Ry. 1st M. 5%, sinking fund gold bonds, due Oct. 1, 1931, $1,806,000.

During 1916 the company set up an amortization reserve, based on a capital of $20,000,000; an estimated life of 20 years; an annual ore production of

2,000,000 tons; and an annual lead production of 80,000 tons. Whenever the company's monthly average sale price of lead exceeds $60 per ton (3c. per lb.) a charge of 2c. per ton of milled ore for each dollar of such excess is charged to profit and loss surplus and credited to reserve for amortization.

In 1918 this plant was revised to agree with that of the U. S. Treasury Department in allowing depletion as a deduction from income in assessing income and excess profits taxes, and the company's books were revised in accordance with this change of plan.

Comparative general balance sheet (including subsidiaries):

Assets.

Year	Capital Stock	Miss. & R. T. Loan	Current	Reserves	Surplus	Total
1918.....	$14,096,750	$1,806,000	$777,222	$2,097,036	$13,258,539	$32,035,548
1917.....	14,096,650	1,850,000	967,883	92,848	11,669,344	28,676,725
1916.....	14,094,660	2,032,000	1,700,319	4,810	4,188,520	22,020,369
1915.....	14,094,600	2,359,769	773,530	.....	3,610,537	20,838,436

Liabilities.

Year	Property & equip.	Current	Deferred debits	Total
1918.....	$23,729,705	$7,660,432	$645,411	$32,035,548
1917.....	19,671,960	8,334,372	670,393	28,676,725
1916.....	22,750,727	4,266,373	1,427,627	28,444,727

Financial results in 1919 were: income, $2,295,256; depletion, $1,116,816; Federal taxes, $117,844; net profit, $1,060,596; and dividends, $1,550,478, leaving a deficit of $489,882.

Dividends: 1885-1912, 6%; 1913, 5%; 1914, 2½%; 1915, 4%; 1916, 25%; 1917, 35%; 1918, 20%, and 6% in 1919. The total is over $21,000,000, exclusive of stock distributions. On March 20, 1920, paid 5%, or 50c. a share.

The company is the largest independent lead producer in America, and the second largest after the A. S. & R. Co.

Property: 13,490 acres of lead-bearing land in southeastern Missouri, in St. Francois and Jefferson counties, power plants, mill, smelting plants, the entire $3,000,000 capital stock and $323,000 par value additional bonds of the Miss. River & Bonne Terre Railway; also $483,940 of the $500,000 capital stock of the Bonne Terre Farming & Cattle Co. and all of the capital stock of the Doe Run Lead Co.; the Miss. & Bonne Terre Ry. owns the St. Francois Co. R. R. Co. Company owns 1,000 houses tenanted by employees, and operates mercantile stores.

The holdings are in the disseminated lead ore region of S. E. Missouri, where production from ores in the lower Bonne Terre dolomite began in 1869. The producing area is within 5 miles of the towns of St. Francois and Desloge. There are six companies operating and seven concentrating mills in commission, those of the St. Joe Co. and its subsidiary handling 8,600 tons out of a total of 20,000 tons daily output.

Six shafts were operated during 1919. A new orebody was found, and No. 16 shaft was completed to 650' in sandstone.

The mines are estimated to contain 19,450,000 tons of developed and 15,525,000 tons of undeveloped ore.

Milling practice is described in "Met. & Chem. Eng." of Sept. 15, 1917, and July 15, 1916; concentration methods are given by Watt, in Bulletin 130 (1917) of the A. I. M. E.; the baghouse and matte granulation plants at Herculaneum in the "Eng. & Min. Jour." of Feb. 17 and Dec. 16, 1917; and in same journal of June 29, 1918, H. W. Kitson covered the property generally.

Flotation is used in the mills, the company operating under license of Minerals Separation. Electrical dust precipitators are used at the smelter.

Equipment: includes the modern 2,400-ton mill at Bonne Terre, that of 2,000 tons at Leadwood, and that of 4,200 tons at Rivermines; also the smelter at Herculaneum, near St. Louis, Mo. This last mentioned is capable of treating 12,000 tons of concentrates per month, and an output of 120,000 tons of lead yearly, from the company's mills. Concentrates assay from 65 to 74% lead, 14% sulphur, and 1 to 5% zinc. Smelter was closed from February to October, 1919.

Production:

Year	Ore, tons	Concentrates, tons	Lead, tons
1919	1,978,922	114,449 (approx.)	68,000
1918	2,999,490	133,099	79,620
1917	2,485,431	157,767	94,820
1916	2,431,939	169,302	91,073
1915	2,127,333	136,379	90,120
1914	1,989,047	120,710	81,716

ST. LOUIS SMELTING & REFINING WORKS **MISSOURI**

(Formerly St. Louis Smelting & Refining Co.)

Branch of National Lead Co. E. J. Cornish, pres.

Address: J. A. Caselton, asst. mgr., 722 Chestnut St., St. Louis, Mo.

Property: 1,895 acres at St. Francois, southeastern Missouri. **Ore:** carries lead sulphide in dolomite. Six shafts are in operation, deepest 565'. Ore is mined on each of 3 levels, and brought to the main entry by electric locomotives, where it is dumped into a 500-ton storage bin.

Equipment: complete with a 3,000-ton concentrating plant. Flotation is employed with gravity concentration. Besides treating its own ore, company treats that from the Baker Lead Co. at Leadwood and the Boston-Elvins Lead Co. at Elvins.

A system of conveyors takes ore to the crushers, after which it passes rolls, screens, jigs, tables, and finally to the flotation department.

Company has its own power-plant, consisting of 32,000 h. p. in steam boilers, supplying 5 engines and generators of 2,161 k. w. capacity, two large air-compressors, 5 motor-generator sets for the underground haulage system, electric light, pumps and fans in the mines, hoists, mill, and other works. One of the hoists is of double-drum type, driven by a 225-h. p. motor, provided with control in the hoist-house or at 365' down in the mine. Five-ton skips are hoisted 425' in 55 seconds.

MONTANA

Montana is essentially a copper and silver State, the 1918 output of these metals being 323,174,850 lb. copper, and 16,797,489 oz. silver, both an increase over that of the previous year. Gold declined to 150,193 oz., a decrease of 20,000 oz.; lead increased to 37,135,875 lb. or 65%, while the zinc output of 209,258,148 lb. was also an increase. Dividends totaled over $20,000,000. In 1919 there was a decrease in production of all metals, partly due to labor strikes, partly to fuel shortage. Production in 1919 was 180,246,000 lb. copper; $2,272,000 gold; 42,163,000 lb. lead; 13,281,000 oz. silver, and 176,432,000 lb. zinc. Dividends were over $10,000,000.

Butte is the one great mining center of Montana, and the companies of this district, whose official title is still the Summit mining district, are grouped under that title. All others are arranged alphabetically.

AINTRAM MINING CO. **MONTANA**

Address: D. Buchanan, supt., Martina, Missoula county, Mont.

Property: a small gold mine sufficient to keep 5 light stamps and a Forrester rod mill employed, the latter machine being added in May, 1919.

ALPENA COPPER MINING CO. **MONTANA**

Office: Wallace, Idaho. **Mine office:** Saltese, Mineral county, Mont.

Officers: C. W. Beale, pres.; A. H. Featherstone, sec.-treas.; preceding officers, Alex. Muir and A. P. Cochrane, directors.

Mine: in the St. Joe district, near the Monitor, and 2 miles from Adair on the C. M. & St. P. railroad.

Development: by 2 long tunnels and shaft, showing a 2' vein of quartz with chalcopyrite. At last account face was 400' from projection of ore-shoot exposed on surface.

Equipment: includes several buildings. No recent data available.

ALTA MONTANA MINING CO. **MONTANA**

New York address: care L. E. Whicher, 25 Broad St. **Mine address:** Thomas Hauser or A. E. Spriggs, Helena, Mont. Raymond Guyer, cons. engr.

Inc. 1917. **Cap.,** $3,000,000; $5 par.

Property: an old silver-lead mine with large production (reported variously up to $4,000,000) in the Corbin district of Jefferson county. Mine closed for 23 years, but workings reported open.

Development: by 8 tunnels, from the lowest of which a vertical shaft is down 682′. The lowest point of development is 1,300′ below apex of the veins.

New York interests have spent over $110,000 in past three years, sinking a 300′ shaft and endeavoring to find a body of commercial ore in the undeveloped part of the ground.

AMALGAMATED SILVER MINES CO. **MONTANA**

Address: 34 Union Bank Bldg., Helena, Mont. **Mine address:** Clancy, Mont.

Officers: M. E. Weston, pres.; A. A. Trego, v. p.; Emil Larson, v. p.; R. A. Weisner, sec.-treas., with A. R. Hall, R. L. Varney, J. S. Scott, J. L. Rice, and R. L. McCray, directors.

Inc. in Montana. **Cap.,** $1,000,000; $1 par; 800,000 issued to pay for property and development. The Banking Corp. of Montana, registrar and transfer agents, Helena, Mont.

Property: 35 claims, including the Free Coinage mine, at Lump Gulch, in Jefferson county, 2 miles from rail at Clancy.

Development: to depth of 350′ in the Free Coinage and 200′ in the Muskegon. Stoping under way at 180 and 250′. Shipments from the first named have averaged 115 oz. of silver per ton, shipments varying up to 30 tons a week in 1919.

Curtis, Packer & Co., 14 Kilby Street, Boston, Mass., with the Silver Mining & Reduction Co., have an option on 200,000 shares, and were offering them at 60c. in December, 1919.

AMAZON DIXIE MINING CO. **MONTANA**

Property: at Sildix, Missoula county Mont., on the Idaho-Montana boundary is really a Coeur d'Alene corporation, and is described under Idaho.

AMERICAN COPPER MINING CO. **MONTANA**

Office: St. Regis, Mont. William Lintner, mgr.

Cap., $10,000; 10c par.

Property: 120 acres between St. Regis and De Borgia, in Mineral county, Mont. Ore occurs in a limestone and quartzite formation, and averages 4% copper, and 4 oz. silver. Development is by tunnels.

ANGELICA MINING & DEVELOPMENT CO. **MONTANA**

Address: Wickes, Mont.

Officers: C. d'Autremont, Jr., Duluth., pres.; Chas. D. Morton, v. p.; C. K. Tibbetts, sec.-treas., with T. T. Hudson and C. M. d'Autremont (mgr.), directors. Chas. D. Horton, supt.

Inc. Jan., 1915, in Montana. **Cap.,** $200,000; $10 par; 14,320 issued. Annual meeting, last Monday in June.

Earnings: gross income from ore sales, $164,652 in 1918, with $88,956 expenses, not allowing for depletion of ore, compared with 1916 ore sales of $49,556, and operating expenses, $64,714.

Property: the Mt. Washington mine, 6 claims, 110 acres, in Colorado mining district, 2 miles west of Wickes, Jefferson county.

Geology: a contact vein in andesite and rhyolite, with dip of 82° N. and strike of N. 83° W. The ore, a sulphide below the 400′ level, contains lead, silver and gold, occurring in shoots 2 to 10′ wide and 50 to 300′ long. Average assays are 0.2 oz. gold, and 26 oz. silver, and some lead.

Property has been reported on by E. J. Collins, T. F. Field, and Reno Sales.

Development: 3,300′ tunnel and 100′ levels down to 800′; total workings, 10,500′. Mining is by square-set system. Reserves are 13,915 tons.

Equipment: Franklin air-compressor and electric power.

Production: ore is sent to smelter at East Helena.

Year	Tons	Gold, oz.	Silver, oz.	Lead, lb.	Average value per ton
1919 (July).....	60 daily	.....	.....	.....	$33.50
1918.....	.....	1,694	171,400	1,659,223	27.90
1917.....	6,711	933	65,526	1,012,176	.....

ARGENTA-DILLON MINING CO. **MONTANA**

Idle. Property taken over by Montana Mines Co., which see.

ARGYLE SILVER MINING CO. **MONTANA**

Address: J. B. Leggatt, Salt Lake City, Utah.

Inc. October, 1919, in Montana. **Cap.,** $100,000.

Property: that of the Benton M. & M. Co., in the Vipond district of Beaverhead county, last operated in 1908.

ARKANSAS COPPER CO. **MONTANA**

Property: on Ten Mile creek, near Helena, Mont., and about 2 miles W. of the summit of Mt. Helena, shows a 30′ vein in diorite, traceable 800′, carrying some copper ore with small gold and silver value.

Development: by 200′ shaft. Was in hands of lessees early in 1915, but inactive at last advice.

ARLINGTON MINING CO. **MONTANA**

Idle. **Office:** Wallace, Idaho. Mine near Thompson, Sanders county. Chas. T. Fisher, pres.; M. J. Mahoney, sec.

Cap., $1,500,000; shares $1 par.

Property: 20 claims, well timbered in the Mountain House (unorganized) mining district, near the Idaho-Montana divide.

A vein is said to be traced 6,000′ by surface cuts, 30 to 100′ in width, carrying, at shallow depth, galena of concentrating grade, with some ore assaying up to 78% lead. The 175′ upper tunnel shows 3′ of concentrating ore, and the 900′ lower crosscut tunnel shows a 10″ stringer assaying 8% copper, 15% lead and 15 oz. silver per ton. No recent returns secured.

AUGUST GOLD MINING CO. **MONTANA**

Address: Landusky, Phillips county, Mont.

Property: a well-known producing gold mine. Ore is a porphyry dike, containing low-grade gold values. Ore is mined by glory-holing and treated by cyanidation.

BALKAN BUTTE COPPER MINING CO. **MONTANA**

Office: 13 N. Wyoming St., Butte, Mont. Idle.

Officers: Chas. Steele, pres.; Thos. Tomich, sec.-treas.

Inc. Jan. 26, 1907, in Montana. **Cap.,** $450,000; shares $1 par.

Property: 4 patented claims, 80 acres, in Elk Park, Jefferson county, Mont., shows gold, silver, copper, lead ore.

BALTIMORE COPPER MINING CO. **MONTANA**

Office: 49 W. Park St., Butte, Mont.

Officers: R. L. Clinton, pres.; J. Maher, v. p.; T. J. Fenlon, sec.-treas., with B. E. Calkins, D. J. Charles, and E. H. Renisch, directors.

Inc. in Montana. **Cap.,** $2,500,000; shares $5 par; assessable; 197,520 shares outstanding. No bonds.

Property: five patented claims in Boomerang Gulch, near Boulder, Mont., showing an ore zone 40 wide, with silver-lead ore in lenticular shoots. Ore said to contain about 3% copper, 20 oz. silver, 12% lead, and $2 gold.

Development: by 5 tunnels, 100′ vertically apart, longest 700′. Property was under lease to the estate of M. W. Atwater, former manager of the Davis-Daly at Butte, who began operations late in 1918.

Production: 7 to 8 cars of ore monthly in early part of 1919.

BAMAR COPPER CO. **MONTANA**

Address: Dr. M. J. Scott, Butte, Mont.

Officers: Dr. M. J. Scott, pres.; F. H. Butler, v. p.; J. B. Frisbee, sec.; M. A. R. Scott, treas.

Inc. Sept. 24, 1910, in Montana. **Cap.,** $1,500,000; $1 par. Annual meeting, first Tuesday in June.

Lands: 12 claims, 230 acres, in the Summit Mountain district, near Buxton Switch, in the foothills of Fleecer mountain, 13 miles S. W. of Butte. Claims were bought of Butte & Buxton Copper Mining Co. for 150,000 shares of Bamar stock. Country rock is granite, with a mineralized zone one-half mile wide, carrying 4 veins, with a diorite dike to the northward. Shallow pits and

trenches show continuity of the veins, which are leached at surface, carrying a little lead and copper carbonate ore.

Development: by 180′ two-compartment Linda shaft, connecting with the 700′ tunnel, on a ledge, carrying a 10′ streak, mainly pyrite, with some argentiferous chalcopyrite. Property has yielded ore carrying 1 to 36% copper and 43 oz. silver per ton, with up to $2.50 gold, also galena assaying 11% lead, 24 oz. silver and $1 gold per ton.

Equipment: includes a 40-h. p. boiler, 20-h. p. hoist good for 500′, 2-drill air compressor and several mine buildings. Idle, but company plans deepening shaft, drifting, and crosscutting.

BANNACK GOLD MINING CO. **MONTANA**

Reorganized, 1918, as the New York-Montana Mines Co., which see. Details of old company are in Vol. XIII of this work.

BANNER & BANGLE MINING CO. **MONTANA**

Address: W. J. C. Wakefield, pres., Spokane, Wash. Leo Greenough, mgr., Spokane.

Cap., $600,000; par $1.

Property worked for many years by T. L. Greenough, is now under lease and bond to Snowstorm Mines Consolidated, which see.

BARNES-KING DEVELOPMENT CO. **MONTANA**

Address: Butte, Mont. **Mine office:** Kendall, Fergus county, and Marysville, Lewis & Clark county, Mont.

Officers: C. W. Goodale, pres.; A. J. Davis, v. p.; J. E. Corette, sec.; C. C. Swinborne, treas., with C. R. Leonard, F. L. Melcher, I. A. Heilbronner, T. A. Marlow, directors. W. B. Roll, asst. sec.

Operating officials: G. T. McGee, gen. mgr.. At the North Moccasin: T. W. Heatherley, in the mine; A. E. Worsdell, in the mill; C. A. Morgan, in the office; E. G. R. Manwaring, mining engineer, and W. A. Young, assaying. At the Piegan-Gloster: J. H. McCormick, in the mill; J. W. Johns, in the mine; William McClean, mechanical engineer; F. E. Eccles, in the office, and Ward Cole, assaying. At the Shannon: J. W. Johns, in the mine, and J. E. Goyer, in the office. At the Kendall: A. B. Fox, in the power-plant.

Inc. 1907, in Montana. **Cap.,** $2,000,000; $5 par; all issued. W. B. Roll, Box 1375, Butte, Mont., transfer agent. Annual meeting, first Wednesday in March. Stock listed on Butte Exchange.

Financial Statement—Years ending December 31:

Assets

Year	Property and Equipment	Deferred	Current (Cash, Bullion, Liberty Bonds, Investments)	Total
1919.....	$1,980,516	$68,196	$193,351	$2,242,064
1918.....	2,103,463	90,024	198,246	2,391,733
1917.....	2,433,433	68,462	265,669	2,767,564
1916.....	2,299,707	54,802	109,783	2,464,292

Liabilities.

	Capital Stock	Current (Accounts and Wages, etc.)	Surplus	Total
1919.....	$2,000,000	$47,816	$194,247	$2,242,064
1918.....	2,000,000	42,228	349,503	2,391,732
1917.....	2,000,000	35,747	731,818	2,767,564
1916.....	2,000,000	139,467	324,825	2,464,292

Profit and Loss.

	Operating Profit	Taxes, Exploration, Losses, etc.	Net Profit
1919.....	$87,170	$19,258	$67,912
1918.....	189,313	49,980	139,333
1917.....	454,551	10,296	444,254
1916.....	139,671	43,332	96,338

Dividends: initial on March 1, 1916, total of 15c per share in 1916; 10c in 1917; 40c. in 1918; 30c. in 1919; 5c. on February 15, 1920; total, $400,000.

Property: three mines known as the (1) **North Mocassin** property, (2) **Piegan-Gloster** property, (3) **Shannon** property. The company originally held only the Barnes-King mine.

In 1912, after spending considerable money in an unsuccessful search for new orebodies, the mine was closed down, with about $300,000 left in the treasury. In 1912, the North Mocassin property, covering about 2,000′ in length along the ore-bearing formation adjoining the Barnes-King on the north and the Kendall on the south, was purchased for $150,000; $5,000 cash, and the remainder to be paid from net working profits as made. The Piegan-Gloster property, near Marysville, Lewis & Clark county, Mont, was obtained in 1913 for $100,000, with an additional cost of $8,200 for 5 adjoining claims. The Gloster mine had been worked from 1880 to 1888 and is credited with a production of several million dollars.

In 1915, the company paid $100,000 for all the property of the Kendall Gold Mng. Co. The Shannon mine, 2½ miles southwest of Marysville, was purchased in 1915 for $228,223, payable from mine profits. Final payment was made during third quarter of 1917.

Company has pursued an energetic search for new properties, and in addition to those mentioned, has had under option 3 claims, 1½ miles N. of the Gloster, at $50,000; surface indications were good, but at 50′ depth results were disappointing. In May, 1918, the Mount Pleasant group of 2 claims, 3,000′ E. of the Shannon, was taken under option at $30,000, but after doing 1,000′ of work, no further exploration was deemed justified. In February, 1919, a $70,000 option was acquired on the Silver Bullion group in the Judith mountains, 10 miles from Kendall. By July, a shaft was down 200′, but 50′ of work had revealed no ore.

Geology: the orebodies at Kendall are irregular replacement deposits in limestone, dipping 25°. The ore are mostly soft and well oxidized.

Development: total footage was 4,008 in 1916; 10,013 in 1917; 10,633 in 1918, and 10,864′ during 1919. These figures are exclusive of work in properties under option.

The *North Mocassin group* was first worked through the Barnes-King shaft; later the Santiago shaft was completed to the 500′ level and it is now the main working shaft. Orebodies have been opened up on different levels to a depth of nearly 800′. Exploration in 1919 on the 600′ level has disclosed a new orebody said to average $11 a ton. The Kendall mine has been under lease for over 2 years, giving the B. K. Co. a royalty of up to $3,700 per year for ore mined and power used. Development keeps up with ore extraction.

The old *Gloster mine* had been opened by a vertical shaft to a depth of 500′, and a winze sunk 300′ below the 500′ level. The Piegan claim had been developed by tunnels. The B.-K. Co. unwatered the Gloster mine to the 800′ level and opened the Piegan orebody above water-level. The Norman tunnel, connects the No. 4 Piegan tunnel and Gloster workings with the tram to the mill. In 1918, the advance on the 500′ level, 937′ west, cut four ore-shoots with a combined length of 350′. They do not appear to extend far above the level. Reserves were 2,835 tons of $7.30 ore. West end of 500′ level is promising.

The *Shannon mine*, previous to the time of its being taken over by the B.-K. Co., was opened by a tunnel with 2,000′ of workings, chiefly on the vein which, in the tunnel, was 300′ long, from 4 to 10′ wide, worth $15 gold per ton. The B.-K. Co. has sunk a shaft 450′ below the tunnel on the vein, dip 70°. The vein is in slate, and where crosscut on the 100′ level is said to have a width of 15′. In 1918, a new ore-shoot, 400′ long, was opened on the 500′ level, but on the 650′ level, the shoot was only 100′ long. The Shannon is 13,400′ from the Gloster mill, with which it is connected by aerial tram.

Equipment: at the North Mocassin there is a double-drum electric hoist, compressor, and a 1,400′ electric tramway from mine to mill, which is on the original B.-K. group, and has a nominal daily capacity of 200 tons, allowing 10 days leaching period. There is also a small oil-fired roaster for treating the

black unoxidized ore found in the eastern ore-shoot. There is a 500-ton cyanide plant on the Kendall.

The *Piegan-Gloster* equipment includes a double-drum electric hoist, 100-h. p. motor and compressor at the Gloster shaft. The old Gloster 60-stamp mill was remodeled with a No. 5 Symons disc-crusher, three 10′ Chilean mills, 2 Wilfley tables, and a cyanide plant. The Shannon mine has a 75 h. p. electric-driven compressor.

Operations and costs at the Piegan-Gloster mill are described by J. H. McCormick in the September, 1918, Bulletin of the A. I. M. E.

Power: purchase of the Kendall property included a 400-h. p. hydro-electric plant on Warm Springs creek, 6 miles from the mine. This plant furnishes power for the Kendall properties, and also supplies the towns of Hilger and Kendall with lighting facilities. The Piegan-Gloster and Shannon properties obtain power from the Montana Power Co.

Production:

	North Mocassin			Piegan-Gloster			Shannon		
Year	Tons	Value	Bullion Sales	Tons	Value	Bullion Sales	Tons	Value	Bullion Sales
1919.....	25,843	$6.56	$178,191	11,917	$6.27	$78,426	36,740	$10.75	$424,710
1918.....	21,378	$8.19	178,230	15,338	$9.21	141,327	26,048	$13.02	349.138
1917.....	26,790	8.53	227,925	20,525	10.43	210,311	32,359	15.17	492,684
1916.....	33,715	8.65	253,788	22,144	6.15	133,588	13,392	13.94	180,486
1915.....	47,038	9.80	418,569	14,956	7.22	85,533	.....	.....	.....
1914.....	51,471	8.44	424,411	.....	.....	.....	.....	.....	.....
1913.....	49,726	8.89	400,854	.....	.....	.....	.....	.....	.....

The grand total from March 1, 1911, to December 31, 1919, is $4,179,533.

Costs per ton:

Year	North Mocassin	Piegan-Gloster	Shannon
1919.....	$8.194	$14.066	$6.212
1918.....	7.558	10.197	6.885
1917.....	6.006	7.991	5.265
1916.....	6.307	6.998	6.494
1915.....	4.653	6.940	....

The Barnes-King Development Co. is a well-managed corporation, which issues a complete report. Development work is said to be disappointing, though enough ore continues to be opened up for the mills and to keep up regular dividends. Details of properties taken on option show that company is endeavoring to prolong its life, and it shows conclusively that most of these outside claims in the district are worthless.

BARTON GULCH MINING CO. **MONTANA**

Address: A. H. Jones, mgr., Virginia City, Mont.

Property: in Hungry Hollow, at Summit, near Virginia City, Madison county. Mine is opened by tunnels, and is said to show $16 gold ore in a 7′ vein. Living quarters and shops have been erected, and a mill was to be installed in 1919.

BASIN-MONTANA MINES CO. **MONTANA**

Office: Room 1012 Little Bldg., 80 Boylston St., Boston, Mass.

Officers: Melvin A. Houser, pres.-gen. mgr.; Francis A. Cave, v. p.; Wm. A. Fotch, treas.; K. F. Baker, sec., pro tem.; E. J. Strasburger, cons. eng.; R. W. Clinton, counsel.

Inc. May 22, 1919, in Montana. **Cap.,** $500,000; $5 par; non-assessable; $350,000 issued. Annual meeting in July.

Property: 22 claims, 400 acres, at Basin, Jefferson county, 29 miles by rail N. E. of Butte. The claims were formerly held by the Ruby and Columbia Mines Co., but forfeited. Sixteen claims, acquired for $350,000 in cash and stock, are said to contain ore to value of $300,000. Six other claims are held under bond and lease. The Great Northern Railroad runs within 500 feet of the property. Examined by E. J. Strasburger and geology described in Bull. 527 of U. S. Geological Survey. Country rock is granite (monzonite) cut by por-

phyry dikes and traversed by two veins containing shoots of complex gold-silver-lead-copper-zinc ore, difficult of treatment. The group covers 6,000′ along the outcrop of the Custer vein.

Development: on six claims, 2,250′ tunnel on Custer vein and 8 tunnels, viz.: Wilson, 750′; Custer No. 2, 500′; Powder House, 100′; Confidence, 100′; Old Custer tunnel No. 1, 100′; Old Custer No. 2, 200′, and Bergman, 500′.

Equipment: electric power, air-compressor, drills, etc.

Production: shipments made some years ago carried 40 oz. silver and $18 gold per ton. Management expects to resume shipments at an early date.

An official report states "The future of this enterprise can hardly be estimated when you take into consideration the orebodies in sight, and with proper equipment. . . . The company can pay a dividend or disbursement of more than $2 per share, or 40 per cent. . . . Take into consideration that the mine has only been developed to the 100-foot level and already produced $100,000 and there is still left $1,700,000 in sight in the mine." We hope so, but, in our opinion, the facts stated do not warrant the conclusions given, and such statements are reprehensible.

BEAR CREEK PLACER CO. **MONTANA**

Probably dead, as letters sent to last address, E. G. Mellander, agent, Libby, Lincoln county, Mont., were returned unclaimed.

Property: company paid $150,000 for Libby Placer Mining Co. and $40,000 for Comet Placer Co.'s properties ,covering 10 miles of gravel flats along Libby creek, beginning 18 miles above the town.

A dredge was being erected in 1917 and ground was to be prospected thoroughly before beginning operations.

BEAR GULCH MINING CO. **MONTANA**

Office: care of Alex. Johnston, Clark Brothers' Bank, Butte, Mont. **Mine:** at Twin Bridges, Madison county, Mont.

Property: the Montana View group, carrying auriferous and argentiferous copper ores, opened by tunnel about 3,000′ long. Has steam power and air-compressor. Property has little ore and is not on the contact zone; its chief value is for a tunnel-site for the Moffat claims, which adjoin it, and were being worked, 1917, by Charles J. Stone, former manager of the Alex Scott mine at Butte. The Moffat mine has developed a granite lime contact with basic ore carrying magnetite, that varies from 5′ wide for 1,000′ along the tunnel, to 100′ wide near the face. This ore, averaging 2.1% copper, was shipped, in 1916, to the East Butte smelter. Tramming to rail cost $2; freight, $1.75, and smelting, $3.75 per ton.

BEAVER CREEK MINING CO. **MONTANA**

Address: Whitcomb, Phillips county, Mont.

Property: in the Little Rocky Mountains. Carries low-grade gold ore in a porphyry dike, mined by glory-holing and treated by cyanidation.

BEAVER CREEK MINING CO. **MONTANA**

Address: Philipsburg, Granite county, Mont.

Property: a manganese mine on which a concentrating plant was erected in 1918.

BEAVER MINING CO. **MONTANA**

Probably dead, as letters were returned unclaimed, 1919, from Duluth, Minn., and from Butte.

Officers: M. H. Gannon, pres.; W. L. Harnan, Butte, Mont., v. p.; Morgan M. Pattison, Duluth, v. p.; Dr. J. B. Sullivan, Butte, Mont., treas.; J. W. Neukom, Duluth, sec.

Inc. 1917. Cap., $950,000. Treasury stock being offered, 1917, at 40c a share.

Property: 320 acres, 7 miles from Brown, on Oregon Short Line, in Beaverhead county, about 50 miles from Butte, said to show several copper-bearing veins. A shipment of about 1,200 tons is reported to have averaged 4% copper and over 3 oz. in silver.

Development: work has only been done on 2 veins, and management

in 1917, planned to drive 650′ tunnel with raises, winzes, etc., to open up the ore-body at a depth of 400′ from surface.

BEAVERHEAD MONTANA COPPER MNG. CO. **MONTANA**

Argenta, Beaverhead county, Mont. Property taken over by the Montana Mines Co., which see.

BELL BOY MINE **MONTANA**

Address: Dr. O. M. Lanstrum, Helena, Mont.

Property: near Marysville, operated by lessees. A wide shoot of gold-silver-lead ore was opened, and ore was sent to the Bald Butte mill and East Helena smelter in 1918.

BEN HUR MINING CO., LTD. **MONTANA**

Address: Saltese Supply Co., Saltese, Mineral county, Mont.

Officers: D. S. Dickson, pres.; Frank H. Bell, v. p. and purch. agt.; Chas. J. Luedke, sec.; C. A. Keating, treas., with Peter Peterson and A. J. Matthiessen, directors.

Cap., $1,500,000; shares $1 par. Annual meeting, last Saturday in April.

Property: 9 claims, adjoining the Last Chance mine, 3 miles from Saltese, showing a fissure vein, in quartzite, of 10′ to 60′ width at surface.

Development: by 3 crosscut tunnels, the lower, of 1,100′ cutting a vein carrying silver lead and gray copper ores. Property considered a promising prospect. No recent returns secured.

BEN THOMAS MINING CO. **MONTANA**

Address: B. M. Thomas, Libby, Mont.

Property: 10 claims in Rainy Creek district of Lincoln county, was under bond to F. J. Doland, of New York.

Development: by 9 short tunnels, ore carrying gold, silver and copper, with molybdenite and vanadium.

BERNICE RED ROCK MINING CO. **MONTANA**

Address: Bernice, via Basin, Mont.

Officers: H. D. Fagon, v. p.; N. B. Lewis, sec.-treas.; J. B. Anderson, agent, 1924 Thirteenth St., Washington, D. C.

Property: 4 claims located 3 miles from Bernice station on Gr. Northern Ry., 26 miles from Butte.

A large vein shows scattered mineralization of lead carbonate and sulphide ore, but of low average value, containing gold, $0.40 to $1.60, silver 2 to 7 oz., 0.5% copper, lead 2%, and zinc 5%. Course of vein is N. 70° W. with dip 70° S., and where exposed has a width of 8′ in the upper tunnel, and 23′ in lower tunnel.

Development: 2 tunnels, upper one 150′ long, the other 100′ vertically below the upper, cut the vein at a distance of 200′ from the portal. A 20′ winze was sunk on the vein from the lower level. The ore can be cheaply mined and is capable of flotation, but value is low. Company officers and stockholders are all colored men. No recent data available.

BETTY ALDEN MINING CO. **MONTANA**

Closed down and company probably dissolved. Fully described, Vols. XI-XII.

B. & H. MINES & MILLING CO (not inc.) **MONTANA**

Owners: N. J. Bielenberg and W. I. Higgins, Deer Lodge, Mont.

Property: known as the Bielenberg-Higgins, consists of 30 claims, 10 patented, 360 acres, 3 patented millsites and 1 unpatented tunnel site, in Bear Gulch, 14 miles from Twin Bridges, Madison county, Mont., on a branch line of the N. P. R. R.

Geology: ore is a complex sulphide, occurring in porphyry and altered granite. There are 9 known veins, said to be traceable for 4,000′ and to contain gold, silver, lead, iron and copper. Veins strike E.-W. with dip of 38°, becoming flatter as work progresses; 4 veins have been extensively developed and proven to be from 7′ to 105′ wide and continuous at depth, containing ore of commercial value, said to average $4 per ton. Ores are treated by wet concentration, making a recovery of 90%. Concentrates run $54 to $80 gold, 11 oz. silver, 25% lead,

2% zinc and 0.5% copper. Ore reserves are estimated at 200,000 tons of $4 to $10 ore.

Development: a 7'x7' crosscut tunnel, 900' long, drifts, raises and winzes, underground workings totaling 2,000'.

Equipment: 100-ton mill, 2 air hoists, pumps, wet-concentration plant, and compressor of 640 cu. ft. capacity.

In 1917, management planned adding electric power, driving the tunnel to 3,000', and increasing daily capacity of mill to 300 tons. In 1918, mill was closed, pending construction of a transmission line from Twin Bridges to the mine, 14 miles; completed, 1919.

BIG EIGHT MINE **MONTANA**

Address: Edward McCaffrey, Troy, Mont.; or H. L. Day, Wallace, Idaho.

Property: adjoins the Snowstorm Mines Cons. near Troy. About 2,000' of work has been done and mine has shipped a good deal of zinc-lead ore. In May, 1918, a suit was heard at Missoula by E. McCaffrey against H. L. Day to have a contract rescinded for the purchase of the mine by the latter.

BIG ELK MINING CO. **MONTANA**

Office: Wallace, Idaho. **Mine office:** Saltese, Mineral county, Mont.

Officers: Peter Peterson, pres. and gen. mgr.; Carlton Fox, v. p.; A. H. Featherstone, sec.-treas., with Geo. K. Garrett and W. S. Brown, directors. C. F. O. Merriam, mg. eng.

Inc. April, 1909, in Idaho. **Cap.,** $2,000,000; shares $1 par; assessable; fully issued. Last assessment, 1 mill per share, July 22, 1914.

Property: 15 claims, 300 acres, unpatented, on Bald mountain, in the St. Joe district, near Adair, showing 3 fissure veins in St. Regis quartzite, various trenches exposing veins with 4' thickness carrying streaks of chalcopyrite and spathic iron, in spar and quartzite. A carload shipment to Helena from an 18' prospect shaft, returned 28.7% copper, 28.9% iron, 15% sulphur, and 2 oz. silver per ton. A 125' upper tunnel and a 200' lower diagonal crosscut tunnel show chalcopyrite and bornite, carrying small values in gold. The C. M. & St. P. R. R. crosses property.

In May, 1918, control passed to S. B. Holbert, of Pittsburgh, Pa., who agreed to spend $25,000 in development and plant in consideration for an option on 1,000,000 treasury shares at 2½ cents, and 500,000 issued shares at 5 cents.

Property considered promising.

BIG FOOT MINING CO. **MONTANA**

Address: Boulder, Mont.

Inc. Sept., 1917, in Montana. **Cap.,** $3,000,000; shares $5 par.

Property: a group of 7 claims in the Big Foot district, Jefferson county, about 12 miles from Boulder. Claims said to show ore carrying silver, lead, and zinc.

Development: by several shafts from 50' to 200' deep, all under water.

Mine had been closed down for many years, and was unwatered and reopened in 1917.

BIG SEVEN MINING CO. **MONTANA**

Address: Neihart, Mont.

Officers: D. L. S. Neihart, pres., treas., mgr.; Violet Barker, v. p.; L. S. Barker, sec., with John Clover, directors.

Inc. 1893. **Cap.,** $3,000; shares $2 par; assessable; all outstanding. Annual meeting, March 10th. Gross earnings for 1916 amounted to $12,497, and operating expenses, $19,259.

Property: the Big Seven mine, an old-time producer, near Neihart, Cascade county, Mont., which shows a fissure vein, 2" to 2' wide, in granite-porphyry, said to carry high value in gold and silver.

Development: 3,600' tunnel.

Equipment: includes compressor and steam power. Total production to date, $1,500,000. Management planned advancing tunnel and further development at last accounts.

BLACK FRIDAY GOLD MINING CO. **MONTANA**

Office: Helena, Mont.

Officers: Willard Bennett, pres.-treas.-mgr.; A. J. Galen, v. p.; R. M. O'Hearn, sec., with J. L. Templeman, directors.

Inc. 1910, in Montana. **Cap.,** $2,000,000; par $5; issued; 356,000. Bonds authorized and issued, $75,000.

Property: 10 patented claims, 128 acres, in the Radersburg mining district, carrying a vein in andesite, that runs N.-S. and dips 45°. Ore contains iron pyrite, with gold and silver values.

Development: by 700′ inclined shaft and 3,500′ of workings. **Equipment:** includes 150 h. p. electric hoist, compressor, 15-ton concentrator.

Production: reported as $261,000 to date. Concentrates average $32 per ton.

Latest reports are that E. N. Breitung & Co. relinquished their option and that foreclosure proceedings were to be started by J. L. Templeman for the bondholders.

BLACK TRAVELER COPPER MINING CO. **MONTANA**

Address: J. R. Bean, sec., Mullan, Idaho.

Officers: O. S. Roof, pres., Mullan, with R. E. Sisler, Wallace, Idaho., and F. Lendtke, Saltese, Mont., directors.

Cap., $1,500,000; par $1; assessable. Annual meeting, 2nd Tuesday in November.

Property: 6 unpatented claims in St. Regis district, under bond and lease to Saltese Consolidated Mining Co., which see.

BLUEBIRD-CORBIN GOLD, SILVER & COP'R M. CO. **MONTANA**

Address: Wickes, Jefferson county, Mont.

Officers: Wm. Q. Ranft, owner and mgr.; John W. Johns, supt.

Property: 4 miles west of Wickes. One of the old mines of the district, taken over in 1911 together with the Penn Yan claim. Claims show 2 veins of 4′ to 14′ in width, carrying ore-shoots averaging 5% copper, 5% lead, 25 oz. silver, and $1.50 gold per ton. Ore occurs in a tourmalinized vein in andesite tuffs and diorite along a contact with a 50′ wide dacite dike that forms the footwall.

Development: by 2,248′ tunnel and 225′ shaft, with levels at 100′ and 200′. Equipped with electric power. Mine was working in September, 1919.

BLUEBIRD LODE **MONTANA**

Address: C. T. Young, Getaway, Mont.; Gus. Peterson and Philip Fortin, owners.

Property: 6 claims, 1 patented, 14 miles from Getaway, Mont. Gold-silver-copper ore occurs in quartz vein, course N.-S. Tunnel 120′ long.

An undeveloped prospect.

BLUE-EYED NELLIE MINE, INC. **MONTANA**

Address: A. W. Paterson, pres., and E. C. Paterson, sec.-treas., Spokane, Wash.; or C. H. Brown, Anaconda, Mont.

Cap., $100,000; 10c par.

Property: 7 claims, 6 miles W. of Anaconda. Mine was a silver-lead producer, reopened, 1918, after an idleness of 25 years. Yield from 1885 to 1891 reported to have been over $1,000,000.

Development: by 325′ shaft; an 1,800′ tunnel (800′ by May, 1918,) will open ore at depth of 700′. **Equipment:** compressor, drills, etc.

BLUE VEIN COPPER MINING CO. **MONTANA**

Office: 17 Owsley Blk., Butte, Silver Bow county, Mont.

Officers: F. L. Melcher, pres.; Lewis A. Smith, sec.; W. F. Noyes, treas.

Inc. June 21, 1906, in Montana. **Cap.,** $1,000,000; shares $1 par.

Property: 9 claims, patented, being the Little Boulder, Valentine, Bunker Hill, Blue Vein, Blue Vein No. 1, Myrahl, North Star No. 1, the Ozone and Columbia lode claims in the southern part of the Butte district. Idle since November, 1909.

BOSTON & ALTA COPPER CO. **MONTANA**

Address: care Geo. H. Hill, Helena, Mont. **Mine:** near Corbin, Jefferson county, Mont.

Officers: John Joyce, pres.; Marcus L. Hewett, v. p. and gen. mgr.; Chas. H. Innes, sec.-treas., with Walter Callender, Warren Curtis, Sr., Jas. G. Gregg, Archibald S. Spriggs, Wm. Tatham and Chas. B. Van Nostrand, directors; Richard M. Atwater, Jr., cons. engr.

Inc. Nov., 1909, in West Virginia. **Cap.**, $3,000,000; shares $10 par; as successor of Alta-Montana Copper Co. to take over and work the Alta mine, whose output of $32,000,000, made it one of the big mines of the world.

The Alta mine, passing from the original owners to the Hudson Mining & Reduction Co., was shut down in 1903. The Alta Montana Co., Kelly Mining & Reduction Co., Alta-Montana Copper Co., and Boston & Alta Copper Co., owned property successively. The New Mexican holdings of the Kelly Smelting & Refining Co. were segregated, holdings of present company being exclusively in Montana.

Property: 640 acres, including the Alta group of 8 claims, carrying about 7,000′ of Alta or mother lode of the Corbin camp. Mine was unwatered in July, 1918. Water being pumped to surface through Hewett shaft by means of a drift driven from the shaft beneath the old workings and the water drawn off by 5 diamond-drill holes.

BOSTON-COLBY COPPER MINING CO. **MONTANA**

Mine P. O.: Saltese, Mineral county, Mont.

Officers: Peter Peterson, pres.; Hon. Andrew Flaig, 208 E. Lake St., Minneapolis, Minn., sec., gen. mgr. and principal owner.

Inc. September 16, 1903, in Montana. **Cap.**, $1,500,000; $1 par; 1,300,000 issued, of which 1,075,000 is held by Andrew Flaig.

Property: 9 claims, unpatented, 180 acres, and a 5-acre millsite, lying next east of the Butte-Coeur d'Alene Copper Mining Co., immediately west of Saltese, in the East Coeur d'Alene, formerly known as St. Regis district. Lands have 2 copper-bearing veins, No. 1 of about 40′ width, showing a great iron capping, and No. 2, to the south, of about 3′ width, carrying mainly chalcopyrite, with some bornite, of good average grade.

Development: by 2 crosscut tunnels, upper of 400′, lower of 900′ length with about 500′ of drifting in both tunnels, said to show chalcopyrite streaks in blue hematite ore. Property crossed by C., M. & St. Paul railroad. Wood and water are abundant. Assessment work only has been done for several years owing to lack of funds, but owners wish to sink the shaft 500′ deeper and to do other work.

BOSTON & CORBIN MINING CO. **MONTANA**

Office: C. R. Jeffers, treas., 67 Milk St., Boston, Mass.

Company is in process of liquidation. Development work at the mine was unsuccessful and the plant burned down. A distribution representing receipts from insurance and sale of remaining equipment was made in August, 1918, equal to 35 cents a share. This is probably the final distribution, unless property is sold. For description, see Vol. XIII.

BOSTON & MONTANA DEVELOPMENT CO. **MONTANA**

Offices: 408 Daly Bank Bldg., Butte, Mont., and 63 Devonshire St., Boston, Mass.

Officers: W. R. Allen, pres.; W. C. Siderfin, v. p.; with J. D. Pope (gen. mgr.); J. Bennetts, E. E. Esselstyn, J. G. Brown, Geo. Gallup and O. S. Heater, directors. C. E. Gallup, sec.; P. B. Goodwin, treas.; S. W. Hall, mine supt.; O. B. Hoffstand, cons. metallurgist.

Inc. Aug., 1913, in Montana. **Cap.**, $25,000,000; $5 par; 3,000,000 issued June 1, 1919. Increased from $15,000,000 in August, 1918. Bonds amounting to $400,000 were sold early in 1919. U. S. Corporation Co., New York, transfer agent; Equitable Trust Co., New York and Boston, registrars. Stock listed on Boston and New York Curbs. Annual meeting, first Monday in February.

Financial statement of December 31, 1918, showed cash and accounts receivable, $136,199; accounts and notes payable, $54,624. Expenditures during

1918 were $193,140 at the mine, $237,994 on the railway, and $18,854 at the Eastern office, a total of $449,988.

Property: is extensive, covering two entire mining districts, including 27 lode claims and 6 placer claims in the French Gulch district, Deer Lodge county, Mont., and 89 lode claims in the Elkhorn district, Beaverhead county, Mont. Company will practically control all these districts.

Both French Gulch and Elkhorn mines were opened in 1865, in the rush which followed the discovery of gold at Bannack, a few miles to the south, in 1862.

The *Elkhorn property* consists of the Central and other groups, including the Idanha, Park, Aspen, Blue Eyed Annie and other mines, about 1,500 acres, all adjacent, either owned or held under bond and lease. This tract is crossed by numerous big, strong quartz veins, cutting quartz monzonite and showing narrow zones of alteration adjacent to the veins. In the western part of the estate the veins are silver bearing, and high-grade ore was extracted many years ago. The ore contains gray copper and high-grade silver sulphides and occurs in shoots whose size and extent is as yet undetermined, since the old workings are shallow, seldom exceeding 100′ in shafts or tunnel backs. The veins appear to belong to two distinct systems, one E. W., the other N. E.-S. W., the latter having a southerly and flatter dip and being the larger veins.

The eastern claims include the Park, a large N. E.-S. W. vein, 20′ to 30′ wide and dipping 75° N. W., traceable across four claims. It is formed of hard white brecciated quartz with altered granite streaks and carries shipping ore with copper and lead sulphides, having gold-silver values. Samples from a number of open cuts for a distance of 250′ along the vein average 1.7% copper and 13.6 oz. silver, and the lead ore from these cuts carries 7.5% lead, 3% copper and 11 oz. silver for 4′ across, the full width of the vein not being disclosed. High-grade ore has also been found in several shallow shafts and cuts to the S. W., but the development does not permit a definite estimate of amounts.

Copper ore occurs in the Idanha or Mono vein, a great lode 20′ to 30′ wide with a dip of 55° to the south. This vein is parallel to the Park and 1-3 of a mile N. W. of it. It is a copper-bearing quartz pyrite vein, which resembles the old veins of the Butte district. It is developed by a 900′ tunnel, giving a 250′ back at the face. This tunnel cuts the ore at a point 600′ from the portal and crosses the vein at a slight angle, crosscuts exposing its full width. Eight samples show an average of 2.9% copper and 6 oz. silver per ton for 10′, there being a persistent hanging wall band and two other bands of sulphide ore.

The Aspen is an E.-W. cross vein, and is said to be faulted by the other system. It is 2′ to 5′ thick and has been exposed for 600′ by a drift tunnel, showing for this distance a 12″ pay streak of silicious ore carrying bornite, chalcopyrite and gray copper. This ore shows values of 0.9% copper, 40 to 60 oz. silver and $10 gold per ton.

The Mary-Montreal vein, developed by a 250′ tunnel; the Red Sky vein, opened by a 100′ shaft and long drift tunnel, and the Elkhorn vein, with half a dozen shallow shafts close together, all show high-grade oxidized silver ore. The Blue Eyed Annie vein is said to carry 15′ of $15 ore on the 200′ level. There are also half dozen other veins of promising outcrop, but slight development.

Development: officially stated in June, 1919, that $2,500,000 had been spent in exploration of the various properties.

The main working tunnel intersects the veins from 1,000′ to 1,200′ beneath their outcrops. This tunnel is 2,065′ long with branches east and west from near its face that intercept the Park and Idanha veins, the total tunnel workings aggregating 11,000′. The Idanha vein above the tunnel is estimated to contain 600,000 tons of milling ore, all of which can be mined through this double-tracked main haulage tunnel, capable of handling 15,000 tons daily.

High-grade ore was cut in the Blue Jay vein in December, 1919, and also in the Park vein, both on the 300′ level and below; 7′ of ore opened in the Central vein is said to show the following average assay: Gold, 0.45 oz.; copper, 6%; silver, 12 oz.; and lead, 20%, worth $59 per ton at early 1919 prices. This ore is to be sent to the Salt Lake smelters over the company's railroad, and O. S. L.

R. R. In September, 1919, a raise from 1,000′ level of the Idanha holed through to the upper tunnel, 640′ above, showing continuous ore.

Ore treatment tests made by the General Engineering Co. and O. B. Hoffstrand, of Salt Lake City, on two separate 100-ton lots show a ratio of concentration of 100 into 27.77 and 100 into 32.6 with a recovery in concentrate of—

Gold	$8.20	$14.60
Silver	48.21	44.33
Lead	7.25	14.63
Copper	14.70	7.20
Total value of concentrate per ton	$78.36	$80.78

A 500-ton mill, under construction, will be completed in July, 1920, and an additional 250-ton unit added thereafter.

The *French Gulch group* of claims includes 1,100 acres, patented, water rights to 5 streams and 15 miles of ditches and flumes. About $750,000 is said to have been spent in development. Claims have been opened up by shafts and tunnels, principally upon the Spain, Lucky Strike, Golden Crown and Leo. The work on the Spain consists of a 900′ tunnel and 200′ shaft, with 800′ of drifting on the 200′ level. The drift tunnel is about 350′ below the apex and shows the vein to carry from a few inches to 4′ of sulphide ore, averaging $17 a ton, according to estimates made by James E. Beveridge. Ore is said to be blocked out to the value of $500,000.

The Lucky Strike has a 200′ tunnel following a contact vein reported to be 20′ to 40′ wide, and 100′ shaft with 300′ of drifting on the vein whose thickness is reported to be 35′, with a paystreak of ore running from $41.50 to $80 gold, 5 to 7 oz. silver and 2½% copper.

The vein has been opened to the west by another 100′ shaft, with 600′ of drifting, showing an orebody 12′ wide averaging $18 a ton, according to the management. Eight hundred feet of tunneling on the Golden Crown claims shows a 1′ to 3′ vein said to carry $8 to $20 ore.

Besides these there are numerous smaller shafts and tunnels on the various claims in the French Gulch group.

A 35-mile power line was built from the Montana Power Co.'s line to the Elkhorn properties, in 1919.

The company's plans are bold and ambitious, but seem justified by the facts. The properties have long been known as promising, though hitherto unworkable for lack of railroad transportation. The management is competent, and deserving of high praise for its energy and ability in continuing work throughout the war-time period.

Montana Southern Railway.

Company controls the Southern Montana Railway, a narrow gage line from Divide on the Oregon Short Line (Union Pacific system) to the mine on Wise river, completed in October, 1919. Three locomotives are employed and the line can handle 2,000 tons of ore daily. This road will handle all freight for the settlements of the Big Hole valley, and should derive a considerable revenue from the transportation of lumber, milled along the road on Forest reserve ground and shipped to Butte and nearby Utah and Wyoming points.

Boston & Montana Milling & Power Co.

Sub. of Boston & Montana Dev. Co.

Inc. in Oct., 1916. **Cap.**, $250,000; $25 par; divided into 5,000 shares 7% preferred, all outstanding, and 5,000 shares common.

Boston & Montana Dev. Co. holds B. & M. Co. stock in treasury, agreeing to redeem the preferred stock at $27.50 a share, and to give one share of B. & M. D. stock as a bonus.

In December, 1919, $300,000 first mortgage 3-year, 6% convertible bonds were sold to shareholders.

Company was formed to provide money for the erection of a concentration-flotation mill, to treat ore developed in the big haulage tunnel.

The results of recent development work in the mine indicate that the mill will have to be enlarged to 1,000-ton daily capacity in the near future.

BOULDER MINING CO. **MONTANA**

Address: E. M. Cooper, Box 1136, Helena, Mont.

Property: the Evening Star silver-lead claims of 20 acres bonded to Andrew Lavich.

BROADWATER COUNTY MINING CO. **MONTANA**

Officers: J. J. Fisher, pres., Harlowton, Mont.; Len Jobb, sec.; John A. Matthews, treas.

Inc. 1910. **Cap.,** $225,000; $1 par.

Property: 7 claims, includes the Evening Star, Copper Glance and Lombard, about 5 miles west of Townsend, on the Radersburg road. Claims show promising outcrops and development is said to disclose veins 4′ to 12′ wide, with chalcocite ore assaying up to 60% copper, 6 oz. silver, with gold and lead. In 1918, management planned having property prospected and reported on with a view to resumption of operations in near future, but nothing recent available.

BUENA VISTA MINES CO. **MONTANA**

Officers: G. F. Russell, bus. mgr., 1303 Dean St., Spokane, Wash.; J. L. Magney, opr. mgr. Identified with the organization are W. P. Russell, J. D. Chickering, F. Leslie, J. Millspaugh, G. P. Larson, J. P. Boyd, G. F. Russell, D. K. McDonald, V. Rapp, Wm. Coleman.

Property: 3 patented claims, known as Buena Vista mine, Maxville, Granite county. Idle for 20 years until present company secured bond and lease. Principal values in silver.

BUTTE CONSOLIDATED COPPER MINING CO. **MONTANA**

Mine at Corbin, Mont. Idle and apparently waiting for developments in the Bertha mine of the Boston-Corbin Co. to prove this property. See Vol. XI, Copper Handbook.

BUTTE-JARDINE METAL MINES CO. **MONTANA**

Offices: 50 Broad St., New York City, and 33 W. Granite St., Butte, Mont.

Officers: W. H. Nichols, pres.; M. W. Acklemire, v. p.; L. M. Harley, sec.; D. E. Nichols, treas., with H. W. Barry, directors.

Inc. Jan. 10, 1917, in Montana. **Cap.,** $250,000; shares 25c par; 600,000 shares issued.

Property: 11 claims, at Jardine, Park county, said to have over 1,600′ of workings exposing gold-bearing veins that vary from 2′ to 36′ wide, and occur in pre-Cambrian schistose rocks.

The company was promoted and stock sold by W. H. Nichols & Co., New York.

BUTTE-KNICKERBOCKER MINING CO. **MONTANA**

Address: G. B. Conway, Helena, Mont.

No business done since 1907, as property reverted to original owners on account of failure to make deferred payments.

BUTTE & BOULDER MINE **MONTANA**

See Shields & Ironsides Mining Co.

BUTTE & ELLISTON GOLD & COPPER MINING CO. **MONTANA**

Merged into Evening Star Developing Co., which see.

Described, Vol. XIII.

BUTTE & GEORGETOWN MINING & MILLING CO. **MONTANA**

Office: The Napton, Butte, Mont.

Officers: Constant Rembaud, pres.; J. A. Nadean, v. p.; Orila Nadean, sec.-treas., with F. L. St. Jean (mgr.), and Franck Boucher, directors.

Inc. 1910, in Montana. **Cap.,** $1,000,000; par $1; assessable; 530,000 outstanding.

Property: 13 claims, 12 patented, total 881 acres of placer ground, to be worked for gold, platinum and sapphires. Inactive.

BUTTE VIPOND GOLD MINING & MILLING CO. **MONTANA**

Office: 91 Owsley Bldg., Butte, Mont.

Officers: Jas. M. Hinkle, pres.; Wm. Worth, v. p.; Wm. E. Carroll, sec.; T. P. Manley, treas.; also directors.

Inc. May 14, 1910, in Montana. **Cap.,** $600,000; $1 par; all issued. Annual meeting, third Tuesday in May.

Property: 5 claims, unpatented, at Vipond Park, Beaverhead county, 16 miles N. E. of Melrose. Carries a fissure vein, 4 to 8′ wide in granite, ore containing gold and copper of an average value of $18 per ton. Ore is oxidized to 200′, changing to sulphide below that depth.

Development: 200′ vertical shaft and 940′ tunnel.

Equipment: includes boiler and pump. Little work has been done on mine for some time.

CABINET RANGE MINING CORPORATION **MONTANA**

Address: S. A. Whiting, Libby, Mont. J. C. Langley, pres., Seattle, Wash.

Property: 9 claims, 40 miles S. of Libby, Lincoln county, between Bramble and West Fisher creeks. A stamp-mill of 100-ton capacity to be erected.

CABLE CONSOLIDATED MINING CO. **MONTANA**

Office: 52 Silver Bow Blk., Butte, Mont. **Mine office:** Cable, Deer Lodge county, Mont.

Officers: I. M. Fickeisen, H. Terheyden and S. Robinson, directors; Pittsburgh, Pa.

Property: 700 acres, 15 miles west of Anaconda, includes the Cable gold mine, in vicinity of the Southern Cross mine. Worked with varying success since 1870. Mine has produced about $4,000,000 worth of ore, with value mainly as gold, but has auriferous copper ore on the tunnel level.

Equipment: includes steam power, air-compressor and a 30-stamp mill. A reorganization as Cable Mining Corp'n was planned, at last accounts.

CALAMONT COPPER CO. **MONTANA**

Mine office: Norris, Madison county, Mont.

Officers: Walter V. Harrington, pres.; Wm. F. Davis, v. p.; Mark E. Davis, managing director; Hugh J. Leonard, sec.; Thos. F. Hogan, treas.; preceding officers, Jas. Keller and F. G. Crist, directors.

Inc. Nov., 1909, in Arizona. **Cap.,** $5,000,000; shares $10 par; non-assessable. Apparently is connected in management with the Montana-Hecla Mining Co.

Property: 22 claims, 380 acres, include the Old Colony group, adjoining the Montana-Hecla, 5 miles southeast of Norris, carrying auriferous and argentiferous copper ore.

Development: includes several shallow shafts, with an old 100′ 2-compartment shaft on the Big Jack claim, and a 160′ tunnel, with about 900′ of workings. Not regarded favorably by late H. J. Stevens. A report on the property made by Reeves Davis, 1911, recommended development of 2 surface outcrops. Mark Davis, former manager, reported to be protecting the property with a view to re-financing the company, at last accounts.

CAPE NOME COPPER MINING CO. **MONTANA**

Office: 1 Dixon Bldg., Missoula, Mont. **Mine office:** Clinton, Mont.

Officers: Edw. Donlan, pres.; F. H. Woody, v. p.; H. T. Wilkinson, sec.-treas.-gen. mgr.; with A. L. Coffey, directors.

Inc. Nov., 1906, in Montana. **Cap.,** $1,000,000; shares $1 par; issued, 924,000. Annual meeting, first Monday in June.

Property: 3 claims, patented, 40 acres, adjoining the Aladdin Mining Co., show 4 fissure veins in granite 1 of 8′ average width, traceable 800′, being opened by 500′ double compartment, vertical shaft, and 4 crosscut and 5 drift tunnels, with 3,750′ of workings.

Equipment: includes two 60-h. p. boilers, a 40-h. p. hoist and a 12-drill air-compressor. There are 6 buildings.

The mine considered promising, though idle for several years, but efforts were being made in 1919 to resume operations.

CARBON HILL MINING & MILLING CO. **MONTANA**

F. S. Earnest, Spokane, Wash., chief owner.

Property: 9 claims, in the Grass Valley section, 1 mile north and west of Fort Harrison, Helena, shows a vein for 2,300′.

Development: by 250′ incline shaft, to be sunk to 400′ at last accounts, showing 5½′ of carbonate ore and galena, said to assay $48 per ton. Value is chiefly in the gold content. A 15′ shaft with 20′ drift, shows a 9′ vein of carbonate ore said to assay from $23 to $111 per ton. Has a 60-h. p. gasoline hoist.

Two carload shipments yielded $23 and $11 per ton respectively.

CASCADE SILVER MINES & MILLS. **MONTANA**

Address: Neihart, Mont.

Officers: G. Hale Brabrook, pres.; Lowndes Maury, v. p.; W. R. McLure, sec.; W. P. Wren, treas.; with J. C. Fairchild, W. J. Creeden, and Paul A. Gow, directors. Thomas Westgard, supt.

Inc. Jan., 1918, in Montana. **Cap.**, $1,000,000; $1 par; 800,000 issued. Annual meeting in January. Cash on hand, April 1, 1919, $53,318.

Property: 9 patented claims, include both the old Moulton mine and the Broadwater group at Neihart, Mont.; examined by W. J. Creeden and Paul A. Gow. Mining geology of district described by W. H. Weed, in U. S. Geological Survey report on Little Belt Mountains.

Geology: ores occur in fissure veins in gneiss; the veins are 3 to 8′ wide, dipping 78° and run N. 18° E. Shoots are from 150 to 200′ long. Ore is a complex sulphide, but easily milled, carrying 20 oz. silver, 5% lead, and 3% zinc.

Development: by 500′ vertical shaft and 3,000′ tunnel, opening the Moulton to depth of 500′ and Broadwater to 1,200′. Underground workings total 15,000′. The Moulton was unwatered by April, 1919, and large bodies of milling ore and considerable smelting ore exposed, the latter returning from $1,500 to $2,500 per carload. Ore is mined by back filling system. Reserves comprise 100,000 tons blocked out and 300,000 tons probable ore. The Broadwater tunnel was cleaned out and exploration started in May, 1919.

Equipment: 350-h. p. steam hoist, boilers, 1,000 cu. ft. compressor, 200-gal. electric pump, 2 aerial trams, and 200-ton mill with a 5-cell Minerals Separation flotation plant, started February, 1919.

Production: from May 1 to Dec. 31, 1918, 174 oz. gold, 108,629 oz. silver, and 470,000 lb. lead. Ore averaged 75 oz. silver per ton. Sales of ore realized $95,002, and in first 2 months of 1919, $77,045. With silver at $1.30 the possibilities of profitably working these old properties seem good.

In June, 1919, a suit was started by Paul A. Gow against the other directors to compel them to return the 150,000 shares illegally voted themselves for alleged services.

CASTLETON COPPER CO. **MONTANA**

Company probably dissolved as property was sold in 1917 for $150,215 to Furnace Creek Oxide Copper Co. See Vol. XIII for description of Castleton Copper Co.

CAYUGA DEVELOPMENT CO. **MONTANA**

Office: 616 Lyceum Bldg., Duluth, Minn. **Mine office:** Divide, Silver Bow county, Mont.

Officers: C. T. Fitzsimmons, pres.; Nels Anderson, v. p.; E. J. O'Rourke, sec.; Max P. Shapiro, treas.; John Helehan, gen. mgr.; preceding officers, Jacob Stein and Jas. L. Norman, directors.

Inc. April 4, 1910, in Minnesota. **Cap.**, $150,000; $1 par; issued, 65,000.

Property: 4 claims, 80 acres, in the Fleecer district, 15 miles southwest of Butte, near the Oregon Short Line railway.

Geology: property shows granite with dikes of porphyry, aplite and quartzite, carrying veins with a generally E.-W. strike, main vein being estimated to range 50 to 125′ in width, traceable for 2,000′, carrying cuprite melaconite, malachite, azurite, chrysocolla, chalcopyrite, chalcocite and bornite.

Development: by 100′ tunnel, and shafts of 45′, 125′ and 150′, showing ore assaying up to 30% copper, and from a trace to 70 oz silver per ton. The 125′ shaft has crosscuts of 150′ and 180′, cutting the vein for an apparent width of 30′. The vein at this depth is nearly vertical. Idle, and no work reported done for many years.

CHICAGO & ALTA EXTENSION MINING CO. **MONTANA**

Office: H. P. Skiles, pres.; 22 N. State St., Chicago, Ill. F. I. Foote, mgr., Helena, Mont., and Corbin, Mont.

Officers: Dr. H. P. Skiles, pres.; H. H. Ebert, sec., Helena, Mont.; Sheldon Leavitt, treas.; with F. I. Foote, J. E. Smith, E. F. Rinear and Arthur Dole, directors.

Inc. Oct., 1907, in Montana. **Cap.,** $600,000; $1 par; $10,000 in treasury.

Property: 2 claims, 36 acres, at Corbin, Jefferson county, adjoining the Boston & Corbin Mng. Co. property on the E., shows fissure veins in granite. The veins are from 1′ to 10′ thick, averaging about 4′, and carry lenticular shoots of copper, silver and lead ore, reported to assay $48 per ton, as shipped.

Development: by 900′ shaft with crosscuts and drifts cutting 4 ledges on 900′ level. Also has a 1,200′ tunnel. Underground workings total 2,000′.

Equipment: 50-h. p. electric hoist and compressor.

All work was done through the Boston & Corbin shaft, crosscutting the entire claim and reported to have cut 5 veins. Ore was milled in the B. & C. concentrator, which was burned,.

COEUR D'ALENE PACIFIC MINES CO. **MONTANA**

Defunct several years. See Vol. XIII of this work.

COMET MINING & MILLING CO. **MONTANA**

Office: Coeur d'Alene, Idaho. **Mine:** near Whitefish, Flathead county, Mont.

Officers: Dr. Max A. Dorland, pres.; Fred Eppinger, v. p.; J. H. Wiggert, sec.; at last accounts.

Inc. 1909. **Cap.,** 1,000,000 shares.

Mine is developed by a short tunnel, but is presumably idle.

CONSOLIDATED CENTRAL BUTTE COPPER CO. **MONTANA**

Office: care R. M. Cobban, sec., Butte, Mont.

Officers: R. R. Jones, pres.; R. H. Wearing, v. p.; D. J. Charles, treas., and E. E. Hershey, directors.

Inc. Oct. 29, 1906, in Montana. **Cap.,** $1,200,000; shares $1 par; assessable; issued 446,000 shares. At last report had levied 3 assessments, aggregating 6¼ cts. per share, or about $28,000. Annual meeting, second Thursday in January.

Property: a third interest in the North Star, South Star and January claims, patented, and mineral and mining rights on 110 acres of patented placer claims. The claims are developed by a 225′ shaft, said to show an orebody 3 to 6′ wide. Idle several years for want of working capital.

CONREY PLACER MINING CO. **MONTANA**

Office: Ruby, Mont.

Officers: C. F. Adams, 50 State St., Boston, Mass., pres.; F. F. Stanley, 79 Milk St., Boston, secretary-treasurer; G. H. Edmunds, Ruby, Mont, business manager; O. O. Sweeney, Ruby, Mont., dredge superintendent.

Inc. in 1898.

Property: extensive placer claims in the Alder Gulch district, Madison county, Mont.; about 80 miles by rail from Butte. Described in detail in Bull. 121 of U. S. Bureau of Mines, 1916.

Equipment: up to 1916 has cost $1,200,000, advanced largely by the late Gordon MacKay and a few shareholders. There are 4 electric dredges, though since 1918 only 2 have been in operation. A few details of the electric dredges are of interest.

	No. 1	No. 2	No. 3	No. 4
Year built	1908	1908	1906	1911
Monthly returns, cubic yards	96,270	62,709	82,415	300,000
Power consumed, h p	380	380	460	1,235
Depth of digging below water, feet	30	35	45	55
Capacity of buckets, cubic ft	7½	7½	9½	16 to 17
Gold-saving area, square ft	1,231	1,231	1,264	3,000
Cost of boat	$108,000	$128,000	$198,999	$296,000

No. 4 boat has dug as much as 411,000 yards in a month. It weighs 2,000 tons.

Power is supplied by the Madison River power plant, 26 miles away. Over $50,000 has been spent on a machine-shop, and over $60,000 of spares and supplies are kept on hand. On the dredges 36 men have been employed; and 49 in other departments.

Production: from 1899 to 1916 a total of 37,000,000 yards had been dug, yielding 16c per yard, or $5,920,000. From 1906 to July 31, 1915, the quantity moved was 31,379,890 yards, at a total cost of 6.96c per yard.

This has been one of the most profitable dredging enterprises in America, but will soon be worked out. Many dredge improvements, now generally in use, have been devised by the Conrey Company. By the will of Gordon MacKay, Harvard University benefits largely from the profits made at Alder Gulch.

COOKE MINING & REDUCTION CO. **MONTANA**

Property: near Cooke, Park county.

Developed: by tunnels, showing auriferous and argentiferous copper ores. Has a small steam plant. District is remote from transportation, being on N. E. border of the Yellowstone Park.

Idle at last accounts.

COPPER AGE & EDISON MINING CO. **MONTANA**

Idle. **Officers:** Chas. J. Heidenreich, Spokane, Wash., pres.; Morton Webster, Wallace, Idaho, sec.-treas.; L. N. Hyde, supt.

Inc. 1906, in Washington. **Cap.,** $250,000.

Property: 12 claims, 4 miles south of Saltese, is an eastern extension of the Richmond mines, carrying extension of copper-bearing outcrop of that mine, the vein paralleling the Monitor. The vein is exposed for 700′ in the tunnel just east of the divide; it averages 10′ thick, is nearly vertical and carries a very little chalcopyrite and chalcocite in a siderite gangue.

Development: includes a main 1,160′ crosscut tunnel, with back of 600′ showing sulphide ore assaying up to 30% copper, and $14 gold per ton. No work has been done since 1916, but company contemplated resuming operations at last report.

COPPER MILL MINING CO., LTD. **MONTANA**

Office: Wallace, Idaho.

Officers: Morton Webster, pres.; A. T. Ryan, v. p.; P. L. Eberhardt, sec.-treas.; preceding, with Howard K. Welch and Jas. Howarth, directors.

Inc. March, 1908, in Montana. **Cap.,** $250,000; shares 25c par; non-assessable.

Property: 7 claims, 125 acres, in the Sunrise district, near Quartz, Missoula county, on the Montana side of the Montana-Idaho divide, showing an altered zone of highly silicious rocks of 25′ to 50′ width, carrying fine disseminations of copper carbonates and sulphides. Mine has a 75′ tunnel, showing ore said to be somewhat similar to that of the Snowstorm, and assaying about 4% copper.

Idle at last accounts.

COPPER KING MINING CO. **MONTANA**

Address: Cooke City, Park county.

Property: the King and Queen group, developed by tunnels, showing an extensive orebody, with fair value in gold. No recent data available.

COPPER MOUNTAIN MINING & DEVELOPMENT CO. MONTANA

Office: Mullan, Idaho.

Officers: John Hendricksen, pres.; A. B. Willard, v. p.; D. Flynn and John Foss, directors.

Inc. 1906, in Idaho. **Cap.,** $1,500,000; shares $1 par. Annual meeting, 2nd Tuesday in December.

Property: 5 claims, one fractional, 95 acres, with 3 adjoining claims, at the head of Copper creek, near Thompson, Sanders county, Mont. Mine has 2 tunnels, the upper a crosscut, deflected for 56′ along the vein, said to be 25′ wide, carrying pockets and seams of copper carbonates, with gold and silver. Idle at last account.

COPPERSMITH MINING & MILLING CO. MONTANA

Address: Lothrop, Mont.

Inc. Jan. 23, 1909, in Idaho. **Cap.,** $3,000,000; $1 par; issued, 2,200,000.

Property: 8 claims, unpatented, 160 acres, the Coppersmith group of 6 claims and the Inverness group of 2 claims, also a water right and millsite, about 6 miles up Petty Creek from Lothrop. Property carries some good timber. The Coppersmith claim shows limestone and quartzite for an estimated width of about 400′, and length of about one-half mile, with outcrops yielding 3 to 20% copper ore.

Development: by prospect shaft and crosscut tunnel, said by management to cut merely 300′ of silicified limestone averaging 1% copper. Property also has a number of open cuts and pits, and a 50′ shaft, bottomed in ore estimated to average better than 6% copper, with small gold and silver values. The Coppersmith was formerly reported to show 3 main veins, one reported to be over 100′ wide at surface, with ore assaying 2 to 3% copper. The Exty vein, parallel with and 500′ from the Coppersmith, is reported as 15′ wide.

The Inverness group, 3 miles from Lothrop, has a vein of 3′ to 4′ wide, in quartzite and slate, carrying malachite, chalcopyrite and chalcocite, giving assays of 15 to 17% copper and $10 to $12 per ton in combined gold and silver values. Property has 4 buildings.

Idle except for annual assessment work.

CORBIN COPPER CO. MONTANA

Office: 60 Congress St., Boston, Mass. **Mine office:** Butte, Mont.

Officers: R. M. Edwards, pres. and gen. mgr.; Henry Tolman, treas.; Newton, Mass.; with S. L. Powers, Jos. C. Walker and T. S. Woods, directors; A. L. Wyman, sec.

Inc. Dec. 24, 1908, in Michigan. **Cap.,** $3,750,000; shares $25 par; assessable; amount issued, 130,000 shares; amount outstanding, 26,000 shares; amount in treasury, 124,000 shares; $8 per share paid in. Company sold 15,000 shares of treasury stock, early 1910, at $10. Federal Trust Co., Boston, registrar; American Trust Co., Boston, transfer agt. Stock is listed on the Boston Curb. Annual meeting, third Tuesday in April.

Three assessments levied: $65,000 due February 11, $65,000 due April 22, $130,000 due November 14, 1913. Poor response was made to these and the company was forced to borrow $95,000 on its notes, giving, as guarantee, the unpaid assessments. Owing to lack of funds all work was stopped on Corbin property early in 1914.

Statement filed in May, 1919, with County Clerk at Butte showed property and other assets of $672,665, and liabilities of $86,596, all unsecured.

Property: company owns 57 mining claims, 45 patented, near Corbin, in Jefferson county. The 3 claims at Butte were sold to the Anaconda company.

The Corbin group lies at the head of Clancy Creek, a few miles west of Corbin, on the western side of an andesite hill across from the Boston & Corbin mine. This property carries several strong fissure veins in andesite on which considerable exploration work has been done with dis-

appointing results. A vein opened for 800′ in the Rosalie tunnel carries up to 20 oz. silver and 7% copper, but is only 18″ wide.

The Montana tunnel shows a pyritized conglomerate with andesite, dacite and aplite cobbles, the matrix containing small silver values in the upper tunnel, while the winze in the lower tunnel shows considerable pyrite. The Bonanza tunnel is driven on a tourmalinized granite dike in andesite, and in places the tourmaline rock carries galena and chalcopyrite with small amounts of zinc-blende and pyrite.

CORBIN-COPPER KING MINING CO. **MONTANA**

Office: State Savings Bank, Butte, Mont. **Mine address:** Corbin, Jefferson county, Mont.

Officers: W. H. Hall, pres.; W. D. Gibson, v. p.; R. M. Depeu, sec.-treas.; preceding officers, I. A. Heilbronner, Wm. Gemmell, and M. H. Schultze, directors.

Inc. 1911, in Montana, as successor to the Montana-Corbin Copper Co. **Cap.,** $1,000,000; shares $5 par; issued, 199,994 shares. Stockholders of the Montana-Corbin Co. received a new share for old on payment of 25 cts. a share.

Property: 2 claims, 26 acres, about 1 mile from Corbin, in Picnic Gulch, shows 4 well-defined veins carrying bornite and chalcopyrite averaging about 10% copper, 20 oz. silver and 50 cts. gold per ton.

Development: consists of a 2-compartment shaft, 400′ deep, with about 500′ of workings on the Hidden King claim. There are also several short tunnels.

Equipment: includes two 60-h. p. boilers, a 15-h. p. hoist, a 5-drill electric air compressor.

A full report on this property was made, 1911, by Alfred Frank, supplementing earlier reports by E. P. Jennings, and L. S. Ropes.

Idle since organization.

CORBIN METAL MINING CO. **MONTANA**

Office: Pittston, Pa. **Mine office:** Corbin, Jefferson county, Mont.

Officers: J. H. Foye, pres.; John Hoy, v. p.; Thos. McLaughlin, sec.; M. W. O'Boyle, treas.; at last accounts.

Inc, 1907, in Montana, as Corbin-Montana Copper Co., changing name, Jan., 1910, to present title. **Cap.,** $1,000,000; $1 par; issued, 400,000. Company apparently is a twin of the Jefferson-Montana Copper Mines Co. Annual meeting, second Tuesday in April.

Property: 11 claims, 176 acres, known formerly as the Baldwin mine, 2 miles S. E. of Corbin, in the Colorado district, shows 5 fissure veins ranging from a few inches to about 8′ in width, cutting granite. Ores carry chalcopyrite, bornite and galena, estimated by company to average 4% copper, 8% lead, 5 oz. silver, and $2 gold per ton.

Development: by 500′ 2-compartment incline shaft with considerable drifting on 500′ level, cutting a small orebody carrying lead-zinc-copper sulphides, and by several short tunnels.

Equipment: includes electric hoist, good for 1,000′ depth, and a 10-drill air compressor. There are 6 buildings, including carpenter shop, smithy and change house.

Idle several years.

CORBIN-VALPARAISO COPPER MINING CO. **MONTANA**

Presumably defunct. See Vol. VI, Copper Handbook.

CRUSE CONSOLIDATED MINING CO. **MONTANA**

Property transferred to Thomas Cruse M. & D. Co., which see.

CUPRITE COPPER MINING CO. **MONTANA**

Office: Helena, Mont.

Officers: P. L. Reece, pres. and mgr., Helena, Mont.; J. B. Waltz, v. p.; F. J. Rixon, sec.-treas.; with P. B. Moss, Geo. M. Sipley, directors.

Cap., $300,000; $1 par.

Property: 10 patented claims, about midway between Helena and

Marysville, Mont. Two well-defined veins on property; one, a gold-silver-lead vein, 4′ to 20′ wide, the other, a gold vein of promise.

Development: by 200′ shaft, 100′ of drifting on this level, and a winze 100′ deep, with 340′ of drifting on the 300′ level, which will cut the quartz vein at depth of 340′.

Equipment: includes a steam hoist and air compressor.

CURLEW MINE **MONTANA**

Address: care A. M. Holter, owner, Helena, Mont.

Property: at Victor, Ravalli county, Mont. Was formerly a silver producer, but contains zinc ore, and a vein claimed to be 12′ wide, is said to show ore carrying 10% copper, with some lead, silver and gold. A concentrating mill with flotation unit to treat 85,000 tons of tailings was worked successfully, 1917. Financed by Los Angeles capitalists.

DAILEY COPPER MINING & SMELTING CO. **MONTANA**

Address: Wickes, Mont. Wm. W. Dailey, pres.; A. R. Robertson, v. p.; C. H. Dailey, sec.

Inc. Feb., 1907, in Montana. **Cap.,** $1,500,000; $1 par; issued, 870,000, of which amount 800,000 shares paid for the property, is held intact.

Property: the Atlas group of 4 claims, patented, 25 acres in town of Wickes, Jefferson county, said to show well-defined fissure vein in andesite. Vein runs E.-W and is of 12′ estimated average width, carrying lenses of ore showing chalcopyrite, bornite and chalcocite, estimated by management to average 3% copper, 12 oz. silver, and $1 gold per ton, 20% iron, 18% sulphur and 50% silica, without lead or zinc.

Development: a 340′ shaft, with 2,000′ of workings on vein, said to show 70,000 tons of ore blocked out.

Former owners shipped about $30,000 worth of ore. An independent source estimates ore to average about 3% copper, 7 oz. silver and 80 cts. gold per ton.

Reports made and property endorsed by F. L. Sizer, and Potter, Dickman & McKenzie.

Idle for several years, owing to inability to finance the erection of a concentrator.

DARBY MINING AND MILLING CO. **MONTANA**

Office: Mullan, Idaho.

Officers: M. J. McHugh, pres.; C. D. Miller, v. p.; S. C. Bean, sec.-treas.; N. C. Sheridan, mgr., with J. A. Ghormley, directors.

Inc. March, 1907, in Idaho. **Cap.,** $1,000,000; shares $1 par; 400,000 issued.

Property: 10 unpatented claims, 200 acres, near Keystone, Sanders county, Mont., 4½ miles from a railroad, said to show a fissure vein in quartzite carrying lead and silver.

Development: by 3 tunnels 175, 375 and 670′ long, opening vein at depth of 55, 155 and 450′, respectively. Mine is a prospect.

DENNEMORA GOLD & COPPER MINING CO., LTD. **MONTANA**

Property: 6 lead and copper claims, one-half mile from N. P. R. R., near Taft, Mineral county, Mont. Described Vol. X.

According to Oscar Nordquist, manager, operations were resumed in 1918 and the vein has been opened for 600′, and a 200′ shaft put down, at 450′ from portal with a crosscut to the vein.

DIVIDEND MINING CO. **MONTANA**

Corporate existence lapsed.

DURANT MINING & SMELTING CO. **MONTANA**

Address: Spring Gulch, via Martinsdale, Mont. C. M. Durant, supt.

Property: 14 miles from Martinsdale, Meagher county, shows fissure-veins carrying copper sulphide ore with gold.

Developed: by 200′ 2-compartment shaft. No recent returns secured.

EAST COEUR D'ALENE MINING CO. **MONTANA**

Address: H. P. Hogan, Mullan, Idaho.

Officers: H. P. Hogan, pres.; W. J. Hughes, v. p.-mgr.; Mrs. L. M. Westervelt, sec.-treas.; with T. A. Westervelt, directors.

Cap., $150,000; 10c par.

Property: 14 claims, 3½ miles N. of Haugan, Mineral county. **Development:** tunnels totaling 1,324′ have opened some 8% copper, ½ oz. gold, and 3 oz. silver ore.

EAST PACIFIC MINING CO. **MONTANA**

Address: Box 122, Helena, Mont.

Officers: R. A. Bell, pres.; O. N. Kessler, v. p.; W. A. Dickinson, sec.; A. L. Smith, treas.; with N. Gage, directors.

Inc. in Arizona. **Cap.,** $1,000,000; $1 par; 556,118 shares issued. Annual meeting 1st Saturday in April.

Property: 8 patented claims, 139 acres, and a millsite, 5⅛ miles from Winston, Broadwater county, and 20 miles S. E. of Helena, reported to show a fissure vein in andesite, carrying gold, silver, lead values. Ore said to run $7-10 a ton.

Development: by 4 tunnels, longest 3,300′, and by a 134′ winze. Equipment includes 75-ton mill, pump and compressor.

Property: worked by lessees only for several years, but reported under option to D. M. Adams, of Spokane, in 1918.

No recent returns.

EASTERN BELLE MINING CO. **MONTANA**

Address: Helena, Mont.

Officers: Geo. Huffaker, pres.; S. T. Hill, v. p.; Geo. H. Hill, sec.-treas.

Inc. 1916. **Cap.,** $100,000; shares $1 par. Bought the Eastern Belle mine from Helena Bureau of Mines.

Property: 2 claims, 40 acres, in the Scratch Gravel camp, near Helena Claims show quartz, carrying free gold.

Management planned to sink incline shaft several hundred feet, at last accounts.

EAST SPRING HILL MINING CO. **MONTANA**

Address: 630 Munroe Ave., Helena, Mont.

Officers: A. H. Kleinschmidt, pres.-treas.; M. Kuphal, v. p.-sec., with F. H. Hillehecht, directors.

Inc. Jan. 20, 1914, in Montana. **Cap.,** $40,000; 10c par; 100,050 issued. Annual meeting first Monday after first Tuesday in January.

Property: 7 claims, 140 acres, between Grizzley and Oro Fino gulches, 4 miles S. of Helena. Ore occurs in contact vein with diorite wall and carries $4 or $5 per ton in gold.

Development: by shaft to depth of 180′, and 1,500′ of tunnels, total of 2,000′ of workings. The president writes that over $40,000 has been spent and property is for sale. The same owners are operating at Landore, Idaho, as the American Mining Co., Ltd.

ECLIPSE ARGO MINING CO. **MONTANA**

Defunct—property lost. **Address:** E. G. Hoffman, sec.-treas., New Britain, Conn. Eclipse Argo mine near Argo, Broadwater county, Mont. was lost by bondholders foreclosing and in April, 1913, deeds were given to trustee for entire property. In 1918 the Furnace Creek Oxide Copper Co., bought 51% interest in this mine, for $150,000.

ECONOMY GOLD MINES CO. **MONTANA**

Address: East Helena, Mont.

Officers: J. L. Kessner, pres.; S. Rosenfield, v. p.; I. Rosenfield, sec.; S. L. Joseph, treas.; directors. C. E. Freyberger, supt.

Inc. in Montana. **Cap.,** $1,500,000; shares $1 par; 280,000 issued.

Property: 180 acres, patented, 6 miles from East Helena, shows 15 fissure veins in diorite, andesite and granite. Chief vein has an E.-W. strike, with 75° dip. Ore, containing gold, silver and copper, occurs in shoots said to average 3′ in width and from 35′ to 150′ in length.

Development: by 2 shafts about 300′ deep. Ore developed on 300′ level

is same shoot of high-grade ore stoped on the 100′, but wider and varying from $10 to $235 per ton.

Equipment: includes boilers, 3 gasoline hoists, two 75-h. p. compressors, complete electric equipment and a 150-ton concentrator built during 1918-1919.

ELKHORN QUEEN MINING CO. **MONTANA**

Mine at Elkhorn, Jefferson county, Mont., was idle many years.

Lessees at last report were stoping ore, said to be 30′ wide, from the 300 level. Shipments made to East Helena smelter.

EVA MAY MINE **MONTANA**

Basin, Mont. Was owned by Betty Alden Mng. Co., now dead.

EVENING STAR DEVELOPING CO. **MONTANA**

Address: H. C. Cooney, Butte, Mont.

Officers: C. M. Joyce, pres.; R. E. Strasberger, v. p. and supt.; H. C. Cooney, sec.-treas.; also directors.

Inc. Sept. 28, 1918, in Montana. **Cap.,** $50,000; $1 par; none issued.

During 1918, ore sold netted $924 and operating expenses were $6,200.

Property: 5 claims, 1 patented, in Nigger Hill, Elliston district, Mont., formerly owned by the Butte & Elliston G. & C. M. Co. Examined by A. F. Monroe and E. J. Strasberger.

Geology: claims contain a fissure vein in diorite as well as a "blanket" deposit. Ore streak is 8″ wide, and consists of a complex sulphide assaying 20% lead, 7% zinc, 1 oz. gold, and 26 oz. silver per ton.

Development: by 300′ vertical shaft, and 1,200′ tunnel. Greatest depth is 485′, and workings total 1,350′. Ore is mined by underhand stoping.

Equipment: steam hoist and compressor. A one-mile aerial tram is to be erected.

Company started work in June, 1918, and shipped 26 tons of $35 ore in that year.

FARRELL COPPER CO. **MONTANA**

Office: Butte, Mont.

Officers: Dr. Donald Campbell, pres.; I. A. Heilbronner, v. p.; J. D. Slemons, treas.; A. T. Morgan, sec.; with W. C. Lewis, W. H. Hall, and Daniel Tewey, directors.

Inc. July 24, 1906, in Montana. **Cap.,** $1,000,000; shares $2.50 par.

Property: 17 acres, in the S. E. part of the Butte district, has a 200′ shaft, sunk jointly with the Alliance Copper Co. Crosscut on the 200′ level shows a little ore carrying copper, lead, zinc, and silver. Inactive.

FLATHEAD DEVELOPMENT CO. **MONTANA**

Address: Gen. Chas. S. Warren, 73 Hirbour Blk., Butte, Mont., and Coram, Mont.

Officers: C. S. Warren, pres., with L. O. Evans and John M. Murphy, of Butte, Fred Oliver and V. D. Williamson, of Spokane, and Dr. W. H. Campbell and A. Ingraham of Kalispell, directors.

Property: Big Copper, Nos. 1, 2, 3 and 4 and Noble Copper claims covering veins 10′ to 20′ wide, on Felix Creek, a tributary of South Flathead river, 30 miles south of Coram, a station on the G. N. R. R.

Work stopped in 1917, because of the great distance from rail and the high cost of opening the property.

FRANKLIN MINING CO. **MONTANA**

Described Volume XIII.

Mine transferred to Thomas Cruse M. & D. Co., which see.

FURNACE CREEK OXIDE COPPER CO. **MONTANA**

Office: John E. Corrette, sec., Hennessy Blk., Butte, Mont. L. A. Stadler, supt., Argo mine, Canyon Ferry, Lewis & Clark county, Mont. Daniel Courteny, supt., Corbin, Mont.

Officers: Chas. W. Goodale, pres.; John D. Haines, v. p.; John E. Corrette, sec.-treas.; with A. H. Jones and R. C. Monahan, directors.

Inc. Oct. 23, 1906, in Arizona. **Cap.,** $1,000,000; $1 par. Indebtedness, January 1, 1919, $15,500 in notes signed by directors..

Company was organized to operate a mine in the Death Valley district, Inyo county, Cal., but which proved of little value.

In 1918 paid $150,215 for a 51% interest in the Eclipse-Argo mine in Hell Gate canyon, about 30 miles E. of Helena, Mont., a property formerly owned by the Eclipse-Argo Co., producing 2,000,000 lb. of copper, 1903 to 1916, and later (1916) was owned by the Castleton Copper Co. In June, 1919, the control of the Legal Tender silver mine at Clancey was acquired by the Furnace Creek company. It is an old and once very productive mine.

Property: the Argo group consists of 5 claims, 2 patented, traversed by a well-defined fissure vein, up to 18″ thick, cutting through shale and limestone, at an angle of 75 to 80°. Ore is massive chalcopyrite assaying 25% copper. Reported on in 1916 by F. A. Linforth.

Mine shut down December, 1918.

Development: by 200′ Argo shaft, to be sunk another 100′, and several tunnels, workings totaling over 3,000′, opening the mine to depth of 400′. The vein probably extends through the Argo and Lamont claims, a distance of 2,750′, but only 500′ has been explored.

Equipment: 8¼-mile electric transmission-line from Montana Power Co. at Canyon Ferry, has reduced power costs as much as $2.76 to $7.50 per ton of ore; mine has hoist and other machinery; the mill, though not yet equipped for fine crushing and flotation, is to be remodelled.

Production:

Period	Ore and Concts. tons	Copper %	Copper lb.	Smelter return
Jan., 1917-Dec. 31, 1918.... (Furnace Creek O. C. Co.)	2,498	25.49	1,273,603	$220,975
Mar., 1916-Jan., 1917..... (Castleton Copper Co.)	1,307	26.03	680,449	141,073
Oct., 1902-May, 1909..... (Former owners)	2,018	27.57	1,112,658	150,000
Total	5,823	26.33	3,066,710	$512,049

Up to October 1, 1918, costs of the Furnace Creek company totaled $11.92 per ton of ore, or 18.997 cents per lb. of copper.

Tailing dumps at the mill amount to 12,000 tons averaging 0.6% copper, which will be leached.

Property though small is considered good, and well managed.

GIRARD COPPER CO. MONTANA

Officers: George J. Kirby, pres., Willimantic, Conn.; Geo. R. Grantham, sec., Kimball Bldg., Boston, Mass.; E. C. Denton, supt., Warm Springs, Mont.

Inc. 1912, in South Dakota. **Cap.,** $10,000,000; shares $10 par; 601,120 issued; 501,000 shares pooled. Admitted to quotation on Boston Curb, for 91,020 shares; January, 1913. Annual meeting in January. First Nat'l. Bank, Boston, registrar; Ex. Trust Co., Boston, transfer agents.

Property: 20 claims, partly patented, 400 acres, 5 miles from Warm Springs and 10 miles N. W. of Butte. Ore occurs as a sulphide in 5′ fissure-quartz vein, between monzonite and aplite, assaying 4-8% copper, 6 oz. silver and 2 oz. gold.

Development: by 60′ Jack Pot shaft and 150′ tunnel. Assessment work only done.

GISH CHROME MINE MONTANA

Address: W. D. Marlow, Bigtimber, or O. V. Miller, Contact, Mont. Financed by Shelby Gish.

Property: 13 claims, 250 acres, 34 miles up the Boulder river from Big timber, Sweet Grass county. Ore consists of chromite in serpentine, 3 to 12′ wide, opened by 140′ and 160′ tunnels to depth of 90′.

Equipment 10-stamp mill with concentrators erected in 1919; $13,000 spent on property in 1918. O. V. Miller, superintendent, places reserves at 800,000 tons, an absurd figure for a chromite deposit. The Bonanza group of claims was sold to Barker & Purdy of Great Falls for $50,000, and the Miller & Roland group to Gish and Marlow of Colorado, for $75,000. The latter also took over the Bonanza group later on. Two carloads of ore were sent to Denver in 1918.

GLADSTONE MINES & REDUCTION CO. **MONTANA**

Address: A. F. Dow & Co., 10 State St., Boston, Mass.

Officers: Charles Stoddart, pres.; L. R. Davidson, v. p.; Dr. F. J. Carr, sec.-treas.; with W. F. Sikes, J. H. Carr, W. M. Decker, and E. H. Hechler, directors.

Inc. in Arizona. **Cap.**, $1,000,000; $1 par.

Property: 8 patented claims, 12 miles from Sheridan, Madison county.

Development: on the Gladstone claim consists of four tunnels, known as the 900, 700, 650 and 570′; levels are connected by raises, said to block out ore to the value of $200,000. The vein is from 12 to 60″ wide, and ore carries gold and silver in proportion of 9 to 1. Ore assays from $8.65 to $101.36 per ton, the average being from $15 to $20.

Equipment: includes a 10-mile electric transmission-line bringing power from Virginia City; two 150 h. p. and several small motors; 12 drill compressor, tramway and a complete 125-ton mill consisting of crusher, Hardinge ball-mill, Dorr classifiers, etc., cyanide plant, filter, and dwellings.

The prospectus and accompanying letters indicate that most of the directors are physicians or druggists of Buffalo, N. Y., who appear to have invested personally. The circular states: "This ore is actual gold value, like so much wheat in an elevator waiting to be ground into flour," and "it is a conservative statement that our mines will not be exhausted in 50 years of operation." "As a rule there is more value below than above." "At the last calculation we should be able to divide $700 per day among the shareholders—more than 30% per year." "We have a clean financial slate." Though the efforts of this company to make a profitable mine seem to be sincere they arouse suspicion by the publication of such absurd statements and estimates which are not at all likely to be fulfilled.

GOLD CROWN MINING CO., LTD. **MONTANA**

Probably dead. Described Vol. XII.

GOLD HILL MINE **MONTANA**

Address: Frank Eichelberger, supt., Melrose, Mont.

Owned by J. J. Edson, Jr., 2206 First Natl. Bank Bldg., Pittsburgh, Pa.

Property: 10 claims, 3 patented, in "Highland" section, Moose Creek district, 20 miles south of Butte, shows gold-quartz vein averaging $6.50 per ton, with payshoot 20′ thick and 300′ long in granite.

Development: by 500′ incline shaft, at 10° dip with total of 1,400′ of workings. 50,000 tons of ore developed. Has steam power and 50-ton mill.

No recent data available.

GOLDEN CURRY CONSOLIDATED MINING CO. **MONTANA**

Property: the Sour Dough group, 9 claims, 162 acres, near Elkhorn, Jefferson county, Mont. Orebody 100′ wide is oxidized, lying between limestone and granite and dipping at 45°. Claims said to show 5 orebodies, 2 being developed. Ore is iron oxide carrying low values in gold and copper. It contains chalcopyrite and tenorite, such ore assaying 1.9% copper, 4 oz. silver and 0.35 oz. gold per ton, with 48% excess iron. Geology and history of property given in Bull. No. 527, U. S. G. S., Helena Mining Region, pp. 136 to 139.

Development: by open cuts and tunnels; total workings said to be 8,200′.

Was under lease May 1, 1917 to the A. S. & R. Co., which gave it up November 1, 1917, owing to depletion of orebody. During 1918, lessees mined 335 tons of ore assaying 0.75 oz. gold, trace of silver, and copper, 52% iron, and 16% insoluble, sold as a flux to the East Helena smelter.

GOLDEN EAGLE MINING & MILLING CO. MONTANA

Address: Mullan, Idaho. J. L. Martin, sec.

Officers: Emil Lennarson, pres.-mgr.; Frederick Hartkorn, v. p.; J. L. Martin, sec.-treas.; with John Rolin and W. Hutchinson, directors.

Inc. Feb. 14, 1919, in Idaho. **Cap.**, $1,000,000; par $1; assessable; 600,000 issued. Annual meeting February 14.

Property: 9 claims, 180 acres, at Keystone, Mineral county. Ore carries lead and silver, and has been opened by 75 and 200′ tunnels. A prospect.

GRAND VIEW MINING & DEVELOPING CO. MONTANA

Probably dead as letters sent to Twin Bridges, Madison county, Mont., are returned unclaimed.

Property: molybdenum-bearing claims, 11 miles E. of Twin Bridges, said to show a vein of porous and well-crystallized cerussite heavily impregnated with iron oxide, containing ½ to 1% crystallized wulfenite (molybdate of lead). Ore also carries gold and silver.

Development: little work done to date and commercial value of deposit not known. Concentration may be complicated.

GRANITE BI-METALLIC CONSOLIDATED MNG. CO. MONTANA

Office: 821 Security Bldg., St. Louis, Mo. **Mine office:** Phillipsburg, Mont.

Officers: J. P. Meyer, pres.; E. S. Orr, 1st v. p.; J. P. Hartnett, 2nd v. p.; F. D. Fusz, sec.; G. J. Tansey, treas., with C. G. Ewing, L. S. Mitchell, L. M. Rumsey, Jr.; A. L. Shapleigh, W. C. Uhri, and J. H. Dieckman, directors. R. S. Blitz, act. supt. and Charles Bielenberg.

Inc. April 6, 1898, in Montana. **Cap.**, $10,000.000; $10 par.

Property: over 2,500 acres at Phillipsburg, Granite county, Mont. Is a merger of Granite Mountain and Bi-Metallic properties, which yielded over 4,000,000 oz. silver per annum in early days, total output being $50,000,000, of which $14,000,000 was distributed as dividends. Decline in price of silver resulted in practical suspension of work.

Geology: fissure veins in granite, adjoining a large area of limestone. Best ore-shoot is said to be 4,400′ long. Ore is mostly sulphide containing silver with accessory gold and copper values.

Development: by 3 shafts to 1,800′ depth, and 2 tunnels, longest 8,800′. Greatest depth of workings, 2,250′.

Equipment: old mill partly dismantled and full mining equipment, etc.

Recent work being done is by 60 lessees, although in 1919, 2 shafts were sunk to 1,000′ to prospect for the manganese area, where zinc-silver ore is expected. In October, 1918, the new hoist bought for one of the new shafts was sold to the Jib Mining Co., of Basin.

Present company has made a courageous attempt to open virgin ground in the hope of developing new orebodies comparable with those which made the district famous. Despite a large expenditure for machinery and development work, results to date are unsatisfactory.

GREAT FALLS-BARKER MINING CO. MONTANA

Address: Hughesville, Mont.

Officers: S. R. Jensen, pres.; H. H. Roberts, sec. and mgr.; W. M. Johnson, treas.

Inc. 1916, in Montana. **Cap.**, $250.000: shares $1 par.

Property: Liberty group of claims in Barker district, Cascade county, Mont., with past yield of $30,000.

Ore: contains lead, zinc, gold, and silver. A flotation plant was to be erected in 1918, but no recent returns secured.

GREAT NORTHERN COPPER CO. MONTANA

Probably dead; letters sent company, returned unclaimed.

Property: the Great Northern mine, 1 mile north of Tava, Flathead county, Mont.

Development: by several tunnels, 200′ to 500′ long, on the strike of the vein. **Ore:** principally gold and copper.

GREAT WESTERN MINING & MILLING CO. **MONTANA**

Idle and probably dead as letters sent former address, Chico., Mont., were unclaimed in 1919. H. F. Lawrence, mgr. at last accounts.

Property: 6½ miles from Chico Hot Springs, Park county, Mont., at 7,500′ elevation. Nearest railroad is at Emigrant, 10 miles away.

Development: tunnel reveals a brecciated and somewhat altered, fine-grained, light-gray porphyry in which fine-grained molybdenite intimately associated with pyrite forms the matrix and permeates the individual fragments of brecciated material. Ore contains 5% molybdenite, and deposit is extensive.

A mill using flotation was erected, 1917, but no recent news is available.

HAMILTON-MONTANA GOLD MINING CO. **MONTANA**

Idle. **Office:** Richard Daxon, mgr., Hamilton, Mont., at last reports, but letters returned unclaimed 1919.

Property: company owns group of claims in Mineral county, Mont.

Development: by 400′ crosscut, driven to intercept a vein of copper and lead ore.

HECLA MINES **MONTANA**

Address: Glendale, Beaverhead county, Mont.

Property: the Atlantic, Cleves and other mines, formerly owned by the Hecla Consolidated Mining Co., which for 20 years was a large producer of silver and lead, with considerable gold and copper, latter reaching 100,000 lb. fine copper yearly. Property paid dividends of $2,250,000 on an original investment of $40,000, but was bought, 1906, at sheriff's sale, for $28,000. About 65 men employed for a year or two, but the little ore found was low-grade, and the mine was again closed down, and abandoned, after some $300,000 had been spent.

Mine worked by lessees until 1912, when it was taken over by the Longmaid Bros. of Helena, who installed electric power.

In 1917, G. B. Conway of Helena had an option on the property and was to sort the dumps and re-open mine.

HELENA MINING BUREAU, INC. **MONTANA**

Address: L. M. Rheem, sec.-treas. and mgr., Helena, Mont.

Officers: S. A. Balliet, pres.; M. H. Gerry, Jr., v. p., with E. N. Brandegee, F. M. Smith, J. P. Bahnsen, C. E. Dalton, and T. O. Hammond, all of Helena, directors.

Inc. April, 1914, in Montana. **Cap.,** $100,000; shares $5 par; 8,000 shares outstanding. Annual meeting 2nd Monday in January.

Bureau was formed for the purpose of advertising and creating a renewed interest in mining industries in the Helena district. Each citizen, who wished to do so, subscribed $5 a month, receiving a share of stock for each subscription for the term of three years or longer. This public enterprise has been most beneficial to the mining industry of the Helena district and many newcomers have taken advantage of the mining opportunities.

In January, 1917, the Helena Mining Bureau took over the operation of the Helena mine, located in Grass Valley district. This mine is fully equipped with a 300′ shaft and made regular shipments of lead-silver-gold ore in 1917 and 1919. Now owned by the Thomas Cruse M. & D. Co., which see.

HEMLOCK SILVER-LEAD MINING CO. **MONTANA**

Address: Saltese, Mont. Walter J. Hughes, pres.; Peter Peterson, v. p.; W. L. Murray, H. C. Thomas, sec.; with W. W. Lee and G. H. Lawrence, directors.

Inc. 1907, in Montana. **Cap.,** $150,000; 10c par; assessable.

Property: 3 claims on Packer Creek, 1½ miles from Saltese, Mineral county.

Development: by 1,500′ of tunnels, a 150′ shaft with crosscut 220′ to the lode, which is claimed to be 60′ wide and to carry silver and lead ore.

Friction in the company is said to have delayed operations. In 1916, the mine was worked and shipments made.

HIDDEN TREASURE GROUP **MONTANA**

Address: W. J. Stephens, owner, Missoula, Mont.

Property: 9 patented claims in the Wallace district, near Clinton, Missoula county, said to show 5 veins with gray copper and bornite ores averaging 2 to 20% copper, $2 to $4 gold, and 2 to 20 oz. silver per ton, as sorted for shipments.

Development: mainly on Hidden Treasure and Cascade claims, includes 2 tunnels in a steep mountain side, uppermost 558′ on vein claimed to be 50′ wide. Ore cut 80′ from portal and extends to face. Lower tunnel, 1,400′ long, follows the east vein, said to be 50′ wide. Crosscuts develop 1 other vein of 13′ width and drifts have opened up some rich spots and several hundred feet of concentrating ore. Total work 3,600′. Shipments began 1899 and ceased in 1907, and property has had but little development since.

HIGGINS & BIELENBERG MINE (H. & B.) **MONTANA**

See B. & H. Mines & Mill.

HIGHLAND COPPER CO., LTD. **MONTANA**

Out of existence. Described in Vol. XIII.

HIGHLAND CONSOLIDATED MINING CO. **MONTANA**

Office: 414 Daly Bank Bldg., Butte, Mont.

Officers: C. A. Hanswirth, pres.; J. T. Bluff, v. p.; W. G. Hoage, sec.-treas.; with Dr. T. J. B. Shanley and R. S. Booth, directors.

Inc. June 27, 1919, in Montana. **Cap.,** $500,000; par $1; 260,000 issued for payment of property. Annual meeting 1st Tuesday after 1st Monday in October.

Property: company owns the Gold Run and 5 other quartz claims, and has an option on 11 others, 22 miles S. of Butte. The Highland district was first opened in 1865 and produced much gold. The Only Chance, held under option, is said to have yielded $1,000,000 from workings only 500′ deep; the Three Ply claim also under option is equipped with a 5-stamp mill.

Development: a 2,000′ tunnel is being driven to cut veins in Nevin hill at depths of 300 and 800′. Face is said to be in a highly-mineralized zone.

Company is banking on past records which it is to be hoped will be equalled.

HOMESTAKE MINING CO. **MONTANA**

Address: H. V. Edwards, Wallace, Idaho.

Cap., $1,000,000.

Property: on Trout creek, 22 miles W. of Thompson Falls, shows good copper ore. A hoist, compressor, and other equipment is in use. Mine was working at last accounts.

HORSE SHOE MINE **MONTANA**

Address: John McMillan, Superior, Mont.

Property: 70 acres, patented, 12 miles S. W. of Iron Mountain, Mont. This is a placer project equipped for hydraulicking and producing a little gold.

HUGO GOLD & COPPER MINING CO. **MONTANA**

Address: Saltese, Mineral county, Mont.

Officers: Richard W. Seideman, pres.; A. G. Kearns, v. p.; A. G. Seideman, sec.-treas., wth A. B. Atwater and Peter Weber, directors.

Inc. 1907, in Idaho. **Cap.,** $1,000,000; 10c par; assessable; 770,000 issued.

Property: 3 claims, carrying the extensions of the Boston-Colby vein system, next E. of the New York & Brooklyn mine, and one-half mile E. of Saltese. Claims carry 2 parallel veins, 300′ apart, 1 about 15′ wide, said to show copper carbonates, bornite and chalcopyrite, giving assays, from selected specimens of 2-57% copper. The second vein, proven by trenching, is said to be 12′ wide, and to carry a 3′ paystreak of ore assaying 12% copper, 6 oz. silver, and $8 gold per ton.

Development: by 195′ drift tunnel, 50′ winze, 60′ shaft and a 750′ crosscut tunnel, with 600′ farther to go to reach the first vein.

Equipment: water turbine with 14′ head of water, and 2-drill compressor.

Still a prospect, in which Eastern capital was reported interested, August, 1919.

IDAHO-MONTANA MINING CO., LTD. **IDAHO-MONTANA**

Officers: Walter H. Hanson, pres.; E. H. McConnell, v. p.; Harry Harris, treas., with F. P. Miller, directors; Harlan L. Heward, sec., at last accounts.

Inc. Aug. 18, 1905, in Idaho. **Cap.,** 1,000,000 shares; 10 cts. par; assessable; 386,349 shares outstanding. Annual meeting 1st Saturday in September.

Property: 10 claims, unpatented, 200 acres in Shoshone county, Idaho, and Sanders county, Mont., showing lead-copper-silver ore in quartz veins. Developed by 1,200′ tunnel to depth of 540′.

In October, 1919, work was resumed in the Monitor tunnel, a crosscut being driven to cut the westerly extension of the Richmond vein at a depth of 1,200′; company is to do this jointly with the Richmond company.

ILLINOIS GOLD MINING & MILLING CO. **MONTANA**

Address: E. G. McAnulty, sec., Carthage, Ill.

Officers: R. H. McAnulty, pres.; E. G. McAnulty, sec.-treas., with Dr. A. Saley, M. M. Wallace, and J. F. Williams, directors.

Cap., $1,000,000; par $1.

Property: 143 acres, patented, in West Fisher district, Lincoln county. Ore carries gold and silver. Only assessment work being done.

INDEPENDENCE COPPER GROUP **MONTANA**

Address: G. F. Stannard, Kalispell, Mont.

Property: 4 claims, 1 patented, 8 miles N. E. of Eureka, Lincoln county. Tunnels total 860′. Ore contains 3.5% copper, $1 gold, and 3 to 6 oz. silver per ton. Not in operation at last accounts.

INDEPENDENCE COPPER-GOLD-SILVER MNG. CO. **MONT.**

Address: Deer Lodge, Powell county, Mont.

Officers: I. S. Eldred, pres. and gen. mgr.; C. H. Williams, v. p.; E. Scharnikow, sec.; C. E. Larabie, treas.

Inc. 1907, in Montana. **Cap.,** $900,000; shares $1 par. Assessments to date 10 mills per share.

Lands: 120 acres in the Oro Fino district, 12 miles S. of Deer Lodge and 5 miles E. of 2 railways, include the old Independence mine located 1870, which is a patented tract of 102 by 2,200′. Examined in March, 1917, by Lucian Eaves.

Development: includes shafts and tunnels, one being 550′ long, and showing vein entire length, from 2 to 4′ wide, carrying gold and silver. The last 20 tons shipped assayed $20 gold. Ore can be concentrated 3½ into 1 giving concentrate with excess of iron.

Property is for sale or lease and bond, 1919.

INDIAN QUEEN MINING & SMELTING CO. **MONTANA**

Letters unclaimed at office, Butte, Mont. Mine near Apex, Beaverhead county, Mont.

Officers: Thos. F. Stephens, pres., treas. and gen. mgr.; Wm. Robertson, v. p.; Thos. W. Ellis, sec.; A. H. Stephens and T. J. Ellis, directors, at last report.

Inc. July, 1904, in Montana. **Cap.,** $450,000; shares $1.50 par; nonassessable; issued, $228,000.

Property: the Indian Queen mine, 2 claims, 40 acres, and a 3-acre millsite, in the Utopia district, Beaverhead county, owned jointly by this company and the Anaconda Copper Mining Co. The mine shows granite, intrusive in quartzite and dolomite, having 2 contact deposits between granite and limestone, of 8 to 10′ average width, carrying malachite, azurite and chalcocite, estimated by management to average 8% copper, 10 to 12 oz. silver and $1 to $4 gold per ton. Mine was opened 1867, and has been worked intermittently by lessees.

Development: by shafts of 150′ and 220′, and 820′ tunnel, with about 1,600′ of workings. Idle at last accounts.

INTER-MOUNTAIN COMPANY **MONTANA**

Office: 26 Pittsburgh Bldg., Helena, Mont.

Company is a mining exploration and exploitation organization incorporated in 1909, to develop a large silver mine somewhere in Montana, and officers state that it has gold mines to sell.

INTERMOUNTAIN COPPER MINING CO. **MONTANA**

Address: Wallace, Idaho. **Mine office:** Iron Mountain, Mineral county.

Officers: Edward Evans, pres.; R. G. McIntosh, v. p.; F. C. Dacufer, sec.-treas., with James Neilson and J. F. Callahan, directors. E. C. Gnaedinger, supt.

Inc. 1915, in Montana, to take over the holdings of the Amador Copper & Gold Mining Co. **Cap.,** $2,000,000; $1 par; assessable. 1,621,800 issued. An assessment of 1c was levied in November, 1918, others in March and June, 1919.

Property: 6 patented and 9 unpatented claims on Cedar creek, 10 miles S. of Iron Mountain, Mont., said to show a vein of copper and silver ore in quartzite, dipping 60° with E.-W. course. Shoots are from 2′ to 11′ wide. Average assay of sorted ore is 15% copper.

Development: by tunnels, shaft, etc., totaling over 8,000′. A 4′ to 6′ orebody was opened on the 400′ level for 250′, carrying good copper ore and a 100′ winze sunk on this shoot in July, 1919. Reserves are given as at least 30,000 tons.

Equipment: includes a 2-mile flume and pipe-line, delivering water under a 310′ head, steam power, with 2 hoists, compressor, pumps, saw-mill, and about 15 mine buildings. A 100-ton concentrator, employing a Callow flotation unit, treats the ore.

Production: $100,022 in 1917, making $212,714 in all, plus shipments worth $2,000 or over per carload at intervals in 1918 and 1919.

Future outlook is considered good.

INTERNATIONAL MINING CO. **MONTANA**

Office: Bozeman, Gallatin county, Mont.

Officers: J. W. Wilcox, pres.; S. J. V. B. Henderson, v. p.-treas.; Samuel F. Walker, sec.-gen. mgr., with Harvey M. Farriss and A. Badgley, directors, all of Bozeman, Mont.

Inc. Oct. 2, 1902, in Montana. **Cap.,** $600,000; shares $100 par; fully paid and non-assessable.

Property: 12 claims, 240 acres, well timbered, in Springhill mining district, Gallatin county, Mont., said to show gneiss, quartzite and shale, fissure and contact veins, opened by 380′ to 1,800′ tunnels, and 5 shafts of 80′ to 800′, showing sulphide ores.

Company developing an ore shoot, at last accounts, said to carry 26% lead, 8 oz. silver, and $8 to $67 gold per ton. The Lone Star group adjoining the International is practically under the same ownership. Letters to company unanswered.

IOWA-MONTANA DEVELOPMENT CO. **MONTANA**

Probably dead; letters sent former address, Fraser, Iowa, and mine address, Jefferson Island, Madison county, Mont., returned unclaimed.

Officers: at last accounts, T. J. McGinnis, pres.; F. H. Hoeffner, sec.; E. H. Daniels, treas.; all of Fraser, Iowa, and John Young, J. D. Morrison, F. Wood, directors. J. D. Morrison, mgr., Butte, Mont.

Inc. June, 1915, in Iowa. **Cap.,** $75,000; shares $50 par. Is a leasing company. Company obtained a 3-year lease, 1915, on the Bismark mine of the Montana-Illinois Copper Mining Co., which was absorbed in 1918 by Liberty-Montana Mines Co. The Iowa Mountain is probably out of business.

IRON MASK LEAD MINING CO. **MONTANA**

Address: Troy, Mont.

Officers: G. F. Stannard, pres.; H. W. Dickey, v. p.; Robert Gregg, sec.

Cap., $150,000; $1 par; assessable.

Property: 4 claims, 10 miles S. of Troy, showing veins carrying zinc, and lead-silver ore, also manganese. Development by tunnels. Leased to G. L. Goshow, of Indiana, at last accounts.

IRON MOUNTAIN TUNNEL CO. **MONTANA**

Purchased in July, 1915, by Federal Mining and Smelting Co., which see.

IRONSIDE MINE **MONTANA**

Owned by Sheils & Ironside Mining & Milling Co., which see.

JARDINE GOLD MNG. & MLG. CO. **MONTANA**

Address: Silver Bow Block, Butte, Mont.

Officers: W. S. Hunnewell, pres.-treas.; H. C. Bacorn, v. p.-gen. mgr.; with J. E. Stevenson and F. W. Bacorn, S. D. Bacorn (sec.), directors.

Inc. 1914, in Arizona. **Cap.,** $2,000,000; $1 par. The company has no bond issue or debts and is financed for all current needs.

Property: 26 claims, 23 patented, containing 353 acres, at Jardine, Park county, Mont. Title was obtained by present company in 1917, workings cleaned up and re-timbered, and new development work done adding largely to ore reserves.

Geology: quartz veins in schist, with general north and south strike and westerly dip. Ore is partly oxidized and partly arsenopyrite.

Development: over 3 miles of underground workings including 21 crosscut tunnels and drifts on veins.

Equipment: includes belt-driven compressor, 150-ton stamp-mill and cyanide plant for gold ore, 20-ton concentrator for tungsten ore, hydro-electric plant now generating 325 h. p., all machinery at mines and mills being operated by electric power; offices, residences, boarding-house and bunk-houses for employees.

Production: the 20-ton concentrator was operated for the first six months of 1918, producing tungsten concentrates, together with crude tungsten ore, of a value of $52,000. During the latter half of 1918 the concentrator treated 3,500 tons of gold ore that ran from $10.03 to $12.98 per ton. Employs 60 men, normally. Is a promising property.

JEFFERSON MONTANA COPPER MINES CO. **MONTANA**

Address: Corbin, Jefferson county, Mont. C. K. McCormick, pres.; P. A. Bell, supt.

Property: 16 patented claims, in Colorado mining district, 3 miles from Corbin, shows fissure veins, 3-5′ wide in granite. The course of the orebody is N. E.-S. W., with dip of 60-70°. Developed to depth of 540′ by vertical shaft, and electric power installed.

No recent information available.

JEWEL MINING & MILLING CO., LTD. **MONTANA**

Office: 436 Peyton Bldg., Spokane, Wash.

Officers: C. E. Morby, pres.; C. C. Baldwin, v. p.; J. A. Powers, sec.

Cap., $250,000; 25c par; non-assessable.

Property: 10 claims and millsite, 1½ miles from Eddy, and 36 miles E. of Burke, Idaho. Examined by F. C. Calkins and D. F. McDonald. **Geology:** 20′ vein is in quartzite and shale. Three shoots of silver-lead ore have been opened. **Development:** is by tunnels, one 1,300′ long. **Equipment:** 2-drill compressor, oil engine, jackhammers, pump and living quarters for 25 men.

JIB MINING CO. **MONTANA**

Address: Basin, Jefferson county, Mont.

Officers: A. E. Spriggs, pres.; M. L. Hewett, v. p. and mgr.; C. G. Weidinger, sec.; Sol Ganzenberger, treas., with J. F. Cowan, and A. E. Spriggs, directors; O. F. Brenton, supt.; F. K. Derby, cons. eng.

Inc. Nov. 19, 1917, in South Dakota. **Cap.,** $3,000,000; $3 par; 600,000 issued. Security Transfer Co., New York, transfer agent and registrar. Annual meeting, third Wednesday in November.

Property: the Hope, Katie and Jib mines, 17 claims, patented at Basin, Mont. Group has been idle for 20 years, after producing $2,000,000. Reported by owners that 400,000 tons of ore is blocked out. Claims show a fissure vein in

granite, 30′ wide, with ore that assays 1½% copper, $2 to $4 gold, and 4 to 10 oz. silver. Examined by A. A. Blow, A. L. Pierce, R. M. Atwater, Jr., F. K. Derby, W. G. Nebeker and J. C. Adams.

Development: by vertical shaft 600′ deep, and 6,000′ of workings. Some rich ore was opened on the hanging wall, August, 1919, near water-level, 35 tons yielding $13,374, and 620 pounds, $6,200. The average from this place is said to be $150 per ton, but this rich ore is irregular in occurrence.

Equipment: includes electric power obtained from the Montana Power Co.; two 600-gal. centrifugal mine pumps, 250-h. p. hoist, bought from the Granite Bi-Metallic Company, and two 2,300 cu. ft. compressors. The old mill is to be re-built and modernized by adding a flotation plant of 2 units, making daily capacity of 600 tons.

Company has been financed by Utah capital. Ore was being mined for shipment in October, 1919.

KALISPELL-TROY MINING CO. **MONTANA**

Address: Kalispell, Mont.

Officers: D. R. Peeler, pres.; G. F. Stannard, v. p.; A. W. Peeler, sec.-treas., with T. S. Hand, J. W. Carey, J. Brinkhouser, W. Hogan and Stanley Wood, directors.

Cap., $60,000; 20 cents par.

Property: 21 claims, 13 miles W. of Troy, 1 mile from Leonia, Idaho. Ore carries lead, silver, and zinc. No recent data available.

KEATING GOLD MINING CO. **MONTANA**

Address: J. A. Murray, Butte, Mont.

All the property was sold under mortgage foreclosure in July, 1917, and in July, 1918, the statutory year for redemption had expired. Property was bid in by J. A. Murray, Butte, Mont., who was the holder of company's bonds, and company is entirely without cash or assets of any kind, but has not been dissolved. Thus ends the life of a company that spent six years mining a strong vein with good values, producing several million dollars worth of ore, but without a profit to the company. See description in Vol. XIII.

KING & QUEEN MINING CO. **MONTANA**

Address: Keystone (formerly known as Carter), Chouteau county, Mont.

Officers: G. T. McCullough, v. p.; John F. Hinckley, sec.; H. A. Spangler, treas.; C. H. McHeffry, supt. in charge.

Inc. Feb. 22, 1905, in Montana, practically as a reconstruction of the Montana Mining & Development Co. **Cap.,** $1,000,000; shares $1 par.

Property: 15 claims, partly patented, 188 acres and a 20-acre millsite, well timbered, 3½ miles from Keystone, the nearest rail point, in the Spring Gulch district, 9 miles N. W. of Superior. Property carries limestone, quartzite and shale with contact deposits between quartzite and limestone. The deposit under development, of 8′ estimated average width, shows copper, lead and silver ore with malachite, chalcocite, chalcopyrite and galena, reported to average 4.5% copper and 12 oz. silver per ton with gold content ranging up to 8 oz. per ton.

Development: by 1,200′ crosscut tunnel opening up 4′ of 4.6% copper ore that carries 9 oz. silver and 11% lead. This tunnel, planned to be driven 1,600′, has cut the vein 460′ below the old workings and intersects several veins. A 200′ raise gives ventilation with the upper workings now abandoned. The main workings total 5,000′.

Equipment: includes an 80-h. p. boiler, 25-h. p. hoist, 6-drill duplex air compressor and 125-ton mill. There are several small mine buildings and a sawmill.

Production: in 1913 was 40 to 50 tons daily, shipped to Utah smelters. Development work was in progress, 1916-17. No recent returns received.

KING SOLOMON MINING CO. **MONTANA**

Company dead for 5 years, but property reported reopened, 1919. See description, Vol. XIII.

LADYSMITH COPPER MINING CO. **MONTANA**

Company dissolved. Fully described Vol. XII. Formerly operated near Elliston, Powell county, Mont.

LAST CHANCE COPPER MINING CO. **MONTANA**

Probably dead; letters sent officials returned unclaimed.

Officers: Geo. Champagne, pres.; Dr. T. C. Witherspoon, treas., Murray Hospital, Butte, Mont., at last accounts.

Cap., $1,200,000; shares $1 par.

Property: 2 claims, patented, adjoining the Ben Hur mine, 4 miles north of Saltese, Mineral county, Mont.

Developed by shallow shafts and a 2,300′ tunnel, the workings said to show a 30′ vein, faulted in the tunnel, but a winze shows an 18″ streak of ore said to carry about $100 per ton in values. Company reported past shipments of about $150,000, one carload giving returns of 13.6% copper, 394 oz. silver and $12 gold per ton. Tunnel was driven in 1915-16 to reach the rich oreshoots from which shipments were made.

LEE MOUNTAIN MINE **MONTANA**

Address: W. Lee Heidenrich, Rimini, Mont.

Property: 6 patented claims at Rimini, under lease to Morton Webber and W. Lee Heidenrich, in September, 1918.

Geology: a quartz vein in quartz-monzonite, dipping 70° with course S. 70° W. Ore is a sulphide carrying 0.15 oz. gold, 12 oz. silver, 6% lead, and 4% zinc.

Development: by 1,200′ tunnel to depth of 660′, and 3,000′ of workings. **Equipment:** steam power, compressor, pump, etc.

Production: $1,500,000 in past 40 years. Lessees, in 1918, found small orebody and shipped $15,000 worth of ore in July and August.

LEGAL TENDER MINING CO. **MONTANA**

Control under option to Furnace Creek Oxide Copper Co.

Address: Daniel Courtney, supt., Clancey, Jefferson county, Mont.; or J. H. Heilbronner, v. p., Butte, Mont.

Property: a famous old silver producer near Clancey. This is now being reopened, developed and fully equipped with electrically-driven mine machinery. Shipped rich ore in 1919 to Anaconda.

LEROY GOLD & COPPER MINING CO. **MONTANA**

Office: Wallace, Idaho. **Mine office:** Saltese, Mineral county, Mont.

Officers: Hon. Herman J. Rossi, pres.; G. F. Dann, v. p.; C. E. Clark, sec.-treas., with Wm. Fissenger and Chas. Bollinger, directors.

Property: adjoins the Monitor mine, and survey for the extension of the Monitor tunnel runs through this property. Assessment of 2 mills per share called August, 1915, and development resumed after several years of idleness.

LEVIATHAN GOLD MINING CO. **MONTANA**

Address: James A. Flint, sec., Pony, Madison county, Mont.

Mine is held under $70,000 bond and lease, on which payments were made as due in 1919.

Property: 6 patented claims, 105 acres, at Mammoth, Madison county, carried an E.-W. vein with 45° dip, cutting through gneiss. Vein shows 4′ to 20′ of copper-silver ore with gold values.

Development: by 700′ tunnel and 2,000′ of workings giving depth of 400′.

Equipment: includes hydro-electric power plant, compressor, and 100-ton concentrator.

Appears to be another name for Leviathan Copper Mining Co., controlled in Waterloo, Iowa. A report by W. H. Winchell estimated reserves at 12,000 tons of $30 ore on dump and twice that amount blocked out in mine. His sampling gave ore content as 2.7% copper, 4.1 oz. silver and $17.20 gold per ton. Mine is an old one, located 1864. Company is developing property as well as mining and shipping ore.

LIBERTY COPPER CO. **MONTANA**

Office: J. F. Ferguson, Wallace, Idaho.

Officers: F. J. Luedke, pres.; Charles Luedke, v. p.; J. F. Ferguson, sec.-treas., with C. B. Spear, directors.

Cap., $150,000; 10 cents par; assessable; 800,000 issued. Annual meeting, third Monday in June.

Property: 8 claims, 160 acres, near the Amazon-Dixie mine, Mineral county, Mont., shows quartzite cut by a fissure vein with auriferous copper ore. Worked by tunnels. A prospect that was closed down in 1919.

LIBERTY METALS CO. **MONTANA**

Address: Troy, Mont.

Officers: G. M. McKenna, pres.; J. T. Sugars, v. p.; J. F. Powers, sec.-treas.; also directors.

Inc. May 10, 1919, in Montana. **Cap.,** $500,000; $1 par; 325,000 issued. Annual meeting, third Tuesday in August.

Property: 8 claims, 150 acres, 51 patented, 5 miles south of Troy, Mont. About $6,000 has been spent on property to date.

Geology: main vein is a contact between a diabase dike and Burke quartzite, and has been traced on surface for 2,200′. Ore carries gold, silver, copper, lead and manganese. Ten other veins are said to be exposed and to vary from 6 to 48″ wide.

Development: by 3 tunnels totaling 250′ in length. A steam plant, compressor, and drills are to be installed.

A prospect in which some rich ore was reported opened up in 1919.

LIBERTY MINING CO. **MONTANA**

Formerly Mike Horse Mining Co., reorganized May, 1919.

Address: J. O. Hamilton, Peyton Bldg., Spokane, Wash.

Property: the Mike Horse mine, 9 claims, at Silver Camp, Lewis and Clarke county, 40 miles N. of Helena, Mont., containing lead-zinc-silver-copper ore. Mine worked 40 years ago for high-grade silver ore, but abandoned because ore became base.

Development: by 3,400′ of tunnel work on 5 veins, including Mike Horse vein, reputed to have 55,000 tons of proven ore assaying 15% lead, 10 oz. silver, 12.5% zinc, 1% copper and 60c gold per ton. A new tunnel, 130′ below the old workings, was being driven at last report.

Equipment: 100-ton concentrator, etc. Mine is a considerable distance from rail, teaming supplies costing $14 per ton.

Production: in 1916 was 325 tons silver lead ore netting $12,700; none reported since. See O. & M. Mines Co., Vol. XIII of this publication.

LIBERTY-MONTANA MINES CO. **MONTANA**

Address: B. W. Wilson, Box 510, Butte, Mont.

Inc. 1918, in Montana. **Cap.,** $3,000,000; $1 par.

Company was organized to buy, develop, and operate mines, and was to absorb the White Chief Copper Co., and Montana-Illinois Copper Mining Co.; the property of latter company was under lease to the Iowa-Montana Development Co. until June, 1918.

Property: (1) lease and option on Mammoth gold-copper mine, 17 miles from Jefferson Island, Madison county; (2) the Bismarck mine, 10 claims, millsites, and placer ground, 20 miles from Jefferson Island, and (3) the White Chief mine, 8 claims, near the Bismarck. Water and timber are plentiful. Country is mountainous.

Development: the Mammoth mine worked by tunnels shows strong veins cutting schists and gneiss, and carrying free-milling gold ore near surface changing at 200′ in depth to chalcopyrite ore with gold and silver values, averaging $28 per ton.

The Bismarck claims show granite and gneiss cut by 3 fissure veins, with N.-W. strike, and of about 4′ average width. Ores carry chalcopyrite and bornite and are estimated by management to average 5% copper, 2 oz. silver, and $1 gold per ton. Flotation concentrates average 22% copper. Development of the Bis-

marck group is by tunnels of 400′, 200′, 500′ and 1,900′, with over 3,000′ of workings.

The White Chief claims, in the Whitehall district, show veins developed by a 600′ upper and 100′ lower tunnel carrying copper, silver, lead and gold ore. A drift at depth of 82′ disclosed a 5′ ore streak assaying 13% lead and $14 gold.

Equipment: an electric transmission-line from the Madison Power Co.'s line extends to the Mammoth mine, 7 miles distant, and will be extended 4 miles to the Bismarck and White Chief, the cost of power being $35 per h. p. a year. An aerial tram is planned to carry ore from the two mines to the Mammoth mill.

Mammoth mine has 6-drill compressor, and 100-ton mill, with flotation unit, concentrating 11 tons into one.

Company has 2 fair mines, but is rather too optimistic as to returns from the Mammoth mine.

LITTLE GOLDIE MINE — **MONTANA**

Address: M. R. Ostronick, Twin Bridges, Mont., owner and mgr.

Property: 3 claims, 54 acres, in Goodrich Gulch, Madison county, Mont., said to show 2″ to 18″ fissure veins, running E.-W., and assaying as high as $114 in gold, silver and lead. Ore occurs in gneiss and limestone formation.

Development: by 200′ tunnel, several drifts, and raises.

Equipped: with compressor.

Shipments: in 1915, reported to have averaged $80 per ton, amounted to $30,000. Owner estimated 6,000 tons of ore blocked out, at last report.

LIVERPOOL SILVER MINES CO. — **MONTANA**

Offices: No. 11 Montana Bldg., Helena, Mont.; and 27 State St., Boston, Mass. William Murray, supt.

Officers: J. W. Brien, pres.; J. F. Quinn, v. p.; J. E. Simpson, treas.; with Ralph Rawlings, C. E. Fryberger, cons. eng.; H. M. Ferry, P. E. Wagner, R. T. Hollis, C. Z. Potter, C. J. Trauerman, Joseph Reinham, H. S. Hirschman, C. H. O. Meyer, H. G. Gallagher and Frank Eichelberger, directors. W. J. Burns, sec.

Inc. May 17, 1919, in Delaware. **Cap.,** $250,000; par 10c; non-assessable; 2,250,000 issued. Metropolitan Trust Co., Boston, transfer agents and registrar. The U. S. Manganese Corporation owns 50% of the shares, paid for by 8% preferred stock.

Property: the Liverpool mine, 7 patented claims, 80 acres, in the Lump Gulch district, 1½ miles from Clancey, Jefferson county, and 15 miles S. of Helena. Past production stated to be $1,250,000. Examined by W. F. Word, of Helena, in 1905.

Geology: a fissure-vein in granite, 4 to 7′ wide, dipping 85° N. and with E.-W. course. Oreshoots are reported to be 300 and 600′ long, with ore that carries 10% lead and 40 oz. silver. Shipments by former owners averaged 12% lead and 9 oz. silver.

Development: by 750′ vertical shaft and 5,000′ of workings. Reserves are officially estimated at 40,000 tons. Shaft is to be re-timbered and sunk to 1,000′.

Equipment: geared air hoist, 600 cu. ft. compressor, pump, electric power, shops, and quarters for employees.

Operations were resumed in June, 1919, and ore mined from 400 to 750′ levels. In September, the old dumps, said to contain 10,000 tons of 9 oz. silver ore, were being sorted for shipment to smelter at East Helena. A prospectus issued by J. D. Crowley & Co. of Boston, shows that the directorate includes several members of the U. S. Manganese Corp.

LOST RANCH & TUNNELSITE MINE — **MONTANA**

Address: Harvey Sullivan, Grant, Beaverhead county, Mont.

Property: 9 claims in the Bloody Dick sections, in Upper Horse Prairie, 5 miles from Brenner, shows gold, silver, lead copper ore in narrow fissure veins (2″ to 3′) in porphyry. The ore carries brittle silver, argentite and mixed sulphides in streaks 8″ to 12″ thick, the ore as shipped carrying 44 to 1,300 oz. silver, 4 to 20% copper, 60% lead.

Development: totals 1,200′, including 420′ tunnel, with 300′ back, blocking out 100 tons of ore with 39 tons stoped. No recent returns.

LUKENS-HAZEL MINING CO. **MONTANA**

Address: Libby, Mont.

Officers: C. E. Lukens, pres.-treas.; J. H. Town, v. p.; W. Jennison, sec., with H. L. Faust and Oscar Nordquist, directors.

Cap., $1,600,000; $1 par; assessable.

Property: 17 claims, 280 acres, all patented, with millsite and water-rights, on Shaughnessy hill, 8 miles S. of Libby, Mont.; is an old property lately re-opened. Formation is quartzite, cut by veins whose ore carries galena, sphalerite, and pyrite.

Development: over 8,500′ of workings. The main orebody is said to average 5′ in width for a length of 1,130′. Reserves are officially estimated as worth $1,200,000.

Equipment: water-power brought 2 miles will run a 200-ton mill to contain rolls, jigs, tables and flotation unit.

LUMP GULCH MINING CO. **MONTANA**

Address: T. J. Chestnut, Clancey, Mont.

Officers: T. J. Chestnut, pres.; G. S. Haynes, v. p.; C. L. Beers, treas.; with A. Munson and R. Wanderer, directors.

Inc. 1906, in Montana. **Cap.,** $500,000; $1 par.

Property: a tract of 37 patented acres in Lump gulch, near Clancey, Mont. The vein is an easterly extension of that at the Liverpool mine. Ore contains silver bearing galena and zinc sulphide. Shaft is 250′ deep.

LUMP GULCH SILVER MINES CO. **MONTANA**

Address: R. A. McCray, R. A. Weisner, John Meagher, R. M. Hawkins, or L. H. Weisner, incorporators, Helena, Mont.

Inc. 1919, in Montana. **Cap.,** $1,000,000.

Property: claims in the Lump Gulch district, near Clancey, Jefferson county.

LUPFER MINING CO. **MONTANA**

Address: Whitefish, Flathead county, Mont.

Officers: George Hoffman, pres. and mgr.; Mike Sullivan, v. p.; Pete Hoffman, sec., with E. Boettcher and John Roeder, directors.

Inc. 1906, in Montana. **Cap.,** 500,000 shares; par value 15c; 250,000 issued.

Property: 160 acres, about 14 miles W. of Whitefish. Developed by 150′ shaft, showing a well defined vein of copper ore, 3′ wide in porphyry and limestone, said to assay 2% copper, 3 oz. silver with a trace of gold. Has a small steam hoist and air compressor. Idle, owing to lack of funds.

MADDEN SCRATCH GRAVEL MINES CO. **MONTANA**

Idle. **Address:** Helena, Mont.

Officers: Jas. Madden, pres.; Peter Scharenbroich, v. p.; Wm. Muth, sec.-treas., above, with Theo. Sarter, L. P. Wells and E. Edwards, directors.

Inc. March 16, 1916, in Montana. **Cap.,** $300,000; $1 par; outstanding 170,000. Annual meeting, third Monday in June.

Property: 3 patented claims, 50 acres known as the Jacquemin group, in the Scratch Gravel Hills, 8 miles from Helena, said to show gold ore in fissure veins in granite. The claims are said to have been worked in a haphazard manner by Jacquemin.

Development: 160′ incline shaft, and 340′ tunnel. Present management intends to develop the property. Fair results were reported in 1916, but no news since.

MAMMOTH MINING CO. **MONTANA**

Address: care John Ferguson, Spokane, Wash.

Officers: A. H. Featherstone, pres.; G. J. Heyfron, v. p.; John Ferguson, sec.-treas, with Dr. W. A. Smith, Jesse Freeman, Dr. C. R. Mowery, directors. J. Austin, mgr.

Cap., $125,000; 10c par; assessable. Annual meeting, first Thursday in August.

Property: 7 patented claims, 7 miles N. E. of Bonita, Missoula county, containing veins from which ore was shipped that returned 28 to 37% lead and 5 to 6 oz silver.

Development: by 124′ shaft, tunnel, etc. Is still a prospect of promise.

MARYSVILLE GOLD MINING CO. **MONTANA**

Address: A. B. Wolvin, Duluth, Minn. **Mine office:** Marysville, Mont.

Officers: Geo. O. Freeman, pres.; Ted E. Collins, sec.-treas.; L. S. Ropes, supt.-cons. eng.

Inc. 1911, in Montana. **Cap.,** $1,000,000; shares, $1 par; 527,000 issued. **Bonds:** $350,000, 6-year, 8%, authorized up to October, 1917. Taken off New York Curb, August, 1918.

Property: 30 claims, 430 acres, in Marysville district, 20 miles from Helena, Mont. This region was practically dead for years, but given a new lease through the efforts of the Barnes-King, St. Louis, and other companies. Marysville company's principal mine is the Blue Bird-Hickey.

Development: mainly by tunnels. About $120,000 said to have been spent in exploration.

Ore reserves: estimated by company at 200,000 tons of $10 ore. Because the 500′ level of the Shannon mine of the Barnes-King Co., adjacent to the Marysville Co.'s mine, shows gold ore, the Marysville Co. claims indicated reserves of several millions, which is an unsafe assumption.

Milling was expected to commence at end of 1917, but nothing has been heard of operations.

MIKE HORSE MINING CO. **MONTANA**

Reorganized May, 1919, as Liberty Mining Co., which see.

MEXICO-COEUR D'ALENES MINING CO. **MONTANA**

Address: R. N. Tutt, Kansas City, Mo.

Officers: L. F. Burnham, pres.; Stella Resium, v. p.; R. N. Tutt, sec.-treas.; Joe Kran, asst. sec.

Cap., $1,000,000; $1 par. Annual meeting January 10.

Property: 5 claims on Swamp creek, Sanders county, 18 miles E. of Burke, Idaho, with veins of lead-silver ore of usual Coeur d'Alene type.

Development: by 232′ tunnel. No recent work reported.

MINES DEVELOPMENT CO. **MONTANA**

Out of business. Had bond and lease 1915-16 on Moffit Group, which see. Fully described in Vol. XII, Mines Handbook.

MISSOURI MINE **MONTANA**

Address: J. H. Pankey, via Virginia City, Madison county, Mont.

Property: a few miles N. E. of Virginia City, is said to have shipped high-grade gold-silver ore for years. In Nov., 1918, a 10-stamp cyanide mill was installed.

MOFFIT GROUP **MONTANA**

Owner: J. W. Moffit, Box 6, Butte, Mont.

Mine: 8 miles from Twin Bridges, Madison county, Mont., was under bond and lease 1915-16 to Mines Development Co., now out of business.

Ore: said to average 2% copper. Over 600 tons have been shipped. Idle several years.

MONARCH MINING & POWER CO. **MONTANA**

Offices: 27 State St., Boston, Mass., and C. E. Fryberger, Montana Block, Helena, Mont.

Officers: P. N. MacDonald, pres.; J. E. Burgess, v. p.-treas.; Dr. C. E. Richardson, sec., with R. M. Davy, C. E. Fryberger, Frank Eichelberger, and C. J. Trauerman, directors. Charles Anderson, supt., Elliston, Mont. Frank Eichelberger and C. J. Trauerman, cons. engs.

Inc. Dec. 21, 1918, in Delaware. **Cap.,** $100,000; 10c par; all issued. Metropolitan Trust Co., Boston, transfer agents and registrar. The U. S. Manganese Corporation owns 51%.

Property: 20 claims, 370 acres, 14 miles S. of Elliston, Mont., on W. slope of Bison mountain.

Geology: a fissure-vein in granite, 8 to 10′ wide, with 80° N. dip and

S. 82° E. course. Ore-shoots are 310 and 600′ long, and carry $1.50 gold, 12 oz. silver, 10% lead, and 1.3% copper.

Development: by 400′ and 1,400′ tunnels, to be extended; and 3,500′ of workings, opening mine to depth of 1,200′. Reserves blocked out are given as 38,000 tons, and a total of 62,000 tons, averaging $16 per ton.

Equipment: steam power plant, 600 cu. ft. compressor, hydro-electric plant, and jig-back aerial tram. A 200-ton flotation mill was built in 1919.

Production: smelter returns from previous owners totaled $600,000. Ore shipments of 25 tons daily resumed in October, 1919.

Company is connected with the Liverpool Silver Mines Co., which see, both re-opening old mines. The public is offered stock by Boston brokers whose publicity agent is a busy and hard worker, with a lively imagination.

MONITOR TUNNEL CO. **MONTANA**

Company defunct. Property bought by Dr. Hall and Charles Kelly from the Schweitzer estate, and sold to North Butte company for $150,000.

MONTANA-CLINTON COPPER CO. **MONTANA**

Company forfeited bond on claims and the property was surrendered to original owner, C. L. Friederichs of Helena, Mont. Company shipped 168 carloads of ore netting $140,000 at smelter up to October, 1914. See full description in Vol. XIII.

MONTANA CONSOLIDATED COPPER CO. **MONTANA**

Office: 51 Wall St., New York.

Officers: E. P. J. Burgess, pres.; E. P. Haas, v. p.; W. E. Doyle, sec.; T. F. Lee, treas.

Inc. 1906, in Maine. **Cap.**, $1,000,000; shares $1 par; all issued.

Property: includes the Comet and Grey Eagle mines, Deerlodge and various placers, millsites, etc., comprising 699.73 acres, about 7 miles N. W. of Boulder, Jefferson county, Mont.

Ores: are mainly galena and sphalerite with associated pyrite and chalcopyrite, and the Comet is popularly credited with having yielded a gross output of $13,000,000. **Ore reserves:** said to be 1,350,000 tons, averaging $20 per ton.

In 1915 M. K. Rogers, of Los Angeles, Cal., took an option on 75% of the capital stock and began an active rehabilitation of the mine and mill. Soon afterwards the New York brokerage firm of Baruch & Co., since dissolved (bankrupt), acquired minority holdings and began advertising the venture; they succeeded in driving the stock up to nearly $2 a share, in the belief that Rogers stock was securely escrowed, when suddenly a large block of stock was thrown on the market and quotations dropped to negligible levels.

The Comet mine was unwatered in 1917, and company was said to be prepared to spend $100,000 in mine development. Crosscuts from the 976′ shaft have never been driven far enough to reach the main vein on the lower levels.

The vein is a large one and the property promising enough to warrant deep development. Clark, Dodge & Co. are said to be interested in the property, but have publicly disclaimed any interest whatsoever in the stock on the market.

The company's holdings were acquired and exploration undertaken in 1907 on the report of A. A. Blow, in which the hope was expressed that copper ores in paying quantity would be found in depth. The 1917 activity was the result of the abnormal price of zinc, and work at the mine was subordinated to the retreatment of the 100,000 tons of tailings from the old mill, for extraction of their zinc content. The geology is described in Bull. 527, U. S. G. S., p. 114, 1913.

The property has a decided speculative value as a mine. In 1918, the 400 and 500′ levels of mine were reopened, and the mine produced 100 tons of ore daily; in 1919, development was continued on the 600′ level, and the mine yielded 20 to 25 tons daily, the ore being hauled to the G. N. railway for shipment. A 150-ton mill is planned.

MONTANA COPPER-SILVER CO. **MONTANA**

Address: E. R. Purnell, supt., Helena, Mont.

Mine in Scratch Gravel hills, Lewis & Clark county, Mont., 8 miles from

Helena, shows quartz veins in quartz-monzonite, carrying ores with pyrite and chalcopyrite and gold-silver values.

Development: by shaft and drills. Equipped with hoist. Is not favorably regarded.

Idle at last accounts.

MONTANA GOLD HILL MINING CO. **MONTANA**

Address: 609 First Ave., Spokane, Wash.

Officers: E. V. Lambert, pres.; A. G. Benson, v. p.; J. W. Sarginson, sec.-treas.

Cap., $100,000; 10c par.

Property: 7 mining claims and a millsite 138 acres, in the Deep Creek district, 14 miles from Iron Mountain and Superior, Mineral county. Surface exposures are said to be encouraging.

Development: by tunnels aggregating several hundred feet, opening some $22 gold ore.

Equipment: includes smithy, sawmill, dwellings, and 50-ton mill completed in November, 1919.

MONTANA-ILLINOIS COPPER MINING CO. **MONTANA**

Absorbed by Liberty-Montana Mines Co., which see.

MONTANA MANGANESE CO. **MONTANA**

Address: Earl Greenough, mgr., Philipsburg, Mont.

Company reported to have mined 65,00 tons of manganese during 1917, and shipped up to 2,000 tons monthly in 1918.

MONTANA MINES CO. **MONTANA**

Formerly the Beaverhead Montana Copper Mining Co., whose holdings were taken over, share for share.

Address: care Ray A. Cobban, Butte, Mont., sec.-treas., at last accounts.

Cap., $100,000; shares $1 par. Company obtained a lease and bond on the old Jack Rabbit mine at Argenta, Beaverhead county.

Development: by a 3,025′ tunnel driven to cut a mineralized diorite dike In 1917 company shipped ore that returned 10% copper and 12 oz. silver.

MONTANA MORNING MINING CO. **MONTANA**

Address: Hyde Block, Spokane, Wash.

Officers: Jos. Rosslow, pres.; H. Rosslow, v. p.-sec.; S. T. Wood, treas.; with G. B. Harrington, E. S. Williamson and D. T. Wood, directors.

Cap., $300,000; shares 20c par.

Property: 12 claims at Troy, Lincoln county, Mont., reported to show 3 well defined veins, partly developed by shafts. Ore opened assays high in lead, zinc, and silver. Last work consisted of driving on the contact veins. Compressor installed.

MONTANA OREWAY MINING CO. **MONTANA**

Office: 522 Postal Telegraph Bldg., Chicago. **Mine office:** Briston, Beaverhead county, Mont.

Officers: W. P. Jahnke, pres.; J. B. Scott, v. p.; Fred W. Scott, sec.; J. D. Rankin, treas.; preceding, with Frank Kimball, B. F. White and Thos. Fay, directors.

Inc. 1909, in Arizona. **Cap.,** $1.000,000; shares $1 par; issued, 950,000.

Property: 7 claims, 5 patented, 100 acres, and a 25-acre millsite, known as the Straight Tip group, in the Big Hole basin. Claims show several fissure veins averaging 10′ thick in quartzite and contact deposits between quartzite and serpentine.

Development: by a 3,025′ tunnel driven to cut a mineralized diorite dike carrying copper oxide ores, with lead and small values in silver and gold. Also 2 shafts 200′ apart, one 100′ and another 130′ deep, showing ore 8 to 36″ thick, assaying $32 per ton in gold, silver, lead and copper.

Equipment: includes a 35-h. p. steam plant, with 1-drill air compressor. There are 6 small buildings. Mill to be erected, at last accounts.

MONTANA RADERSBURG MINING CO. **MONTANA**

Address: Townsend, Broadwater county, Mont.

Officers: A. E. Spriggs, pres.; Helena; Fred Allen, v. p. and supt.,

Townsend; B. E. Mathews, sec.-treas., with Hugh Broderick, C. A. Whipple, Sol. Genzberger and L. A. Sarecky, directors.

Inc. Nov., 1914, in Montana. **Cap.,** $300,000; shares $1 par; $100,000 stock donated to treasury. Annual meeting, in November. Operating expenses in 1914-1915, $10,000; receipts, none.

Property: 5 claims, unpatented, 100 acres, in Broadwater county, said to show gold, silver, lead, zinc ore in a fissure vein in lime and quartzite. Vein has a N.-S. strike, dips 20°, and is said to be 12′ wide, with average assays per ton of $2 gold, 50 oz. silver, 20% lead, 2% zinc.

Development: 500′ incline shaft with 1,500′ underground workings. Management claims 200,000 tons of probable ore, with 100,000 tons already blocked out.

Equipment: includes a 40-h. p. gasoline hoist. Management states the company is preparing to erect a mill.

Production: said to have been $300,000 in gold and silver up to the shut-down of property in 1908. Inactive, 1919.

MONTANA SCOTCH BONNET COP. & GOLD MG. CO. MONTANA

Office: 603 Jamieson Blk., Spokane, Wash. **Mine office:** Cooke, Park county, Mont.

Officers: S. A. Gibson, pres. and gen. mgr.; Jos. Skerrett, sec.-treas..

Inc. March, 1902, in Washington. **Cap.,** $300,000; 10c par; fully issued.

Property: 17 claims, partly fractional, 200 acres, in the New World district, 65 miles from a railway.

Development: by tunnel with about 1,500′ of workings developing oxidized and sulphide ores of lead and copper, said to give small copper assays, an average of 3.7% lead, 4 to 5 oz. silver and $3.10 gold per ton.

Mine sold under bond and option to Robert McKay and others of Livingston, Mont., for $150,000, with payments spread over 5 years. First payment made, second was due November, 1919. Lack of railroad has long hindered work in this district, but it is hoped that a line will soon be built from Gardiner, Mont., through a corner of Yellowstone Park to Cooke City, and thus serve the Scotch Bonnet mine.

MONTANA SILVER-LEAD MINING CO. MONTANA

Address: 605 Dekum Bldg., Portland, Oregon.

Officers: H. G. Lougee, pres.-treas.; R. Naylor, v. p.; O. E. Heintz, sec., with J. Bingham and C. B. Roosa, directors.

Inc. Oct. 17, 1906, in Washington. **Cap.,** $1,000,000; $1 par; 900,000 issued.

Property: 6 claims, 120 acres, in the Cabinet range, near Libby, Lincoln county, Mont., 16 miles from railroad.

Geology: contact vein in quartzite and slate. Orebody said to be from 2′ to 20′ wide, and pay-shoot on surface 600′ long. Ore is a sulphide, assaying upwards of 5% lead, 5 oz. silver, $2 gold, and 4% zinc.

Development: by 2 tunnels, 750′ and 1,300′ long, reaching depth of 1,100′ with total workings of 2,050′. Lower tunnel was being extended to cut ore opened above, but abnormal conditions compelled a shut-down in 1918.

MONTANA STATES MINING CORPORATION MONTANA

Office: William Muth, sec.-treas., Bailey Blk., Helena, Mont. **Mine office:** Alhambra, Jefferson county, Mont.

Officers: R. A. Bell, pres. and gen. mgr.; R. Horsky, v. p.

Inc. May, 1911, in Montana. **Cap.,** $5,000,000; shares $5 par; issued, 120,000 shares.

Property: 38 claims, partly patented, 700 acres, in the Warm Springs district, 6 miles from a railroad. Country rock is a quartz monzonite of the Boulder batholith, cut by rhyolite dikes and showing quartz veins with mineralization along the walls.

Development: by numerous shallow shafts, and short tunnels, with about 2,300′ of openings. Ores are mainly galena, sphalerite and tetrahedrite, with a chalcedonic quartz gangue, reported by management to carry up to 22% copper, 10% lead, 8% zinc, 16 oz. silver and $16 gold per ton.

Long crosscut tunnel was being driven to cut veins at depth late in 1917. Idle, 1919.

MONTANA UNITED MINING CO. **MONTANA**

Address: J. G. Kirby, pres., Wilmantic, Conn.

Cap: 150,000 shares; $1 par; all issued.

Property: 240 acres, patented, 9 miles east of Deer Lodge, adjoining the Emery mine, shows a fissure vein varying from a streak to 7′, average width 3′-4′.

Ore: gold, silver, lead, zinc and much antimony. Said to have 20,000 tons ore blocked out that will average $20 per ton, including zinc.

Equipment: includes 50-h. p. hoist, 300-cu. ft. compressor, and all necessary boilers, buildings, etc. The mine is idle, needing money for a mill and further development.

MT. THOMPSON GOLD MINING & MILLING CO. **MONTANA**

Address: 56 East Broadway, Butte, Mont., care Western Mining Supply Co., but all letters returned unclaimed in 1919.

Officers: Dr. E. S. Rinehart, pres.; John W. Franks, v. p.; C. L. Franks, sec.-treas., with W. H. Rager and Jos. Hunter, directors.

Inc. 1916, in Mont. **Cap.,** $1,000,000; $1 par.

Property: 10 claims, in tract 6,000′ long, situated on Cataract Creek, 4½ miles from Basin, on the Great Northern R. R., Jefferson county, Mont.

Geology: ore is a complex mixture of galena, pyrite, some chalcopyrite, and much sphalerite, in small shoots in an E.-W. fissure vein in granite. The ledge is said to be 12′ to 25′ wide, almost vertical and is a typical quartz-tourmaline vein.

Development: by 1,000′ Copper Hill tunnel, with 35′ crosscut 300′ in, exposing main vein.

Equipment: 14-h. p. gasoline engine, small compressor, etc.

Company claims 200,000 tons of ore blocked out that samples $32 for 500′. Planned erection of mill 1917-18, run by water power. Not favorably regarded as vein is lean, and orebodies small.

MOUNTAIN VIEW OR JOHNSTON GROUP **MONTANA**

Address: Alex J. Johnston, Butte, Mont.

Property: 6 patented claims in Bear gulch, near Twin Bridges, Madison county. The vein is a contact between limestone and granite. Ore is a sulphide, and carries 1½% copper, with some gold and silver.

Development: by 250′ vertical shaft and 2400′ tunnel, opening ore to depth of 900′. Idle in 1919.

NANCY HANKS & MONTANA MNG. CO. **MONTANA**

Office: H. A. Bellows, Suite 711, 53 Park Row, New York. **Mine office:** Andrew Ryan, supt., Garnet, Mont.

Officers: C. G. Grossman, pres., Rudolph Schalk, J. O. Delamater and J. T. Thatcher, directors; N. O'Connor, sec.; H. A. Bellows, treas.

Inc. Oct. 28, 1916, in Maine. **Cap.,** $1,000,000; $1 par; all issued. On July 16, 1919, 200 shares were sold in New York at auction for $23 the lot.

Property: company holds about 93% of the stock of the Nancy Hanks Mng. & Mlg. Co. Latter company owns 10 claims, 5 patented, at Garnet, Granite county, Mont., 12 miles from Bearmouth.

Geology: quartz vein in granite, from 1 to 8′ wide, said to carry an ore-shoot from 100 to 130′ long. Ore carries gold, silver, and copper; and is reported to average $68 per ton, partly in free gold and partly as telluride of gold, associated with pyrite, etc.

Development: by 100 and 500′ shafts; total workings about 4,000′. Ore reserves are estimated at 20,000 tons blocked out and stope fillings.

Equipment: 2-cylinder Anaconda hoist, 3-drill compressor, pumps, etc. Proposed at last report, to erect a 20-ton mill and hoist good for 1,500′ depth.

Production: the Nancy Hanks mine was opened 20 years ago, and yielded $500,000 from workings only 80′ deep. Mills were built for the treatment of the lower-grade ores, but extreme friability of the ore caused a high percentage of fines in crushing, resulting in a loss of about 40% of the value in

milling, with the imperfect methods of that period. After an 18 years' shut-down, a new company secured a lease, and option on a large block of shares, sank the shaft to depth of 400', and mined ore yielding between $150,000 and $200,000. The present company purchased control, completing payment Dec. 4, 1917, sank 100' deeper and extracted about $120,000 of shipping ore. Due to the high cost of labor and materials the mine was shut-down in March, 1918.

A mill ½ mile away from mine was secured early in 1919, and remodeled. In April, the mine was unwatered and milling begun on a 5,000-ton dump. Mine fully described in U. S. Geological Survey, Bull. 660-F. Former mining costs were about $15 per ton, but this is expected to be greatly reduced through milling of both high and low-grade ore.

NATIONAL TUNGSTEN & SILVER MINING CO. **MONTANA**

Supposedly operating near Butte, Mont., but no information obtainable from Butte Chamber of Commerce, or other sources.

NEIHART CONSOLIDATED SILVER MINING CO. **MONTANA**

Address: Dan Tracy, Pearce Coal Co., Great Falls, Mont.

Officers: Dan Tracy, pres.; J. E. Dawson, v. p.; W. A. Brown, treas.; L. M. McDonnell, sec., with William Thornton and F. R. Van de Putte, directors.

Property: 7 claims, including the Hartley, in the Neihart district of Cascade county. This mine is said to have yielded 150 cars of 100-oz. ore when silver was 50 cents an ounce. A 4' shoot of ore reported opened on the 200' level in October, 1919, containing an 18" streak assaying 100 oz. per ton.

NEW COPPER SILVER CO. **MONTANA**

Address: Helena, Mont.

Officers: W. C. Bardon, pres.; Z. B. Melborn, v. p.; J. R. Wine, sec.-treas. Company acquired the holdings of the defunct Copper-Silver Montana Mining Company at receiver's sale in 1914.

Property: 7 claims, 130 acres, adjoining the Lexington and Sacajewea, in the Scratch Gravel district, 1 mile from Great Northern railway, and 5 miles north of Helena.

Geology: claims show granite and monzonite, reported to carry numerous fissure veins, dipping N. W. and S. E. All veins are reported mineralized at surface, carrying melaconite, azurite and malachite. Mine has a 500' shaft, cutting at 300' a vein estimated to average 4.5% copper, 12 to 100 oz. silver, and $1 to $55 gold per ton.

Equipment: includes a 30-h. p. steam hoist and a gasoline engine. Operations were stopped during the war, but company hopes to resume in 1920.

NEW VICTOR EMPIRE M. & M. CO. **MONTANA**

Address: S. R. Boyer, Moscow, Idaho.

Directors: S. R. Boyer, I. L. Collins, P. S. Rose (sec.), W. R. Sampson, and R. H. Wing, three latter of Spokane, Washington.

Cap., $60,000; 10c par; assessable.

Property: 5 claims, 12 miles from Libby, Lincoln county, carries veins in slate that contain silver-lead ore. **Development:** by tunnels, 1,900' long. Air-compressor is driven by water-power. Idle at last accounts.

NEW VULCAN MINING CO. **MONTANA**

Officers: H. A. Arnold, pres., 716 S. Arthur St.; G. M. McDonald, v. p.; Hugh Monroe, sec.-treas., with O. L. Jones, C. B. Etnier, J. L. Bailor, and B. E. Vaill, directors.

Cap., $150,000.

Property: 7 claims, 7 miles from Superior on C. M. & St. P. and N. P. railroads, Mineral county. Ore carries gold, silver, and copper in veins, developed by 2,000' of tunnels, etc. No recent returns secured.

NEW YORK-MONTANA MINES CO. **MONTANA**

Address: Bannack, Beaverhead county, Mont.

Officers: F. B. Howell, pres.; C. H. Smith, v. p.; P. C. Hanson, sec.-treas., with Samuel Barker, Jr., and W. C. Ebaugh, directors. C. W. Stallings, supt.

Is a reorganization of the Bannack Gold Mining Co., which in Jan., 1918, was in financial difficulties owing to local farmers shutting off the company's

water supply. Title and Guaranty Trust Co., New York, transfer agent and registrar.

The first discovery of gold in Montana was made in the Bannack district in 1862, and in that year the placers are reported to have produced $600,000 in gold. Quartz mining began very shortly after. In 1863 a 6-stamp mill was in operation. A reasonable estimate from available data puts the total production of the district to 1905 at not less than $4,000,000. From 1905 to 1913 the production reported is approximately $2,000,000. The ores have been of value almost wholly on account of their gold, but they contain also some silver, lead and copper. The district has been comparatively inactive during the last twelve years. The Bannack property has been operated in the past in a desultory manner by owners and lessees.

Property: the Golden Leaf group of 8 patented claims, adjacent to the town of Bannack, at an altitude of 5,935′ a part interest in 2 claims, the Junction millsite, with underground rights, also an additional area of 200 acres, besides the underground rights in Excelsior and Horace Placer millsites. Nearest shipping point is at Grant, 12 miles from Bannack, on the Pittsburgh-Gilmore Railroad, which connects with the Oregon Short Line at Armstead.

Geology: the rocks of the Bannack district consist of Paleozoic limestone intruded by a nearly circular shaped area of syenite about 1¼ miles in diameter. The contact deposit on which the company's claims are located extends around the border of the syenite intrusion. The orebodies are irregular masses in the limestone, and vary in width from 1′ to 30′ and even 40′, averaging about 10′. The high-grade bodies vary in length from 50′ to 100′; the milling orebodies are of much greater extent. The best ore is usually in the widest parts of the vein, and is for the most part very soft, requiring little blasting, though the ground stands well without timbering. A large tonnage of shipping ore, estimated at over $1,300,000, has been removed from the property, leaving in the mine large reserves of milling grades of ore. See U. S. G. S. Bull. 574, pp. 72-75.

Development: approximately 17,000′ of underground workings to a depth of 600′. The Priscilla tunnel, the main working adit, was driven 800′ to the contact at an elevation of 90′ above creek level, and cuts the contact 250′ below surface, though the highest point of contact on the surface will be 800′ above the Priscilla tunnel.

Ore reserves: were estimated Feb. 1, 1917, as 130,700 tons, averaging $7.34 per ton, with a net realizable value of $632,750. There were also 100,000 tons of probable low-grade ore at $6; 5,000 tons medium grade at $20, and 1,000 tons high grade at $100 per ton, a total of 106,000 tons of a net value of $535,000. The value is principally in gold, the silver contributing 50c. to $1 per ton. No account has been taken in above estimate of ore below the Priscilla tunnel level. In May, 1918, a winze was said to be down over 160′ in rich ore.

Equipment: a well-equipped surface plant, also a reduction plant; the first unit of the cyanide plant has a daily capacity of 150 tons. The plant, which started operations May 5, 1917, uses the continuous counter-current decantation process. Power for mine and mill is furnished by a hydro-electric plant at the mill, water being obtained from Grasshopper creek, 2½ miles above the mill, furnishing a net working head of 39′. During the winter, when water is not available, a Diesel oil engine will furnish the power.

Milling costs were estimated not to exceed $2 per ton; mine and overhead costs not to exceed $1 per ton. Average mill-heads were estimated at $10 per ton, with an extraction of over 90%.

A new plant of 9,000 tons (yearly) capacity was reported under erection in 1918.

Mine is well developed and ore reserves, as estimated, are sufficient for 4 years' operation. The possibility of developing new orebodies seems good, since less than ⅛ of the mineralized contact area owned by the company has been prospected, and no work goes below the water-level. Using modern methods and under an efficient management, the Bannack mine should have a large production and make a profit.

NEW YORK & MONTANA COPPER MINING CO. MONTANA

Address: care E. J. Mathews, 1007 Hoge Bldg., Seattle, Wash. Mine near Corbin, Jefferson county, Mont.

Inc. 1903, in Delaware. **Cap.,** $1,000,000; shares $1 par.

Lands: about 250 acres, including the Erickson, Scioto and Copper Gulch groups, opened by 3 two-compartment shafts, said to have a good showing of medium-grade ore. A plant costing $30,000 was to be erected to treat mine and custom ores, at last accounts.

NEW YORK-MONTANA TESTING & ENGINEERING CO. MONT.

Office: Montana Bldg., Helena, Mont.

Officers: and directors: Charles E. Fryberger, pres.; Frank Eichelberger, v. p.; Ralph T. Hopkins, sec.-treas.

Inc. Jan., 1917, in Montana. **Cap.,** $100,000; $1 par; fully paid and non-assessable; 91,000 issued, all owned by U. S. Manganese Corp. Bonds, $35,000, first mortgage 7½, due Jan. 1, 1922. U. S. Manganese Corp. owns $15,000 of bond issue and $8,000 of issue is still in treasury of New York-Montana Company. Transfer agent and registrar—company office at Helena.

Dividend: 7% each on April 20 and July 20, 1919.

Transfer agent and registrar—company office at Helena.

Property: consists of a concentration mill, and lands at Stedman, a suburb of Helena. This concentrator was operated as a custom plant during the war, treating manganese ore from the mines of the Clark-Montana Realty Co. of Butte, the concentrates being shipped to the U. S. Steel Corp., and the Miami Metals Co. at South Chicago. The company also made a high-grade chemical manganese concentrate used in electric dry cells. The managers expect to develop a market for this class of ore and compete with foreign supplies.

Concentrator remodelled in 1919 to work on sulphide ores from the Rimini district, and will treat other custom ore from the various districts around Helena, including a second-class product of the Liverpool Silver Mines Co. which has a mine at Clancey. The New York-Montana company also conducts an ore testing laboratory, testing ores on both a laboratory and a commercial scale.

NORTHERN VALLEY MINING CO. MONTANA

Officers: S. F. Mallette, pres.; Godfrey, Ill.; Walter K. Mallette, v. p.; Anaconda, Mont.; H. W. Wilson, sec.-treas., Twin Falls, Idaho.

Inc. 1912, in Arizona. **Cap.,** $1,000,000; shares $1 par; 600,000 shares issued. Controlled by the American Metal Mining Ass'n of Arizona.

Property: consists of the holdings of the defunct Amazon-Montana Development Co. in Amazon district, Jefferson county, Mont. Idle and no work contemplated in near future, according to last advice.

NORTHWESTERN METALS CO. MONTANA

Bankrupt. Entire property reported sold by court for $22,000, July, 1916. Fully described in Vol. XI, Copper Handbook.

OHIO KEATING GOLD MINING CO. MONTANA

Address: P. O. Box 1711, Butte, Mont. Mine at Radersburg, Broadwater county, Mont.

Officers: J. E. Oppenheimer, pres.; J. S. Cohen, v. p.; C. H. Smith, sec.-treas., with B. E. Calkins and W. M. Tuohy, directors.

Cap., $800,000, increased Dec., 1910, from $500,000. Company had $113,924 debts, July, 1914, and stockholders changed stock from non-assessable to assessable, with an initial assessment of 15 cts. per share.

Property: a promising, though small gold mine, producing some copper from pyrite ores found as shoots in strong fissure veins in igneous rocks. According to Fred. T. Green, who examined the property in 1914, the probable ore in mine is valued at $486,151, with $116,914 worth of ore blocked out (6,680 tons) and $90,000 worth of $4 ore on the dump.

Development: to 500′ level, with about 3,800′ of drifts and crosscuts.

Equipment: includes electric and steam pumps, electric hoist, mining cars and tools. No recent news.

OLYMPIA MINING CO. MONTANA

Office: Princeton, Granite county, Mont.

Property: Lillian and Banner claims in the Philipsburg district. Tunnel said to cut 3 veins, one 20′ wide, carrying galena, silver and gold values.

Some development was being done in 1917.

O. & M. MINES CO. **MONTANA**

No longer active. Fully described in Volume XIII. See Liberty Mining Co.

ORIGINAL BANNACK MINING CO. **MONTANA**

Office: 302 D. F. Walker Bldg., Salt Lake City.

Officers: Lorenzo Price, Jr., pres.; A. J. Bruneau, v. p.; E. F. Mobley, sec.-treas., with W. L. Smith and Ambrose Nord, directors.

Inc. in Utah. **Cap.,** $1,000,000; shares $1 par; assessable; 600,000 shares outstanding. Listed on Salt Lake City Exchange.

Property: 9 patented claims in the Bannack mining district, Bannack, Beaverhead county, Mont., adjoining the Bannack Gold Mining Co., and said to have the extension of the latter's ore zone. Credited with a production of $350,000. Management claims there is an ore-shoot 1,800′ long and from 50 to 125′ in width, containing "hundreds of thousands of tons of ore, that will average $11 per ton," value mainly in gold, with some copper, a statement that is considered to be a gross exaggeration. Developed by 300′ shaft.

Equipment: included a 325 cu. ft. compressor and a 25-h. p. gasoline hoist.

Reported in 1917, that the U. S. S. R. & M. Co. had an option to purchase the mine for $225,000.

PHILIPSBURG MINING CO. **MONTANA**

Office: 821 Security Bldg., St. Louis, Mo. **Mine office:** Philipsburg, Granite county, Mont.

Officers: John P. Meyer, pres.; John H. Dieckman, v. p.; G. J. Tansey, sec.; F. D. Fusz, treas., with John J. Taussig, Max Kotany, L. M. Rumsey, Jr., C. G. Ewing, E. S. Orr, A. L. Shapleigh, Edward Barklage, directors. R. S. Beitz, mill supt.

Inc. 1910, in Missouri. **Cap.,** $50,000; shares $1 par; all outstanding. Annual meeting, fourth Friday in March.

Property: 450 acres at Philipsburg, said to show ore in contact deposit and quartz fissure veins between limestone and granite. Ore carries gold, silver, copper, zinc, lead, and manganese. Company was the largest producer of manganese ore in Montana. Manganese ore is of the nodular variety of pyrolusite and psilomelane.

Company is successor to Hope Mining Co., one of the earliest companies formed in Montana. Mine is credited with past production of $4,000,000 in silver. Also has a deposit of copper ore, but faulted segment has not yet been located.

Development: by several shafts, deepest 500′, and a number of tunnels.

Equipment: 350-ton mill with grizzlies, gyratory crusher, trommel with 1½-in. holes, in which the ore is washed, sorting-belt, rolls, elevators and trommels, Harz jigs, tables, thickeners and bins. Crude ore assays 32% Mn. and 35% SiO_2; wash ore, 41% Mn. and 18% SiO_2; and concentrate, 49% Mn. and 9% SiO_2.

Production: shipped about 100 tons of manganese ore daily in 1917, and a total of 42,479 tons in 1918.

POLARIS MINE **MONTANA**

Address: Jack Mercer, supt., Dillon, Beaverhead county, Mont.

Property: one of the old gold-silver mines of the district reported to contain a large quantity of ore. A cyanide mill was erected in 1919.

PONY MINING & MILLING CO. **MONTANA**

Formerly Garnet Gold Mining Co. Ole Peterson, owner, St. Louis, Missouri.

Property: 19 claims at Pony, Madison county; idle at last accounts. Is said to have yielded over $700,000. Development is by tunnels.

Equipment: water power, compressor, 20-stamp mill, etc.

PORPHYRY DIKE GOLD MINING CO. **MONTANA**

Address: James Breen, gen. mgr., Helena, Mont. S. R. Brown, supt.; M. A. Evans, mill foreman.

Cap., $650,000; $1 par.

Property: 19 claims, 18 patented, 7 miles S. W. of Rimini, and 17 miles from Basin, the nearest rail point. The formation is peculiar, being a rhyolite lava flow containing numerous egg-shaped masses, technically called spherulites, netted with quartz threads carrying gold; the rock itself also carries clay films and quartz films, containing gold. A large quantity of this ore has been exposed by surface workings and tunnels. Over 20,000 tons of this ore milled in a 10-stamp mill in former years gave a recovery of $2.45 gold per ton. A 300-ton ball-mill plant, driven by electric power, was erected late in 1917. Mining costs are low, probably not over 75c., and ore mills easily and cheaply so that property ought to pay if a large enough tonnage were handled.

POTOMAC COPPER CO. **MONTANA**

Office: Hirbour Bldg., Butte, Mont.

Officers: Wm. P. Jahn, pres.; Paul A. Gow, v. p.; J. J. Harrington, sec.; George E. Palmer, treas., with N. J. Bielenberg, John Harrington, and W. I. Higgins, directors.

Inc. Nov. 30, 1918, in Montana. **Cap.**, $1,500,000; $1 par; 950,000 outstanding. Application made for listing on New York Curb. Security Transfer and Registrar Co., 66 Broadway, New York, transfer agent and registrar. Annual meeting, second Tuesday in March.

Property: 20 claims, about 300 acres, in the Copper Cliff district, Powell county, Montana, 12 miles north of Bonita, Mont., on N. P. R. R., and 8 miles from Potomac, terminus of a branch line of the C. M. & St. Paul R. R. Examined by W. H. Weed and P. A. Gow, 1919.

Discovered in 1881, the property was desultorily operated until taken over by an English syndicate in 1900, when selected ore was sorted and shipped.

Geology: ore occurs in six well-defined fissure veins cutting quartzite, and in faults between this and an impure limestone. The veins occur clustered in a zone of sheeting, 1,200′ or more wide, and a mile long. The ore mineral is enargite, accompanied by famatinite, pyrite and some copper glance. A great outcrop of mineralized brecciated quartzite, 100′ high, 400′ long and about 100′ thick, and known as the "Copper Cliff," is estimated to contain over 300,000 tons of 2½% copper ore, with $2.50 per ton in gold. The reported gross value of the ore in this "Cliff" is $5,000,000. A second ore zone, cut by the Copper Cliff tunnel, shows 40′ of 2¾% ore with $2 gold.

Development: by several tunnels, the two lower ones not yet reaching the veins. The lowest is a crosscut, 500′ long, to be extended 1,200′ more in 1920, to cut the veins at depth of 400′. This will be the main haulage-way for ore extraction from all veins of the property. At the Leonard mine a 100′ shaft exposes a 10′ vein with 60° N.-W. dip and good average values.

Company has electric power, a new and excellent wagon-road to Potomac, and an old logging railway grade much of the way which is available for a railroad. An 11-mile transmission-line, compressor, and dwellings were erected late in 1919.

Company estimates that with 90% recovery, milling 10 to 1 and recovering 90% of value of concentrate paid for by smelters, the ore will have a gross value of $9.42 per ton and a net profit of $3.65 per ton.

Property covers an entire mining district, showing veins with commercial amounts of profitable concentrating ore and a promise of very large additional tonnages by development work. It is a very promising property.

PRICKLY PEAR MINING CO. **MONTANA**

Office: care J. C. Murray, pres., Helena, Mont. Mine P. O.: Jefferson City, Jefferson county, Mont.

Officers: J. C. Murray, pres.; Lee Dever, v. p.; H. M. Brooks, sec.-treas.

Property: the Prickley Pear mine, 2 miles from Jefferson, opened by a 350′ tunnel, showing gold and silver-bearing copper ore. Has no power equipment. Production not reported for several years.

PRINCEMONT MINING CO. **MONTANA**

Property near Noxon, Sanders county, is listed under mines of Coeur d'Alene district, Idaho as it is really a part of that district.

RELIANCE MINING & MILLING CO. **MONTANA**

Officers: D. M. Adams, pres.; Box 386, Butte, Mont.; Frank Eichelberger, v. p.; J. F. Barnes, sec., with J. C. Lane and J. W. Higgins, directors.

Inc. April 17, 1913, in Montana. **Cap.,** $150,000; shares 10c par; nonassessable; 1,325,000 issued. Control reported in hands of D. M. Adams and P. H. Kenny.

Property: the Reliance and Sunnyside group of claims, in the Moose Creek section, Silver Bow county, 18 miles south of Butte, showing veins of copper-silver-lead-zinc ore in carboniferous limestone. The new property—the Sunnyside, whose ore carries silver principally, is considered to have much merit.

Development: by shaft and crosscuts, in which water has been troublesome. During 1917, $12,415 was spent and more money is needed for further exploration.

REVENUE CONSOLIDATED MINING CO. **MONTANA**

Address: G. D. B. Turner, Norris, Mont.

Property: near Norris, Madison county, closed in 1917 on account of excess of water and lack of power, since obtained from the Montana Power Co. Gold yield from depth of 200′ said to be $2,500,000. Four oreshoots are exposed. Four winzes are in ore below 200′ depth. Sinking was under way in February, 1920.

Equipment: 700 cu. ft. compressor, 100-h. p. electric hoist, etc. Mine is under option to De Forest Condee and others of New York.

REVIAS CREEK MINING & POWER CO. **MONTANA**

Former mine near Dixon, Sanders county, Mont.; fully described in Vol. XI, Copper Handbook.

RICHMOND MINING, MILLING & REDUCTION CO. **MONTANA**

Office: 404 Sherwood Bldg., Spokane, Wash., and Delage, Idaho.

Officers: J. E. Codd, pres. and treas.; H. W. Claussen, v. p.; C. H. Maloy, sec.; B. N. Sharp (mgr.), and P. W. Peterson, directors.

Inc. in Washington. **Cap.,** $1,000,000; $1 par; 840,000 issued, increased to $1,500,000 in February, 1920; 1,340,000 issued. Profit in 1917 was $93,360, and $8,370 in 1918. **Dividends:** 2c per month, equal to $16,800. Total to October, 1918, $92,400. None since.

Property: on Idaho-Montana line, 6 miles from Saltese, Mineral county, Mont., and 1½ miles from Adair, Idaho, connected with C., M. & St. P. R. R. by 8,800′ aerial tram. Company owns 7 claims, 6 patented, and millsite, total of 140 acres.

Development: 2,200′ of tunnels, 500′ of shafts, 2,000′ of drifts, and 600′ of raises. Lowest depth is 570′, and total workings are 6,000′. Vein shows on surface for 2,200′, of which 400′ is being developed. Reserves are estimated as sufficient for 50 tons daily for a year. New work in 1918, amounted to 1,685′. A peculiarity of the mine is the presence of small but persistent stringers of high-grade ore on each level, indicating the existence of rich ore lodes below according to report.

Equipment: 2-h. p. gasoline hoist, 80-h. p. compressor, 8,800′ aerial tram of 240 tons daily capacity, etc.

Production: 4,600 tons in 1917 worth $292,117; and 3,912 tons in 1918, assaying 8.4% copper, 0.189 oz. gold and 0.64 oz. silver, or $23 per ton, totaling $90,535.

Early in 1919, regular shipments were made to Anaconda, but in November the mine was closed down as developments at 500 and 600′ levels were unsatisfactory, and increased treatment charges, together with low metal market absorbed profits.

RIPPLE CONSOLIDATED MINING CO. **MONTANA**

Address: Neihart, Mont.

Officers: J. H. Rowe, pres.; J. A. Canty, v. p., and H. A. Frank, sec.-treas.

Property: 10 claims, 6 miles from Neihart, Cascade county. Ore car-

ries galena with high silver values. Reserves estimated at 30,000 tons. A 100-ton mill was planned in 1919.

In January, 1920, ore yielding $18 per ton net was being sent to the smelter at East Helena, and earnings were said to be equal to 25 cents a share.

ROBERT EMMET COPPER CO. **MONTANA**

Address: Amazon, Jefferson county, Mont. Wm. Q. Ranft, pres.; at last reports; John J. Schmitt, sec.-treas.

Cap., $3,000,000; shares $5 par.

Property: 6 claims, patented, 90 acres, carrying veins in granite, not far from the andesite contact. The main vein has a generally N.-E. strike, developed by a 500′ shaft, showing a shoot of ore on the 350′ level. A 1,200′ tunnel having about 1,000′ of laterals shows a 10′ vein carrying copper, silver and lead ore.

Equipment: includes 10-drill air-compressor, electric plant, with transformers for 60,000-volt current. Idle at last accounts.

ROCK ROSE MINING & MILLING CO. **MONTANA**

Address: Helena, Mont.

Officers: J. M. Nilan, pres.; H. C. Krug, v. p.-treas., Butler, Pa.; Andrew Weisner, sec., Helena, Mont.; R. A. Weisner, asst. sec.; L. S. Ropes, cons. engr.

Inc. in Montana.

Property: 6 claims, 3 patented, adjoining Fort Harrison on east, near Helena, Mont., and 3 claims under option. The ground is traversed by many veins and porphyry dikes. Dandy claim has 117′ shaft with 300′ drift and crosscut exposes 2 veins, one of silver-lead, the other of gold ore. Galena vein is 6″ to 4½′ wide, averaging 2½′.

Ore: silver lead carrying $14.07 to $57.79 per ton. A total of 196 tons of ore shipped in July, 1906, June, 1907, July, 1908, yielded $4,234 smelter returns.

Development: by 300′ shaft with a 125′ drift, exposing ore for 75′, in part lead and in part copper ore that carries 4½ to 10% copper. The gold vein is 2-3′ wide and reported to average $25 per ton, though none has been shipped. The vein is traceable by 6 pits for 378′ across the claim.

Equipment: 80-h. p. boiler, compressor, etc., complete. Buildings include engine house, ore sorting house, boarding and bunk houses. The freight rate is but $1 per ton for team, R. R. and loading. Water is handled by 1-2 hours pumping each day.

The mine is shallow and worthy of development. In March, 1918, ore was being sent to smelter. No later returns.

ROSE CONSOLIDATED MINING CO. **MONTANA**

Address: 701 Sherwood Bldg., Spokane, Wash.

Officers: H. H. Phipps, pres.; Frank Olney, v. p.; L. M. Weaver, P. S. Rose, and R. G. McIntosh, directors. E. C. Hormel, sec.; A. I. Goodell, mgr.

Cap., $200,000; par 10c; assessable. Annual meeting May 10.

Property: a gold-tungsten mine, 10 claims, 26 miles E. of Libby, reopened August, 1916.

Equipment: 10-stamp mill and concentrators, to be enlarged, 1919, by addition of Hardinge tube mill and flotation plant.

This is a small mine that can make a profit from its gold, plus a fair amount from tungsten, when the market is favorable.

Production: total about $25,000 to March, 1919.

ROYAL BASIN MINING CO. **MONTANA**

Office: Makeever Bros., 170 Broadway, New York, and Journal Bldg., Boston, Mass. **Mine office:** Maxville, Granite county, Mont. Walter Neal, mgr. The Montana Phosphate Co., formed in 1915 to treat phosphate beds near Maxville, is controlled by same interests as Royal Basin.

Cap., $2,000,000; $1 par.

Property: the North Star mine of 2 lode claims, 90 acres, in Wymans gulch, within the Missoula forest reserve and 3 miles east of the Drummond branch of the N. P. R. R. Also owns the Northern Bell mine, a silver property near Princeton. Claims show a fissure vein 15′ to 40′ wide, in 3 upper tunnels, 100′ vertically apart. A new lower tunnel cut the vein 800′ in and at a depth of 700′. At this point the vein carries concentrating ore 12′ wide with a paystreak

of sulphide ore, assaying 7½% copper, and 5 to 70 oz. silver, per ton. The smelter returns for over 1,100 tons shipped showed 5.14% copper.

Mine is equipped with a leaching plant using sulphuric acid to get the copper into solution and depositing electrolytic copper as cathode plates in tanks direct from the solution.

Reported leased for 5 years, from April, 1916, to Northwest Cons. Mines Co., Spokane, Wash. No recent returns.

ROYAL COPPER MINING CO., LTD. **MONTANA**

Office: Wallace, Idaho. Mine near Belknap, Sanders county, Mont. John H. Nordquist, pres.

Property: 12 claims, patented, near Thompson Falls, shows a vein of about 18′ surface width, traced 1,500′ on company land, carrying copper and lead carbonates and sulphides, said to average 6% copper and 18% lead, with small values in silver.

Development: by prospect tunnels of 50′ and 600′. The property is a prospect on which assessment work only has been done for several years past.

ROYAL MINING CO. **MONTANA**

Address: Mohawk Bldg., Spokane, Wash. **Mine office:** Potomac, Missoula county, Mont.

Officers: John H. Wourms, pres.; J. M. Long, v. p.; J. H. Pelletier, sec.; with Sam Seidenfeld and Dennis Reardon, directors.

Inc. Nov. 10, 1916, in Washington. **Cap.**, $1,000,000; $1 par; 600,000 issued.

Property: 17 claims, 3 patented, 320 acres, 6 miles N. of Clinton, on N. P. R. R., and 4 miles S. of Potomac, Mont., on C., M. & St. P. R. R. Formerly known as the Charcoal, which shipped $18,000 worth of ore some 20 years ago.

Geology: quartz vein in granite, 4′ wide, dipping 50° with N.-S. course. Ore assays 150 oz. silver, 6% copper, 20% lead, and $5 gold per ton.

Development: by 2-compartment shaft to 200′ depth, and 800′ tunnel.

Equipment: includes 600′ hoist, boiler, 225 cu. ft. compressor, and quarters for all employees.

Production: shipments totaled over $40,000 to mid-1918, but no figures available since then.

RUBY & COLUMBIA MINES CO. **MONTANA**

Dead. Property held by Basin-Montana Mines Co. (which see), which secured possession after Ruby & Columbia had forfeited all rights for non-compliance with terms of lease.

RUBY GULCH MINING CO. **MONTANA**

Address: Zortman, Phillips county, Mont.

Property: in the Little Rockies, Mont., 60 miles from railroad at Malta. Ore occurs in a wide lode of altered porphyry. It contains from $1 to $3 per ton in gold and is mined cheaply. In Jan., 1919, 200 men were employed, and the output was $30,000 per month. Cyanidation is employed at the mill.

SACAJEWEA GOLD & COPPER MINING CO. **MONTANA**

Office: 11 Broadway, New York. Mine near Helena, Mont. Col. Henry Altman, pres. and gen. mgr.; W. J. Anson, sec.

Cap., $5,000,000; shares $10 par.

Property: 47 claims in the Scratch Gravel district, adjoining the Copper-Silver Montana Mining Co. Idle some years, and no data available.

SAGINAW COPPER CO. **MONTANA**

Jackson, Beaverhead county, Mont.

Officers: Geo. North, pres.; E. M. Frank, sec.-treas., with Elmer North and Kenneth Campbell, directors.

Inc. Jan., 1916, in Montana. **Cap.**, $125,000; $25 par.

Property: 5 claims, including the Saginaw mine, in Beaverhead county, shows fissure veins in porphyry, with E.-W. strike, dip 35° and 3′ average width. Developed by a 300′ incline shaft.

Equipment: includes steam hoist. Shipped 19 cars ore in 1915, average assay, 11% copper. No figures available since.

ST. JOE GOLD-COPPER M. & M. CO. **MONTANA**

Probably dead, as letters sent former office, Wallace, Idaho, are returned unclaimed.

Property: 9 claims, well timbered, on Kelly Creek, near Saltese, 3 miles west of the Monitor mine, and one-half mile from a railroad, showing 2 strong veins.

ST. LAWRENCE COPPER MINING CO. **MONTANA**

Office: Saltese, Mineral county, Mont.

Officers: Henry M. Lancaster, pres.; S. B. Holbert, v. p.; F. W. Dewart, sec.; N. P. Hyndman, treas., with John Sloan, H. F. McLain and E. N. Ohl, directors.

Inc. Oct. 19, 1917, in Montana. **Cap.,** $1,000,000; $1 par; 924,505 issued, increased to $1,500,000 in January, 1920. Annual meeting, September 2. Operating expenses during 1918 were $81,184.

Property: 8 claims, 1 patented, 160 acres, 5 miles S. W. of Saltese, the nearest rail point.

Geology: claims show quartzite cut by a vertical fissure vein 6′ wide, carrying gold and copper. Ore-shoots are from 85 to 100′ long, and carry both sulphide and oxide ore, assaying 8% copper and $3 gold.

Development: by 2,500′ of work including tunnels 748 and 1,360′ long, connected by raise and opening mine to depth of 480′. Shrinkage stoping is used.

Equipment: includes a small compressor.

Production: 1,250 tons in 1917, and 1,500 tons to March, 1919. Fifteen men were employed at last report.

ST. LOUIS MINING & MILLING CO. **MONTANA**

Address: Marysville, Mont.

Property: the famous Drumlummon mine. In 1918 a little ore was extracted from a lower tunnel.

Equipment: 25-stamp mill and cyanide plant.

ST. PAUL MONTANA MINING CO. **MONTANA**

Probably dead, as letters sent to company's office, Maiden, Fergus county, Mont., are returned.

Officers: O. L. Taylor, pres.; Chas. W. Ames, v. p.; D. W. Taylor, sec.; W. K. Braden, treas., with L. P. Ordway and E. B. Coolidge, gen. mgr., directors.

Inc. in Arizona. **Cap.,** $50,000; shares $100 par; 500 issued.

Property: 2 patented claims, at Maiden, said to show gold ore in contact deposits between porphyry and limestone. Developed by a 450′ vertical shaft, with 5,000′ of workings. Ore claimed to assay $4 to $30 per ton and property is said to have produced $4,000,000.

Equipment: includes hoist, air-compressor, and 50-ton cyanide mill. Operated under lease at last accounts.

ST. REGIS COPPER MINING & MILLING CO. **MONTANA**

Probably dead, as letters are returned unclaimed from company's offices, Missoula, Mont., and St. Regis, Mineral county, Mont.

Officers: S. J. Wilson, pres.; F. W. Wilson, sec.-treas.

Inc. May, 1901, in Montana. **Cap.,** $300,000; shares $1 par; in half preferred and half common stock.

Property: 5 claims; also a 15-acre millsite and miscellaneous lands, 180 acres, on the Northern Pacific railway, shows quartzite and shale, with 2 orebodies of 6′ estimated average width, carrying chalcopyrite ore said to give average assays of 8% copper, and $1.50 gold per ton.

Development: by tunnels of 60′, 380′ and 600′.

SALTESE CONS. MINING CO. **MONTANA**

Office: J. R. Bean, sec., Mullan, Idaho.

Officers: G. A. Turner, pres.; O. V. Manring, sec.-treas., with W. H. Smith and H. E. Ferris, all of Spokane, Wash., directors. J. O'Brien, mgr.

Inc. in 1911. **Cap.,** $150,000; 10c par.

Property: 6 claims, 3 miles N. E. of Saltese, acquired from Black Trav-

eler Copper Mining Co. in December, 1917, for $10,000. Shows 2 parallel veins, one of about 6′ width, having a strong gossan.

Development: by 2 crosscut tunnels, the upper cutting a vein of 12′ estimated width, carrying copper ore, mainly chalcopyrite, giving assays of about 3%, with richer streaks assaying up to 32.4% copper and 15.8 oz. silver, with traces of gold. In Dec., 1917, an orebody was cut that carried 4′ of ore averaging 4.5% copper, 2 to 5 oz. silver, and $6 gold per ton. Shipments were to have started in 1919.

Equipment: includes engine, compressor, drills, shops, and living quarters.

SALTESE MINING & MILLING CO. **MONTANA**

Office: 22 Symons Blk., Spokane, Wash. **Mine:** near Saltese, Mineral county, Mont.

Officers: J. C. Johnson, pres.; Wm. Dixon, v. p.; O. V. Manring, sec.-treas., with J. B. Ward and G. A. Turner, directors.

Inc. March, 1911, as the successor of the Saltese Cons. Copper Mng. & Mlg. Co. **Cap.,** $1,500,000; shares $1 par; assessable. Levied an assessment of .02c. per share, Jan. 12, 1914.

Property: 12 claims, 240 acres, east of Mullan, near the National mine in the St. Regis district, about 8 miles N. W. of Saltese.

Development: by 2 tunnels aggregating 1,400′. The lower one, 655′ in length, opens a 13′ vein, probably the Black Traveler vein, at 460′ from the portal, which is said to show 5′ of high-grade copper ore. The tunnel is being extended to cut the big iron-capped vein seen on the surface.

Developing with a small force, 1915-16, but nothing heard of operations since. Property considered promising.

SCRATCH GRAVEL GOLD MINING CO. **MONTANA**

Address: Sidney Norman, Spokane, Wash.

Inc. Nov. 5, 1915, in Montana. **Cap.,** $1,000,000; $1 par. Reorganized February, 1920, in Washington. Capital increased to $1,500,000; $1 par.

Security Transfer & Registrar Co., New York, transfer office and registrar. Listed on New York Curb.

Operating statement for period Oct. 1, 1915, to August 31, 1916, shows: income from ore sales, $119,947 net, from 2,847 tons. On Dec. 31, 1918, cash on hand amounted to $11,496; supplies, $1,030; and due from Kootenay Gold Ex. Co., $18,011.

Company has a 25% interest in the Kootenay Gold Exploration Co., Ltd., operating near Nelson, British Columbia, whose property was sold in July, 1919, to Inland Mining Co., B. C.

Property: known as the Head property, 34.7 acres, lies 2 miles N. W. of Helena, on same fissure vein as the Franklin mine belonging to the Cruse estate.

Development: to 500′ depth, by 3 incline shafts, 90′, 50′ and 500′, with 800′ of drifting. Only high-grade ore is shipped, the low-grade being stored for the mill which was constructed from a plant erected by another company nearby.

Ore reserves were estimated in Jan., 1917, by C. E. Fryburger, as $944,509 in ore blocked out and $1,939,311 probable above 500′ and down to 600′ depth. Rich ore was sent to the smelter occasionally during 1917 and 1918. Production totals $320,000.

SELWAY-BOND COPPER GROUP **MONTANA**

Address: Herbert B. Selway, or H. A. Bond, Armstead, Beaverhead county, Mont.

Property: 12 claims, 240 acres, situated 1½ miles from Armstead, Mont. Claims cover 4,000′ on the course of several E.-W. fissure veins, 3′ to 3½′ wide that cross beds of quartzite, schist and limestone. The ore carries 3 to 9% copper.

Development: by 130′ shaft and several shallow openings, all said to show ore. Two shafts at water level show 3½ to 10% ore. An open-cut has yielded 250 tons of ore. No late returns secured.

SHEILS & IRONSIDE MINING & MILLING CO. MONTANA

Office: Dr. F. A. Ironside, 16 North Main St., Butte, Mont.

Officers: John Sheils, pres.; Stanley Ironside, v. p.; F. A. Ironside, sec.-treas.

Inc. 1913, in Montana. **Cap.**, $500,000; shares $1 par; 446,000 issued.

Property: 6 claims, 2 patented, 120 acres, situated 13 miles N. E. of Butte, and an equal distance from Boulder, Jefferson county, show a fissure-vein with ore shoots 250′ and 90′ long occurring in granite. This granite is cut by an almost vertical dike, greatly altered and mineralized, having a maximum width of over 50′. The ore occurs entirely in the dike, not as a segregation, but in quartz veins running with the dike, within it or at its margin. Orebody is 3′ to 5′ wide and carries silver, lead, copper, zinc and some gold.

Reported on by W. L. Creden, H. D. Morse, C. J. Stone; also by H. S. Morris.

Development: by 3 tunnels, main one 1,850′ long, with several stopes, and a 50′ winze with 200′ of drifting at the bottom.

Equipment: includes hoist, 3 drills, electric power, and a 100-ton concentrating mill.

Production: for 1915-16 amounted to 476 tons averaging 4.3% copper, 26.6 oz. silver, and $4.40 gold. Shipped about 40 tons of concentrates monthly in 1917, and until mine was closed, February 1, 1918.

SILVER CABLE MINING CO. MONTANA

Address: Box 1403, Missoula, Mont.

Officers: J. D. Corbett, pres.; George Falligan, v. p.; C. C. Mott, sec.-treas., with J. W. Kennedy, H. E. Chaney, and W. J. Rhoades, directors.

Cap., $1,250,000; shares $1 par; assessable. Listed on Butte Exchange. Annual meeting, first Saturday in July.

Property: 7 claims in east Coeur d'Alene district, just over the Montana line on the eastern slope of Bitter Root Mts., 5 miles from the Northern Pacific R. R.; part of the land lies in Idaho. Said to have a high body of silver, lead and zinc ore, from 500′ to 700′ high, proved for over 200′ in length, and from 4′ to 6′ wide. Ore is said to average better than 15% zinc.

Development: by 1,500′ tunnel, raises and drift in ore. Reported developing in 1919.

SILVER FISSURE MINING CO. MONTANA

Address: A. W. S. Cochrane, sec., 30 Broad St., New York.

Property: near Polaris, Beaverhead county, Mont., known as the Polaris mine, formerly operated by F. Aug. Heinze, carries silver and gold.

Shut down 1915, but leased to and operated by Silver Fissure Silver Mining Co. (which see), since 1918.

SILVER FISSURE SILVER MINING CO. MONTANA

Address: Seligman & Meyer, 61 Broadway, New York.

Officers: A. J. Seligman, pres.-treas.; J. Blanner, v. p.; D. J. Ferguson, sec., with J. F. Mercer and P. Mangone, directors. H. W. Chadwick, asst. sec.; Glenn Anderson, mgr., Butte, Mont.

Inc. in Delaware. **Cap.**, $1,000,000; par $1; all issued. Annual meeting first Monday in November.

Property: the Polaris mine, 6 patented claims, 150 acres, in Beaverhead county, owned by the Silver Fissure M. Co. Ore reserves, July, 1918, reported as 69,620 tons containing 1,507,300 oz. silver and 1,300 oz. gold. A 50-ton mill, employing chloridizinz roasting and hypo-sulphite leaching was erected during 1918. Property is a good one, but its operation is greatly hampered by its remote situation.

SILVER KING MINING CO. MONTANA

Address: Thomas Price, Kellogg, Idaho, and Thomson Falls, Mont.

Officers: D. W. Price, pres.; D. W. Haefeli, v. p.; Thomas Fluke, sec.-treas., with A. J. Brainard and R. R. Price, directors.

Inc. 1919, in Idaho.

Property: an old lead-copper-silver mine said to have produced $100,000 up to 1919. Development under way.

SILVER TRAIL MINING CO. **MONTANA**

Address: Basin, Mont. M. L. Hewitt, pres.; J. A. Cowan, v. p.-mgr., Salt Lake City, Utah.

Inc. 1919, in Montana. **Cap.,** $500,000; par $1.

Property: 3 miles S. of Basin, Jefferson county.

Development: by tunnel, one nearly 400′ long being driven to cut the Silver Blue vein, which assays high in silver on the surface.

SNOWSTORM MINES CONSOLIDATED **MONTANA**

Office: Old National Bank Bldg., Spokane, Wash.

Officers: Leo Greenough, pres. and gen. mgr.; J. W. Greenough, v. p.; W. J. Beaton, sec.-treas., with M. D. Hall, James Broad, H. P. Greenough, and R. E. Walters, asst. gen. mgr., directors.

Inc. in 1916. **Cap.,** $625,000; 25c par. Annual meeting third Tuesday in January.

An operating profit of $129,792 was made in 1918, but this was reduced to $47,314 when taxes, insurance, interest, exploration, etc., was deducted. Current assets totaled $42,562, and liabilities, $101,581.

Company was organized to take over the Snowstorm Mining Co. and to acquire under bond and lease the Banner and Bangle claims, at Troy, Lincoln county, Mont. Of the capital stock, 1,500,000 shares were issued to Snowstorm Mining Co. stockholders in full payment for the corporation's assets. Proceeds of sale of 1,000,000 shares not transferred to the former Snowstorm holders has been devoted to developing and equipping the Banner and Bangle property. Payments on this mine are $100,000 on Nov. 20, 1920; and $125,000 a year later, with a royalty of 10%.

Property: the Banner & Bangle mine. Also owns the old Snowstorm holdings at Larson, Idaho; and 25 claims, 7 millsites, 2 power-sites, 5 water-rights, and other holdings about 6 miles S. of Troy, Mont. Ore contains lead, silver, and zinc.

Development: at the Banner and Bangle property includes 6 long tunnels. No. 7, over 1,900′ long in 1919, is to be the main working adit, and is expected to cut the vein at 2,500′ from the portal. Ore reserves are said to be considerable.

Equipment: includes a 6-mile railroad, 1,500-h. p. hydro-electric plant, compressor, and 300-ton concentrating plant, mine change-house, boarding house, bunk-houses, etc.

Production:

Year	Ore milled, tons	Lead concts., tons	Zinc concts., tons	Gold, oz.	Silver, oz.	Lead, lb.	Zinc, lb.
1918....	65,342	5,093	3,644	561	164,605	6,060,484	2,474,969
1917....	61,647	2,933	3,150	445	89,980	3,927,559	1,826,903

It would seem as if company has a good mine and equipment, and is making every effort to develop it thoroughly. Profits so far have not been large, and payments due on property are heavy, but dividends are expected in the not far distant future.

SPOKANE-MONTANA MINING CO. **MONTANA**

Officers: J. O. Hamilton, pres., Peyton Bldg., Spokane, Wash., D. E. Burns, v. p.; Fred Ludwein, sec.-treas., with Wm. Gumm and Andrew Kuklo, directors.

Cap., $1,000,000; $1 par. Annual meeting October 15.

Property: 2 claims, 2 miles from Basin, Jefferson county, Mont., developed by tunnels on veins in granite. Ore contains galena with gold and silver values.

SPOTTED HORSE MINING CO. **MONTANA**

Address: Maiden, Mont. S. B. Coolidge, mgr.; C. L. Carstens, mine supt.; H. J. Mamill, mill supt.

Inc. in Arizona. **Cap.,** $50,000; $100 par.

Property: an old and well known gold mine, 35 acres, 1 mile from

Maiden, in Judith mountains. (See Geol. of Judith Mts., Montana, by Weed & Pirsson, U. S. Geol. Survey.)

Development: by 450′ shaft. Five distinct oreshoots extend to No. 7 level. Reserves are given as 20,000 tons.

Equipment: the mill contains crusher, rolls, Chilean mill, and Dorr counter-current decantation system of cyanidation, treating 120 tons daily.

Production: monthly output of concentrate is 30 tons, assaying from $200 to $800 per ton. Costs are reported as $2 per ton for mining, and 90 cents for milling.

STEARNS & KING MINE **MONTANA**

Address: G. W. King, Iron Mountain, Mont.

Property: a gold prospect 3 miles N. E. of Cobden, Mineral county, opened by 500′ tunnel.

SUMMIT DEVELOPMENT CO. **MONTANA**

Address: A. J. Reeder, Minneapolis, Minn., or A. H. Jones, supt., Virginia City, Mont.

Property: the Shafter and Marietta gold-silver mines in Summit district, near Virginia City.

SWASTIKA MINING CO. **MONTANA**

Address: Philipsburg, Granite county, Mont. W. W. Williams, mgr.

Officers: W. I. Power, pres.; F. R. Andrus, v. p.; C. E. Hansen, sec.; W. W. Kroger, treas.; the officers are the directors.

Inc. April, 1913, in Montana. **Cap.**, $500,000; shares $1 par; 407,043 outstanding.

Property: 3 claims, 1 patented, known as the old Basin mine, and held under long term option, shows a 4′ vein of argentiferous copper ore, oxidized to carbonates near the surface, exposed for 100′ on the 150′ level.

Development: consists of a 190′ shaft, and 200′ of drifts. Ore averages 4% in copper, 1½ oz. silver, 50c. gold per ton.

Equipment: includes electric hoist good for 500′, compressor and pump.

Mine was closed down in 1914, but at last accounts efforts were being made to increase capitalization and resume operations.

TARBOX MINING CO. **MONTANA**

Office: 426 High St., Wallace, Idaho. **Mine office:** Saltese, Mineral county, Mont.

Officers: Richard Daxon, pres., mgr. and treas.; W. J. Smith, v. p.; R. E. Seysler, sec., with Dennis Reardon and T. H. Cotton, directors. William Wallace, supt.

Inc. in 1890. **Cap.**, $2,000,000; shares, $1 par; 1.600,000 issued; assessable. Last assessment (No. 39), payable Jan. 19, 1920. Annual meeting, third Monday in July. Listed on Butte Exchange.

Property: 12 claims on Packer creek, 3 miles N. of Saltese, Missoula county. Ore, mostly of concentrating grade, carries galena and zinc blende, copper and gold coming in at 800′. Vein at surface is 10′ to 30′ wide and filling is quartz and siderite. Examined by F. J. Davey in 1918.

Development: by 800′ two-compartment shaft and winze sunk 200′ below bottom level. At last accounts the ore shoot on the 1,000 level was 9′ wide and had been opened for a length of 160′; one-third of the vein is shipping ore. It is estimated by management that 110,400 tons of ore between the 600′ and 800′ levels, plus that shown by recent development, and 5,000 tons on dumps, will average 2.85 oz. silver, 7.3% lead, and 7.6% zinc.

Equipment: includes sawmill, steam hoist and compressor, gasoline-driven mine fan, pumps, water power plant, living quarters for 50 men (12 employed), and a 150-ton concentrator to be built in 1919-20.

THOMAS CRUSE MINING & DEV. CO. **MONTANA**

Address: Helena, Mont.

Officers: Richard Cruse, pres.; Carolyn B. Cruse, v. p.; W. J. Cooke, sec.; J. J. Cruse, treas, with C. B. Nolan, E. J. Lange, and E. D. Phelan, directors.

Inc. in Montana. Cap., $1,500,000; $1 par; all issued.

Property: the Franklin, Helena, Looby, and Rock Rose mines, in

Marysville and Scratch Gravel districts, Lewis & Clark county; also claims on Jackson creek, Jefferson county; and Butcher creek, Carbon county, a total of 1,735 acres. Examined by W. F. Word of Helena. Ores are principally gold and silver bearing.

Shaft sinking was done at each mine in 1918, and a new ore-shoot was uncovered at depth of 640′ in one mine, and 2′ of solid galena ore at 400′ in the Helena mine. Three of the mines are equipped with machinery, and smelting ore is being mined and shipped from small payshoots.

THREE FORKS COPPER MINING CO. **MONTANA**

Probably inactive.

Address: Copper City, Broadwater county, Mont. Herbert G. Dunbar, supt., Three Forks, Mont.

Property: a group of claims, at Copper City, 7 miles north of Three Forks. Developed by 400′ shaft. As shaft is in lead material from top down, the lode is said to be 200′ wide. Sulphide copper ore appears at 325′, or 25′ above water level. Company planned extensive prospecting on 400′ level.

The ore is somewhat bismuthiferous, assaying up to 20% copper, with small values in gold and silver.

Equipment: includes steam power and an air compressor. No recent returns received.

TICON MINING CO. **MONTANA**

Controlled by Jas. A. Murray of Butte, Mont.

Property: 1 fractional claim, about 2 acres, lying between the Bell and Wild Bill mines of the Anaconda and the Speculator and Edith May claims of the North Butte. Mine has a 700′ incline shaft on the vein with levels opened at 300′, 500′, 550′ and 600′, said to show 4′ of good ore in the bottom. Work was stopped by an injunction, secured by the Anaconda Copper Mining Co. Idle for four years past.

TRIANGLE MINING & DEVELOPMENT CO. **MONTANA**

Letters returned from former office: 8 Allen Blk., Missoula, Mont. Mine office: Clinton, Mont.

Officers: R. B. Hughes, pres and gen. mgr.; Oliver Blood, v. p.; H. Y. Gephart, sec.-treas., with David C. Smith, E. C. Mulroney, F. C. Robb and Geo. E. Sullinger, directors. Henry E. Kuphal, engr.

Inc. Aug. 25, 1906, in Montana. **Cap.,** $500,000; increased later to $1,200,000; shares $1 par, non-assessable; issued $665,000. Debentures, $150,000 6%, $38,000 issued. Annual meeting, third Monday in February.

Property: 13 claims, 10 unpatented, 230 acres, well-watered and partly timbered in the Wallace district, 2½ miles from a railway, in 3 groups, known as the Triangle group of 8 claims, and the Hill group of 5 claims, 2 miles N. E. of Clinton and 17 miles E. of Missoula. The company also owns land in the town of Clinton.

The claims contain fissure veins cutting granite and altered sedimentary rocks near the contact with a large batholith of granite. The veins show chalcopyrite and bornite associated with hematite, siderite, and quartz in altered granite. The Triangle group shows a 16′ vein, opened by a 540′ tunnel with back of 450′. At the face the vein is 14′ wide and assays 2% copper, ½ oz. silver and 40 cts. gold, while an 8″ streak averages 15.04% copper, 3.20 oz. silver and 24 oz. gold and a 4′ footwall streak averages 4.65% copper, 12 oz. silver and 80 cts gold.

Development: by a 140′ crosscut and 540′ drift tunnels and 40′ shaft, estimated to block out 25,000 tons ore. The Grass Widow claim has 513′ of crosscutting and 300′, 75′ and 100′ drifts. The Hill group has a 300′ drift tunnel.

Equipment: includes a 40-h. p. boiler and an Ingersoll-Rand air-compressor, besides several mine buildings. Idle since 1917.

TWIN CITY MINING & MILLING CO. **MONTANA**

Address: Elliston, Powell county, Mont.

Officers: W. M. O'Connell, pres.; F. B. Hubbard, v. p.; E. J. P. Dwelly, sec.-treas., with P. H. McCauley, J. L. Hurd and John Churchill, directors; Allan McNaughton, gen. mgr.

Inc. in Montana. **Cap.**, $500,000; shares $1 par; 300,000 issued. Annual meeting, April 4.

Property: 5 claims, 70 acres, patented, in Elliston district, 8 miles from Elliston, on east side of Telegraph creek. Ore occurs in granite, and management reports 6 veins, of which one is developed by 2 shafts, 185′ and 50′ deep, and a 250′ tunnel with 3 crosscuts. Total workings 525′, said to prove vein 18′ wide, traceable for 3,000′ and proven to 170′ depth, carrying 5% copper, 4% lead, 19 oz. silver and $3 gold per ton. Value is said to increase in depth and sulphide ores expected at about 300′.

Equipment: includes steam power, one 40-h. p. hoist and several buildings. Reported 1915, that development would be resumed, but nothing reported since.

UNITED SMELTING & REFINING CO. **MONTANA**

Controlled by American Smelting & Refining Co.

Property: the East Helena, Mont., silver-lead smelting plant.

UNITED STATES COPPER MINING CO. **MONTANA**

Address: H. V. Edwards, Jr., Wallace, Idaho.

Officers: Mrs. Emma Stansfield, pres.; H. V. Edwards, Jr., sec.-treas.; with J. Lucas, C. W. Edwards, H. V. Edwards, Charles Strope, and Jesse Freeman, directors.

Cap., $100,000; 10c par; non-assessable.

Property: 3 patented claims on Clear creek, Sanders county, carrying copper-silver ore, and developed by tunnels. Not working at last accounts.

VALENTINE MINING CO. **MONTANA**

Address: O. A. Olsson, Wallace, Idaho.

Officers: F. Bland, pres.; A. L. Thurston, v. p.; O. A. Olsson, sec.-treas., with T. McCabe and O. W. Lewis, directors.

Cap., $1,000,000; par $1; non-assessable.

Property: 7 claims near DeBorgia, developed by 600′ tunnel and shaft. Idle at last accounts.

VALLEY FORGE MINING CO. **MONTANA**

Address: S. A. Mendenhall, mgr., Rimini, Mont.

Property: silver-lead-zinc mine in Ten-Mile district, 14 miles W. of Helena. Shipments were 80 tons daily, of dump ore in 1917. No recent returns.

VANDOR MINING CO. **MONTANA**

Address: E. B. Lindberg, Livingston, Meagher county, Mont.

Officers: J. F. Simmons, pres.-mgr.; J. F. Stuart, v. p.; E. B. Lindberg, sec.-treas., with J. J. Tucker and J. P. Kurtz, directors.

Cap., $1,000,000; par $1.

Property: 5 claims, 7 miles S. W. of Ringling, Meagher county. Production reported to mid-1918 as 16 carloads of ore averaging 6½% copper.

VERMILLION SILVER & LEAD MINING CO. **MONTANA**

Address: W. A. Kittrell, Wallace, Idaho.

Property: 6 claims, 12 miles from Trout creek, Sanders county, carrying veins of gold-lead-copper-zinc ore, opened by tunnels. A 100-ton mill is run by water power.

WAR EAGLE GOLD & COPPER MINING CO. **MONTANA**

Property: 3 claims, 7 miles from Alhambra, in Warm Springs gulch, Jefferson county, Mont., shows strong fissure veins in granite. Mineralization is in bands of sulphide ore in soft altered granite, the ore consisting of pyrite and a little chalcopyrite, whose value is mainly in gold.

Development: by a 300′ tunnel, planned to intersect the vein at about 1,500′ and give a back of about 500′. Presumably idle, as letters sent company were returned unclaimed.

WASHINGTON MINE **MONTANA**

See Angelica Mining Co.

WESTERN RESERVE MINING CO. **MONTANA**

Office: Youngstown, Ohio. **Mine office:** Basin, Mont.

Officers: F. S. Merwin, pres.; C. Livingston, v. p.; H. F. Duesinc, sec.-

treas., with C. J. Burns, J. E. Richardson, A. F. Schontz, E. C. Welch, J. W. Kuhns, directors. J. H. Hildebrand, supt.

Inc. in Ohio. **Cap.**, $100,000; $1 par. Annual meeting, February 1. **Transfer office:** Youngstown, Ohio.

Property: 3 claims, at Basin, Jefferson county, developed for gold, silver, lead, and copper. The quartz veins in granite strike E. W. and dip N. Pay ore occurs in large and small bodies as shoots and streaks showing sulphides.

Development: by 2,700′ tunnel, greatest depth being 660′.

Equipment: includes a steam compressor. Plan driving 100′ tunnel and erection of concentration plant. Developing in 1916 and 1917. No recent returns.

WESTERN SMELTING & POWER CO. **MONTANA**

Office: 601 Eitel Bldg., Seattle, Wash.; and Cooke City, Park county, Mont.

Officers: G. L. Tanzer, pres.; C. A. Swartz, v. p.; J. J. Black, sec.; G. B. Baker, treas., with C. J. Steeple, E. W. Gaylord, Joseph Schlenker, G. M. Moores, and C. A. Follett, directors. W. M. Tanzer, mgr.; F. A. Hancock, supt.

Inc. 1911, in Washington. **Cap.**, $5,000,000; $1 par; 2,206,117 issued. Annual meting, first Saturday in March. Expenses in 1916 were $89,592; $57,395 in 1917; $79,161 in 1918.

In March, 1919, company reported that a 1,000-h. p. hydro-electric plant, lumber mills producing 20,000 board feet daily, and 5-drill compressor at mine were all in operation. The 300-ton modern copper blast-furnace at Cooke City, Park county, was expected to be working by end of 1919.

WHITE CHIEF COPPER CO **MONTANA**

Described in Volume XIII. Absorbed 1918 by the Liberty-Montana Mines Co., which see.

Inc. Sept. 1913. **Cap.**, $1,000,000; shares $1 par.

WHITEHALL MINING, MILLING & DEV. CO. **MONTANA**

Address: Whitehall, Mont.

Officers: at last accounts, T. T. Gates, pres.; N. D. Root, v. p.; C. W. Hatch, sec., with Edward Ryan, Jesse Johnson, L. B. Knight, R. Edwards, J. M. Borden and James Ryan, directors.

Inc. June, 1914, at Whitehall, Mont. **Cap.**, $500,000; shares $1 par; 200,000 shares in treasury; 250,000 shares were given for the mining property.

Property: 5 claims, about 3 miles N. E. of Whitehall, Jefferson county, is reported to have an orebody 36′ wide from which shipments have averaged $16 per ton. Idle at last accounts.

WHITLATCH GOLD CO. **MONTANA**

Owned by C. W. Young, Chicago, Ill. Worked since 1912 under lease by Sherman Bros. (H. C., A. R. & Wm.), of Helena, Mont.

Property: the mine, 3½ miles south of Helena, Mont., located in 1864 and operated intermittently to date, has been a good and profitable gold producer. The veins carry silicious ore, containing small silver values, developed by a 500′ shaft; recent work is mostly between the 400′ and 500′ levels; a new shoot was opened at 450′ in May, 1919.

Equipment: includes tramway, compressor, pump and hoist. Only 5 stamps of the 20-stamp mill and cyanide plant were worked in 1916, treating both Whitlatch and custom ores. Ore from the 400′ level was milled in 1917-18.

WICKES-CORBIN COPPER MINING CO. **MONTANA**

Office: 21-25 Union Bank Bld., Helena.

Officers: S. A. Balliet, pres.; A. Major, v. p.; L. C. Henry, sec.-treas.; with N. Salvail and T. A. Grimes, directors.

Inc. July 9, 1907, in Montana. **Cap.**, 5,000,000 shares; 10c par; non-assessable; outstanding 3,633,900. Annual meeting, third Tuesday in June.

Property: 7 claims, 3 patented, 140 acres, 20 miles S. of Helena, and a half mile S. of Wickes, Mont. The claims show N.-S. and E.-W. fissure veins cutting granite, aplite, andesite and dacite. Ores carry gold, silver, copper and zinc.

Development: by Bunkerhill tunnel, 1,030′ long and Tulare tunnel, 700′; also 220′ shaft. Total workings, about 2,500′, greatest depth, 350′.

Production: test lot of 31 tons in 1917 returned 4.87% copper, 17.6 oz. silver, and 0.01 oz. gold, equal to $24.94 per ton. The cost was $4 per ton.

Appears to be a promising property.

WILLOW CREEK MINING CO. **MONTANA**

Address: P. H. McDermott, chief owner, Helena, Mont.

Property: Owns the Mountain Meadow group, 4 miles from Pony, Madison county, Mont., on Willow creek. Mine shows a 12′ fissure vein in granite carrying free gold with pyrite and chalcopyrite, both with gold values, in quartz gangue. Has a small mill. Regarded as promising.

A small shipment was made in July, 1917, but no recent returns secured.

WILSON MINING & SMELTING CO. **MONTANA**

Address: William Burke, pres. and mgr., Saltese, Mont.

Officers: A. Burke, v. p.; G. W. Dougherty, sec. and treas.; M. Hays and G. Early, directors.

Property: 2 groups of claims on Silver and Big Thunder Creeks, about 2 miles from Saltese, Mineral county; 6 claims on a lead and silver vein form one group, 8 claims showing a shoot of copper, in the other group Commercial lead ore is reported in an upper tunnel.

An assessment to pay for further exploration was levied in March, 1918.

WINDFALL PLACER MINING & DEVELOPMENT CO. **MONTANA**

Office: Missoula, Mont.

Officers: W. J. Johnson, pres.; Chas. Marsh, v. p.; A. J. Gibson, treas.; A. K. Anderson, sec.-mgr., with Gunnar Nordquist, directors.

Inc. in Montana. **Cap.**, $1,000,000; $1 par.

Property: 620 acres of placer ground and of water rights, dump, and timber lands, of which 300 acres are said to contain gold-bearing gravel, 8 miles from Quartz, Mineral county, and 3 miles from the N. P. and C. M. & St. P. railroads. The district is reported to have produced over $20,000,000 gold.

Geology: bedrock consists of soft shale, sandstone and quartzite, overlain in places by porphyry, above which is from 15′ to 40′ of gravel, averaging 30 cents a cubic yard. The gold is high grade, being 984 fine.

Development: ground has been opened by the "booming" system of moving gravel. Dumping facilities are good, there being a 1,200′ drop between the upper and lower ends of property.

Equipment: includes a 6,000 board feet sawmill, a 6,400′ flume, 30″ by 30″ in cross section, 1,600′ of 16″ to 24″ pipe having a vertical drop of 395′, at bottom of which is a "Y" with two 11″ branches carrying water to giants fitted with 2, 3, 4, or 5″ nozzles. An average of 300 miners' inches of water is available for 7 months each year. A derrick is employed to lift up to 8-ton boulders; and in 1918 an hydraulic elevator of 5 tons capacity under a 300′ head of water was installed. Sluice-boxes consist of double line 36 by 48″ with grade of 5″ in 12′.

Production: approximates $260,000, from 200,000 cu. yd. Costs are estimated at 10 cents a yard.

No recent production figures are available.

WISCONSIN MONTANA MINING CO. **MONTANA**

Office: Downing, Wis. **Mine office:** Superior, Mont.

Officers: A. O. Nichols, pres. and gen. mgr.; D. McDonald, v. p.; D. C. Coolidge, sec.; Dr. P. A. Beebe, treas., and R. A. Cleveland, directors.

Inc. January 29, 1906, in Wisconsin. **Cap.**, $50,000; shares 5c par. Annual meeting, first Tuesday in February.

Property: 16 patented claims, 320 acres, and a 5-acre millsite, 1 mile from the Missoula river and about 10 miles east of Superior. Claims show fissure veins cutting through limestone, slate and quartz; one reported as 70′ wide, with irregular shoots, assaying from 1 to 42% copper, with gold, silver, and lead values.

Development: by tunnels of 40′, 80′, 400′ and 710′ length, with laterals. A 3,000′ tunnel was planned. Mine was under lease in August, 1917. No recent returns received.

WOOD PLACER MINING CO. **MONTANA**

Address: J. M. Flugstad, sec., Corvallis, Ravalli county, Mont.

Cap., $25,000; shares $1 par; non-assessable.

Property: 480 acres of placer ground on Hughes creek, Ravalli county, worked by drag-line scraper. Output in 1918 was $21,000.

YAHK VALLEY M. & M. CO. **MONTANA**

Address: S. H. Ehlers, Libby, Mont.

Cap., $250,000.

Property: a gold mine in Sylvanite district, Yahk Valley, Lincoln county, developed by a 1,000′ tunnel.

BUTTE DISTRICT, MONTANA.

ALICE GOLD & SILVER MINING CO. **MONTANA**

Mine is operated as one of the Anaconda units. A steel head-frame and large hoist were erected during 1918. For recent litigation, see Vol. XIII.

In December, 1919, minority shareholders were allowed a re-argument of the proceedings covering sale of the mine to the Anaconda company. The dispute was over the price paid, and upon jurisdiction of the court, the Alice Company having been incorporated in Utah.

ALLIANCE COPPER CO. **MONTANA**

Mine office: 3 Lewisohn Bldg., Butte, Mont. Donald Campbell, pres.

Inc. May 19, 1906, in Montana. **Cap.,** $400,000, fully issued, shares $2 par. Stock listed on Butte Exchange.

Property: is very small acreage in the S. E. portion of the Butte district with surface rights to sundry town lots.

Development: by shaft, sunk jointly by the Alliance and Farrell companies. Mine was worked by lessees in 1919.

AMAZON-BUTTE COPPER CO. **MONTANA**

Office: Butte, Mont.

Officers: James H. Lynch, pres.; John A. Poore, v. p.; with F. Love, M. J. Cavanaugh, and Thomas T. Poore, directors.

Inc. Sept. 29, 1906, in Montana. **Cap.,** $2,500,000; $5 par; 198,000 issued.

Property: the following lode mining claims: Amazon, Altoona, Annie, Antoinette, Bertha, Henrietta, Jessie, Josephine, and Gaynor. Approximately 128 acres, situated in the east side district of Butte, Silver Bow county.

Property has been inactive for a number of years.

ANACONDA COPPER MINING CO. **MONTANA**

Office: 42 Broadway, New York City. **Mine office:** Hennessy Bldg., Butte, Mont.

Officers: John D. Ryan, chairman of board of directors; C. F. Kelley, pres.; B. B. Thayer, v. p.; A. H. Melin, sec.-treas.; R. D. Cole, asst.-sec.; J. T. Roberts, gen. aud.; D. B. Hennessy, asst. treas. Directors: John D. Ryan, B. B. Thayer, George H. Church, Nicholas F. Brady, Wm. Rockefeller, C. F. Kelley, J. Horace Harding, Andrew J. Miller and H. H. Rogers.

Operating officials:

Mining Department

John Gillie, gen. mgr. of mines; W. B. Daly, asst. gen. mgr.; C. W. Goodale, chairman Safety First committee. C. L. Berrien, gen. supt. of mines; John O'Neill and E. M. Norris, asst. gen. supts. The mine superintendents are as follows:

Anaconda Group

Ed. Renouard, Badger State mine.
Jas. S. Egan, Mountain Con. mine.
E. G. Kane, Bell-Diamond mine.
T. H. Oass, High Ore mine.
D. H. Crowley, St. Lawrence mine.
Wm. Nevin, Anaconda mine.
C. E. Calvert, Safety engr.
Dan Cronin, Never Sweat mine.
Dan. P. Sullivan, Original mine.
Charles Bonner, Steward mine.
Jos. Merrick, Moonlight mine.
Thos. McGrath, Gray Rock mine.
Jas. L. Gwinn, Belmont mine.
A. Barton, Asst. Safety engr.

Boston & Montana Group

John Varker, Mountain View mine.
Herbert R. Tunnell, Penn. mine.
K. P. Krueger, West Colusa mine.
G. E. Moulthrop, Tramway mine.
C. E. Calvert, Safety engr.
Jas. W. Tippett, East Colusa mine.
John Bartlett, Tramway mine.
Geo. Bennett, Leonard mine.
John C. Gaul, Berkeley mine.
Wm. McLain, Silver Bow mine.
Jas. McQuay, Tropic mine.

Zinc Group of Mines

J. J. Carrigan, gen. supt.
Herbert Tonkin, Poulin mine.
J. F. Dugan, Nettie mine.
John Bouck, Lexington mine.
Jas. Brennan, Emma mine.
Leo McGrath, Alice mine.
J. C. O'Brien, Southern Cross mine.
John Berkin, Orphan Boy mine.

Reduction Departments

Washoe Reduction Works, Anaconda

Fred. Laist, mgr.
L. V. Bender, gen. supt.
H. S. Ware, asst. supt.
L. E. Jones, supt. elec. dept.
W. M. Kelly, gen. smelter foreman.
W. N. Tanner, chief engr.
W. C. Capron, asst. chief engr.
B. S. Morrow, supt. of concentration.

Department.	Superintendent.
Converting and Casting	Pat Dalton R. E. Howe, asst.
Carpenter shop	Carl Johnson
Boiler shop	John Casey
Blacksmith	J. A. McDonald
Laboratory	J. A. Root
Sampling mill	Rod Munn
Local terminal and weighing	W. H. Nutting
Concentrator	B. S. Morrow
Blast	P. Barker G. Brolin, asst.
Surface	W. C. Cadwell
Power house	M. M. Adams P. J. Grush, asst.
Arsenic plant	E. M. Dunn
Foundry	H. N. Blake
Testing department	C. D. Demond
Research	F. F. Frick
Stock bins	Thos. Marron
Leaching plant	H. T. Maguire
Reverberatory	Ed. O'Brien
Briquette	H. S. Ware
Acid plant	M. R. Hoyt
Masons	A. N. Jette
Roaster No. 2 and McDougalls	J. K. Murphy
Coal dust	H. I. Silvester
Zinc concentrator	S. S. Rodgers
Brick plant	H. H. Coe
Electric department	L. E. Jones
Machine-shop	Clarence Bardon
Pipe-shop	John Bills
Paint-shop	James Sweeney
Lead burning	G. C. Detrich
Water works and Street Railway	H. M. Johnson
Chief clerk	Geo. C. Jackson

Boston & Montana Reduction Works, Great Falls

James O'Grady, mgr.
A. E. Wiggin, supt.
J. O. Elton, asst. supt.
E. S. Bardwell, metallurgist.
W. H. Gunniss, mgr. brick dept.
A. T. Elliott, gen. smelter foreman.
Edgar C. Maclay, chemist.
W. T. Burns, supt. elec. refinery.
P. Cudahy, supt. furnace refinery.
Peter Thill, asst. chief engr.

International Smelting Co.

For Tooele, Utah, and Miami, Ariz. smelters, the East Chicago and Raritan refineries, see International Smelting Co.

Coal Department

F. W. C. Whyte, mgr., Anaconda.
Thos. Snedden, supt. Diamond Coal & Coke Co., Diamondville, Wyo.
Thos. Good, supt. A. C. M. Co., Coal Department, Washoe.
C. A. Sederholm, supt. A. C. M. Co., Coal Department, Sand Coulee, Mont.

Lumber Department

Kenneth Ross, mgr., Missoula, Mont.
M. M. Ross, supt., St. Regis.
H. L. Soar, mill supt., Bonner, Hope, Idaho.

B. A. & P. Railway

H. A. Gallwey, mgr., Anaconda.
C. H. Spengler, master mechanic.
C. F. Murphy, supt.
J. H. Schuch, chief engr.

Labor Commissioner

Thomas J. Chope.

Inc. June 18, 1895, in Montana, as successor of Anaconda Mining Co. **Cap.**, $150,000,000; shares $50 par, 2,331,250 isued.

Funded debt: $16,000,000 2-year 5% gold notes, due March 1, 1917, were paid off in cash at maturity.

On December 31, 1918, an issue of $50,000,000 ten-year secured gold bonds was authorized. Of these, $25,000,000, designated as Series A, bearing 6% interest, were issued on January 2, 1919, under a trust agreement with the Guaranty Trust Co. of New York. The issue was sold to bankers. The amount of this loan is for equipment of the Andes Copper Mining Co. and Santiago Mining Co., and to replace in current account part of the earnings which have been invested by the company. It was deemed best to raise money this way rather than add permanently to the capitalization.

In a statement issued at the time this loan was raised, company reported that on September 30, 1918, its current assets totaled $73,000,000, and current liabilities $41,000,000. The excess of assets increased by $11,200,000 from Jan. 1, 1913, to Sept. 30, 1918. Fixed assets of company and subsidiaries aggregated $155,687,253, an increase of $59,109,458. During that period, earnings totaled $165,060,981, and dividends $82,687,500.

From the principal subsidiary companies and investments, the following results have been obtained during the period:

Inspiration Consolidated Copper Co.

Cost 250,900 shares @ $32.72		$8,210,433
Dividends received	$4,544,700	
Annual return at present rate	2,007,200	

Greene Cananea Copper Co.

59,600 shares @ $37.94		$2,261,437
Dividends received	$1,130,600	
Annual return at present rate	476,800	

International Smelting Co.

Book value 120,000 shares		$12,000,000
Dividends received	$3,600,000	
Earnings from May 27, 1914, above dividends	974,864	
Total	$4,574,864	

International Lead Refining Co.

Book value 7,500 shares		$750,000
Earnings from May 27, 1914	$216,567	

Raritan Copper Works

Book value 20,000 shares preferred and 40,000 shares common stock		$6,994,773
Dividends received	$3,030,000	
Earnings from May 27, 1914, above dividends	921,739	
Total	$3,951,739	

United Metals Selling Co.

Book value 50,000 shares		$5,741,249
Dividends received	$3,700,000	
Earnings from April 1, 1915, above dividends	564,813	
Total	$4,264,813	

Company has a very broad charter, permitting it to acquire, mortgage, lease, assign and transfer the capital stock, bonds or securities of any other corporation. National City Bank, N. Y., transfer agent; Bankers Trust Co., N. Y., registrar. Pogson, Peloubet & Co., auditors. Annual meeting, third Wednesday in May at Anaconda. Stock listed in New York, Boston, London.

Balance Sheet, including subsidiaries, years ended December 31:

Assets.

Year	Mines and lands	Buildings and works	Investments in companies not owned	Supplies, etc.	Metals	Cash and accounts	Total
1918...	$80,214,613	$56,416,775	$28,592,856	$13,411,134	$27,865,266	$30,702,053	$237,203,698
1917...	80,102,398	51,881,399	22,545,610	11,252,240	32,966,589	27,109,809	225,858,647
1916...	80,186,011	47,303,134	18,936,376	8,295,662	37,225,804	32,065,854	224,013,841
1915...	78,179,422	40,074,652	11,153,959	6,601,050	18,944,075	19,832,368	174,785,526
1914...	77,376,204	31,896,252	5,211,727	5,918,139	17,554,757	3,443,719	141,400,789

Liabilities.

Year	Capital Stock	Notes	Reserve for depreciation	Current	Dividend payable	Surplus	Total
1918...	$116,562,500	.....	$15,476,482	$35,435,357	$3,496,875	$66,232,484	$237,203,698
1917...	116,562,500	.....	10,316,446	31,402,619	4,662,500	62,913,989	225,858,647
1916...	116,562,500	$16,000,000	5,278,269	33,114,710	4,662,500	48,395,863	224,013,841
1915...	116,562,500	16,000,000	1,900,578	21,748,997	3,526,586	15,051,865	174,785,526
1914...	116,562,500	.....	.....	15,974,835	1,182,404	7,681,059	141,400,789

Income Account, including subsidiaries:

	1918	1917	1916	1915	1914
Sales of metals (deliveries)..	$102,586,542	$109,055,593	$96,097,709	$61,473,678	$36,745,559
Sales of merchandise.....	6,918,202	7,514,591	7,191,366	3,778,655	.....
Royalties, etc.	10,248,791	6,668,384	7,675,167	3,077,479	457,129
Metals in process and on hand	27,865,266	32,966,589	37,225,804	18,944,075	14,330,972
Total.....	$147,618,802	$156,205,157	$148,190,046	$87,273,887	$51,533,660
Metals in process and on hand	$32,966,589	$37,225,804	$18,944,075	$17,554,757	$16,173,788
Mining and development.....	29,844,525	24,591,950	24,709,071	17,254,622	15,298,517
Ore purchase	19,474,604	21,156,715	15,227,457	13,647,705	1,695,810
Treatment and transportation	23,695,832	18,960,026	19,183,023	11,723,703	7,894,479
Transport, refining and selling metals	8,552,862	6,956,883	6,760,480	4,492,172	2,998,098
Cost of merchandise sold.....	5,845,701	6,419,289	5,210,178	2,559,686	.....
Administration and taxes...	2,522,616	3,396,110	1,613,424	573,545	272,412
Balance	24,716,073	37,498,380	56,542,339	19,467,697	7,200,556
Total.....	$147,618,802	$156,205,157	$148,190,046	$87,273,887	$51,533,660

Profit and Loss:

Operating profit	$24,716,073	$37,498,380	$56,542,339	$19,580,618	$9,198,420
Income from companies not entirely owned	2,867,515	2,749,083	2,350,642	112,922	2,843,491
Total available	$27,583,588	$40,247,463	$58,892,980	$19,693,540	$12,041,911
Depreciation	$6,104,185	$5,387,436	$7,113,463	$1,900,575	.....
Interest	676,533	526,275	951,145	984,233	408,832
Dividends paid	17,484,375	19,815,625	17,484,375	9,325,000	9,077,500
Balance	$3,318,495	$14,518,127	$33,343,997	$7,483,632	$2,555,589

Dividends: paid quarterly; 13% in 1901, 4% in 1902, 1903, 1904; 11½% in 1905, 19½% in 1906, 26% in 1907, 8% in 1908 to 1911, inclusive; 9% in 1912, 12% in 1913, 10% in 1914, 6% in 1915, 14% in 1916, 17% in 1917, 16% in 1918, and 9% in 1919, to Nov. 27. For 1920, $1 is payable on Feb. 24. The total amount is $161,510,625.

Early in 1916 the following companies were organized under the laws of Delaware, the Anaconda owning 78% of the stock of the first named and all that of the other two companies; Andes Copper Mining Co., **cap.**, $50,000,000; shares $100 par; Andes Copper Co., **cap.**, $50,000.000, shares $25 par; and Potrerillos Railway Co., **cap.**, $5,000,000, shares $100 par. These companies are operating in Chile, and development so far shows 100,000,000 tons of 1.4% copper ore. These will be found described in the chapter devoted to Chile.

Investments made in 1916 amounted to $7,968,836. This includes total cost of the Andes Copper Co. stock acquired to Dec. 31, 1916; 20,740 shares of Alice Gold & Silver Mining Co.; 26,100 shares of Greene Cananea; 50,000 shares of Inspiration Cons., and 188,300 shares of Butte Copper & Zinc.

In 1917, investments, with $4,550,600 of Liberty Bonds, totalled $9,066,389, this amount including the cost of stock issued during the year by the South American companies to reimburse Anaconda for advances made; 28,740 shares of Butte Copper & Zinc; 50,900 shares of Inspiration Cons., and 2,700 shares of Greene-Cananea.

In 1918, the sum of $8,883,628 was invested. Aside from advances made to the South American companies, the International Smelting Co. (a subsidiary), exercised its option on 630,000 of the total of 1,250,000 shares of the Walker Copper Co. in California (which see), and $794,668 in purchasing land and organizing the Arizona Oil Co., which has producing wells in California.

Property: Company owns 1,168 acres mineral claims at Butte, including all the property formerly held by the following companies: (1) **Boston & Mont. Cons. C. & S. Mng. Co.**; (2) **Butte & Boston Cons. Mng. Co.**; (3) **Red Metal Mng. Co.**; (4) **Washoe Copper Co.**; (5) **Parrot Silver & Copper Co.**; (6) **Alice Gold & Silver Mng Co.**; (7) **Trenton** (formerly Colorado) **Mng. & Dev. Co.**; (8) **Big Blackfoot Lumber Co.**; (9) **Diamond Coal & Coke Co.**; (10) **Original Cons. Mng. Co.**; (11) **Colusa Parrot Mng. & Sm. Co.** It owns the Southern Cross gold mines near Anaconda. In 1915 it bought the Alex Scott mine at Butte, and in 1916, the Pilot Butte mine.

Company owns 1,100,000 acres lumber land (Big Blackfoot Lumber Co.) and sawmills at Bonner, Hamilton, Hope, St. Regis, Mont.; and 13,280 acres coal lands at Diamondville, Wyo.; Washoe, Belt, and Sand Coulee, Mont.

The Raven mine was bought August 4, 1915, for $65,000. Company has a 5-year lease on the Emma mine (Butte Copper & Zinc Co.) operated as a zinc producer, and bought the Czarroma claim fraction, containing the continuation of the Emma vein for $225,000 late in 1915. Options were secured on several placer claims in the S. W. part of Butte. The E. portion of the Alex Scott claim, and the Little Annie claim, were purchased for $750,000. Company stopped work on the low-grade gold property, called the Porphyry Dike, near Rimini, Mont.; also on the Bonanza claims in the S. W. part of Butte, because of failure to find zinc-silver ore in commercial amount. The Gambrinus mine was purchased in July, 1918; and company bought a half interest in the Kit Carson claim for $48,000, the ground lying between the company's Orphan Girl mine and Hibernian of the Davis-Daly Co.

Geology: Butte hill is a network of metalliferous veins, the older with nearly east and west strike being displaced by a number of northwest fault veins cut in turn by still later northeast fault veins and these all cut by the Rarus fault. The geology is fully described by Walter Harvey Weed in Prof. Paper 74 (1912) of the U. S. Geological Survey, which can be had free of charge from that Bureau. The matter of clearly defining apex and extra lateral rights, under the present Federal mining laws, is one of the greatest possible difficulty, and in the past has led to litigation costing millions of dollars, all of which ultimately had to be paid out of the profits from copper produced. In 1916 the mines now owned by the Anaconda were developed by 42.06 miles of new openings, of which 2,879′ was shaft-sinking.

The mine waters are highly charged with copper, and precipitation tanks have been built at practically all of the big mines merged in the Anaconda. Old scrap iron, tin cans and wire rope are used as precipitating agents, these articles commanding a standard price of 1 cent per pound. The flow of the water in the precipitation tanks and launders is much more rapid than is the case in the large Spanish lixiviation plants. The principal plant, at the Leonard mine, cost about $20,000, and treats water from all of the Boston & Montana mines. It has a building for drying and shipping the copper precipitate.

Mines and shaft equipment: by the merger of the Anaconda and Boston & Montana, both among the six largest copper producers of the world, and the addition of a number of other mines of second and third rank in productive capacity, the Anaconda became the largest copper company in the world, employing normally, 8,863 men in the mines and 1,854 on surface at high wages (a new agreement, arranged July 1, 1919, and good for one year, gives miners $5.75; first-class engine-men, $7.75; journeymen in other trades, $6.50; and laborers, $5 per day), and with a payroll in Butte alone of over $1,000,000 monthly, with very large additional payrolls at its works in Anaconda and Great Falls. The company's interest in its employees is genuine, and in addition to a department of labor, and a safety-first organization, a large area of ground near Anaconda called "Opportunity" has been drained and cut up into large lots for farming and residences.

As property lines have been practically eliminated, so far as underground work is concerned, by the merging of various companies, and workings have been connected, the property can be most usefully described in sections called by the familiar names used under former ownership, or by the names of the 22 operating shafts of the company.

The many mines of the Anaconda Company have immense reserves of ore of all grades, and each year's development maintains the required tonnage.

The Anaconda mine was opened, 1880, as a silver producer, but at about 150′ depth the oxidized silver ores were succeeded by high-grade copper ores, mainly chalcocite and bornite, while at depth there is a large amount of enargite. Net earnings of the mine, during the 15 years, 1880-1894; are unknown, but may be safely estimated at not less than $50,000,000. At a depth of about 1,600′ quartz pyrite veins of the Anaconda showed impoverished values, there being considerable pyrite, but the fault veins showed large orebodies at depths of 1,200′ to the deepest levels yet reached in mining which is 3,400′ in the High Ore mine.

The Anaconda mine proper has a 3-compartment shaft, 2,800′ deep, connected underground with the Never Sweat, St. Lawrence, Bell, Belmont and Moonlight mines. The mine has electric locomotives for tramming on several levels. Hoisting is by 8-ton skips, swung under double-deck cages and worked in counterbalance.

The St. Lawrence mine has a 2,600′ three-compartment main shaft, connected underground with the Anaconda, Never Sweat, Mountain View and Pennsylvania mines. The St. Lawrence has been on fire since 1889, in an extensive area above the 1,100′ level. The fire has been fought constantly, and walled off by cement bulkheads, and while it cannot be extinguished and is troublesome, it does not result in the loss of copper, as the sintered ore remaining after the burning of the sulphur can be mined later, and the mine waters are strongly charged with copper, much of which is recovered by precipitation on

surface where it is run over scrap iron and cement copper is made. The hoist has 32″x72″ cylinders, raising 5-ton skips swung under single-deck cages.

The Never Sweat mine has a 2,500′ three-compartment main shaft. Square-set timbering is used in stoping, as well as back filling. Some trouble has been had with fire from the St. Lawrence. The surface plant includes a 28″x48″ double drum hoist, raising 3-ton skips swung under single-deck cages; also a 7,500 cu. ft. compressor.

The Belmont mine, about 1 mile south of the main shaft of the Anaconda, and 375′ lower, has a new 2,400′ four-compartment working shaft, the largest in the district. Connections have been made with other mines and a 1,500-ton ore bin erected. Equipment includes a powerful new hoist, with capacity of 3,500′, taken from the Corra mine.

The Diamond mine has a 3,400′ three-compartment shaft, developing the Corra vein and other veins to the bottom level. Equipment includes a 34″x72″ hoist, operating single-deck cages with 5-ton skips; and 2 electrically-driven compressors of 7,500 cu. ft. capacity each.

The High Ore mine is one of the deepest in Butte, having a 3,600′ three-compartment shaft, producing high-grade chalcocite. The High Ore does the pumping for a number of connecting mines of the Anaconda, handling all water from the Anaconda, Washoe and Parrot properties. The mine has 9 electric pumps, each good for 600 gals. per min., with 1,200′ lift. These are located on the 1,200′, 2,200′ and 2,800′ levels. Relief pumps to run by steam or air are also installed on different levels.

The Modoc mine has a 2,500′ three-compartment shaft, connected with the 2,800′ level of the High Ore mine. The Modoc has several veins besides the one of this name, its chief ore supply coming from the veins, which are stoped up to the North Butte Co.'s boundaries on the north and to the Ballaklava mine on the south.

The Mountain Chief mine, area 1.15 acres, lies next north of the Butte-Ballaklava, and is said to have produced about $1,500,000 worth of ore from a shallow shaft. The Mountain Chief is developed to 500′ by its own shaft, but its deeper levels are worked through the High Ore mine.

The Parrot group of properties includes the former holdings of the Parrot Silver & Copper Co., 19 fractional claims, area 40.6 acres, embracing the Parrot, Little Mina, Bellona, Original No. 6 and the Oro Butte, Champion and Copper Reef mines, and various other small properties. Main shaft of the Parrot mine is now used as an air shaft, and the ground is worked from the West Steward and Never Sweat shafts.

The Little Mina 1,200′ shaft is now used for air only.

The Original, Steward and Gagnon shafts are on a western continuation of the Anaconda and Steward veins, and in 1912 a continuous ore shoot of good grade, over 2,700′ long, was opened in the bottom level of these mines.

The Original mine has a 3,100′ shaft with three compartments below 1,100′. The mine was located, 1864, in the first stampede to the new Silver Bow diggings and was the first mine patented in Butte.

The Steward mine has a 3,800′ vertical shaft, showing, in the bottom workings, a 30′ vein, carrying good copper ore, with silver values. Equipment includes a 120′ steel headgear and a 34″x72″ first-motion duplex hoist, good for 3,500′.

The Pilot mine, purchased for $1,125,000 cash, in 1916, is now part of the Badger State mine. It has been equipped with a steel head-frame and large hoist.

The Gagnon is the westernmost of the productive copper mines of Butte. Its ores have carried more silver than those of the mines farther east and have held a number of minerals, such as hübnerite, unusual elsewhere in the camp.

The Gagnon old 2,800′ three-compartment incline shaft, sunk at an angle of 74°, is now used as an auxiliary shaft, ore being hoisted through the Original shaft. The new vertical 2,800′ shaft, near the west end of the property, is as yet used for ventilation only. Equipment includes a 22″x48″ hoist.

The Moonlight mine, once the principal producer of the Washoe Co., has

ore averaging about 1 oz. silver for each unit of copper. The Moonlight has a 1,700′ three-compartment shaft, connected underground, with the Blue Jay, Never Sweat and Anaconda.

The Poulin mine, formerly owned by the Washoe Co., has a 1,200′ shaft, but is operated through the 1,500′ Buffalo shaft, and is to be operated for zinc ore.

The Silver Bow No. 1 mine has a 1,000′ shaft, connected with the Pennsylvania, Berkeley and No. 3 mines. It has been a good producer for many years.

The Berkeley 1,500′ three-compartment shaft has a 28″x48″ double drum hoist, handling 3-ton skips in each compartment.

The Rarus mine has a 2,800′ three-compartment shaft, connected with the Tramway mine. The veins have divergent branches, and constitute a sort of stockwork, with an ore zone up to 300′ in width, in places. It has been equipped with steel head-frame and 34 by 72 in. air-operated hoist.

The Tramway mine, lying between the Minnie Healy and Rarus, formerly owned one-third by Butte Coalition, and two-thirds by Butte & Boston, has a shaft that is the central shaft for the Minnie Healy-Rarus group. The Tramway shaft, 2,800′ deep, has 3 compartments, each 5′x4′ 2″ in the clear. The first of the new levels in the Minnie Healy is the thirteenth, about 50 below the old 1,500′ level, in which fire was burning, 1908-1909. The Tramway has numerous bodies of 5 to 6% copper ore, with good gold and silver values, the really great orebodies coming in between the 1,300′ and 1,400′ levels, and on the 1,700′ level there is an orebody up to 75′ in width, averaging nearly or quite 7% copper.

At the Tramway mine equipment includes a 92′ steel head-gear with 12′ sheave wheels. A 34″x72″ Allis-Chalmers 2-cylinder Corliss hoist, with 12′ drums, using 1½″ round wire cables, has capacity to raise 7-ton skips from a depth of 3,500′. Each compartment has 5-ton skips changeable to 4-deck cages, for lowering men, an auxiliary hoist being used for sinking and handling supplies through the third compartment. The main surface plant of the department, at the Tramway shaft, includes a boiler house, engine house, carpenter shop, machine shop, office buildings, warehouse and changing house with hot and cold water and shower baths.

The Nipper mine of the Red Metal group, includes the Nipper, Chief Joseph, Balm and L. E. R. claims. The Nipper mine, area 15.18 acres, has 2 shafts, of 1,000′ and 1,200′ depth, with 12 exits, being connected underground with the Parrot, Never Sweat and Little Mina mines, and has been operated to some extent through the Parrot shaft.

The Green Mountain mine has a 2,200′ three-compartment shaft, not deepened for several years.

The Mountain Consolidated mine has a 2,500′ three-compartment shaft, with a good ore showing on the 1,400′ level and below, and an especially good showing on the bottom level, at 2,500′. A Nordberg first-motion hoist was erected in 1918. The East Grey Rock shaft is used for ventilation only.

The West Grey Rock mine, producing ore carrying values mainly in gold and silver, with a small percentage of copper, has a 1,826′ shaft, the 1,800′ being the deepest level open in 1916. The veins, though small, carry good ore, rich in silver. The Corra shaft is kept open for ventilation.

The Leonard has an old 1,800′ shaft, used for men and supplies, and the main, or No. 2, a new shaft of 4 compartments, 2,800′ deep. Mine is timbered with 12x12″ and 14x14″ square sets, requiring monthly an average of about 1,000,000′ of mine timber, board measure. The 2,000′ level shows equally large and good orebodies. Water from the Mountain View, Pennsylvania, Tramway, East Colusa and West Colusa mines drains to the 1,200′ level of the Leonard and is forced thence to surface by 4 electric pumps. Valves are of pot form, and the entire water end is phosphor-bronze, columns being lined with wood, thoroughly soaked in oil, to withstand the corrosive action of the mine waters.

The Leonard surface equipment is the show plant of Butte, and is very complete, including a 152′ steel headgear and 2,000-ton ore bins. The power plant has ten 250-h. p. boilers, and a 34x72″ hoist, good for 3,500′ depth, raising cages with 5-ton skips swung under, with 1½″ round cable. There also is a

12x14" sinking engine. Plant includes 3 air compressors of 3,000, 4,000 and 5,000 cu. ft. capacity per minute, respectively, and 2 of 7,500 cu. ft. each.

The West Colusa mine has a 2,200' three-compartment shaft, with levels at 100' intervals to depth of 1,200', and thereafter at 200' intervals. Shaft retimbered, early in 1910, and cut down to 3 compartments, being given false sets, to obviate squeezing, which caused much trouble in the past. Mine is timbered with 10x10" and 12x12" square sets, and shows vein matter up to 400' in width. Connection is had underground with the Mountain View and Leonard mines. Surface equipment includes a 23x60" hoist, operating 2 double-deck cages, a tramway and a 28x48" single drum auxiliary hoist.

The East Colusa mine has a 2,000' three-compartment shaft with levels opened at 100' intervals from 300' to 700'. The mine has a vein of about 65' width, formerly averaging 3 to 4% copper, but mine is now an important producer of zinc ore for the new electrolytic zinc plant. Production is about 200 tons daily.

The Pennsylvania mine has a 2,800' three-compartment shaft, with levels at 100' intervals from 100' to 1,000', and at 200' intervals below. This property has extensive stopes above the 600' level, ore lying nearer surface than in most of the Butte mines. Equipment includes a 350-gal. electric pump on the 1,800' level, forcing water to a crosscut to the Leonard mine, whence it goes to the precipitation plant. Surface equipment includes 2,000-ton ore bins, a 34x72" Allis hoist, operating two 5-ton skips and a 28x48" single drum hoist sinking engine.

The Badger State mine in the northwestern part of the camp, develops the Badger State, Jessie, Edith May, Emily and several other veins. Mine has a 2,800' four-compartment shaft with extensive orebodies opened up on the 1,100', 1,300', 1,400', 1,600', 2,000' and 2,200' levels. The Emily shaft auxiliary to the Badger, was deepened from 400' to 817', or 1,000' level of the Badger and connection made in 1912. Property is now an important producer of copper and zinc ore.

The Mountain View mine has a 2,249' three-compartment shaft, and a 2,000' air shaft. The Mountain View shows 6 veins of 8' to 60' width, ore averaging nearly 5% in copper tenor, being among the richest mines in the camp. Equipment includes 4,500-ton ore bins, a hoist good for 3,000' depth, and a 28x48" single drum auxiliary hoist.

The Tropic shaft on one of the most easterly claims of the company is 900' deep and mine is now a producing property.

The Greenleaf mine, located east of the proven ore zone of Butte, has a 1,000' shaft, with about 800' of lateral workings. Work was suspended, July, 1908, but the property is by no means devoid of promise.

The Southern Cross mine, situated in the Georgetown district, west of Anaconda, purchased 1912, for $370,800, is a gold property developed by a 500' shaft, equipped with electrical machinery. It was extensively worked because its oxidized ore is good iron flux, but was closed permanently Dec., 1919, on account of exhaustion of orebodies.

The air-compression plant at the High Ore mine has eight 1,200-h. p. air compressors, each with a capacity of 7,500 cu. ft. of free air per minute. The air is compressed to 90 lb. and is used in the hoisting engines in place of steam. A building 300' long, contains 25 receivers, each 10x30' on the ground, for the compressed air, this air-storage plant having reserve power for 8 hours. In connection with this plant is the largest steel water-tank in the world, 100' in diameter.

Electric power, supplied by the Montana Power Co., is brought from Great Falls, 130 miles, and from Canyon Ferry, near Helena, 70 miles distant, current being wired to the mine with a primary voltage of 50,000 volts, reduced to 2,000 volts in a transformer station, just outside of Butte, power being distributed to the various workings from a main station at the Never Sweat mine, the current being used at 440 volts.

Ventilation and fire protection have been given much attention by Anaconda engineers, and in 1917 a systematic plan covering all underground workings was

adopted, electrically-driven surface fans with a capacity of 696,100 cu. ft. of free air per minute being installed. In 1918, five Sirocco double and single-inlet fans, of 228,000 cu. ft. capacity, were put in. To increase the velocity of air currents in shafts, experiments were made at the Parnell shaft, inserting concrete slabs between the timbers. Results were so good that all shafts will be so arranged.

As a protection against fire, shaft and station timbers are covered by metal laths and cement coating at the Belmont, High Ore, Parnell, Rarus, and Tramway shafts. At other points underground, timbers are coated with cement by the "Gunite" method.

New development—the total at all mines:

Year	All work feet	Shafts deepened, feet	Ore mined, tons	Cost of Mining per ton
1918.....	220,704	4,991	4,918,468	$6.07
1917.....	182,688	2,809	4,193,624	5.86
1916.....	222,103	2,879	5,582,077	4.42
1915.....	186,560	.....	4,383,339	3.93

The normal daily output of ore is 16,500 tons.

A feature of work in 1917 and 1918 was the mining of pink manganese ore (rhodochrosite) from the Emma and other mines. This was concentrated, and partly sold or used in making ferro-manganese at Great Falls.

Coal mining—the quantity raised and its disposition.

Year	Mined tons	Used at coal mine, tons	Used by Anaconda, tons	Sold tons
1918.....	1,065,743	56,589	632,012	374,138
1917.....	1,054,510	66,238	551,533	436,740
1916.....	964,122	64,773	616,910	282,418

Lumber Department—the mills at Bonner, Hamilton, Hope, and St. Regis had the following record:

Year	Timber cut, feet	Purchased, feet	Used at mills, feet	Sent to mines, feet	Used at factory, ft.	Sold, feet	Stock, feet
1918.....	82,950,859	41,219,939	1,415,915	72,162,891	2,208,966	35,765,541	54,027,560
1917.....	87,330,500	16,476,014	1,455,703	57,205,887	4,172,414	50,534,133	41,410,075
1916.....	105,495,846	30,005,910	1,361,549	91,321,061	6,215,378	80,800,144	50,971,698

Profits from the coal and lumber departments were $1,295,119 in 1916; $363,312 in 1917; and $354,187 in 1918.

Railroad—the Butte, Anaconda and Pacific line had the following results:

Year	Ore and freight, tons	Passengers, number	Gross earnings	Operating charges	Taxes, interest etc.	Net income
1918.....	5,630,451	245,682	$2,122,607	$1,535,724	$213,960	$372,923
1917.....	6,800,161	355,224	1,803,374	1,436,199	219,590	147,585
1916.....	8,416,003	408,865	2,199,611	1,464,796	207,648	527,167

The Washoe smelter, where all the Anaconda company's ore is concentrated and most of it smelted, is about 2 miles from Anaconda and 26 miles from Butte, all ore being hauled by electric power over the Butte, Anaconda & Pacific R. R., owned by the company. In 1914-15 the entire plant was remodeled, the capacity increased to 15,600 tons per day, leaching and flotation plants installed, an acid plant erected, a zinc plant put in operation and brick works built, the improvements costing, it is said, over $6,000,000. The results are so remarkable as to be almost startling. The great items of saving of the remodeled plant comprise coal-dust firing of reverberatory furnaces with greatly increased capacity (583 compared with 239 tons per day) with less slag loss; the abandonment of briquetting and blast furnace smelting in favor of the new reverberatory practice; the treatment of all ore in the Anaconda concentrator, instead of sending it to Great Falls; the introduction of flotation and the operation of the leaching plant. The saving has been increased from 75 to 96%, the tailings formerly carrying 0.62% copper now carry but 0.1% copper—that is, 2 lb. of copper to the ton. The savings amount to 8.4 lb. copper per ton, and paid the entire cost of reconstruction in the first half year of operation. This work has

put the Anaconda company in the ranks of low cost producers and was a great triumph for its metallurgists.

The Washoe Smelter: This plant can treat 16,000 tons of ore per day using 500 tons coke, 900 tons coal for reverberatory furnaces, 3,000 tons limestone flux and 260 tons coal for power and heating. Sixty million gallons of water are used each day and 42,000 gals. per min. Three thousand, two hundred men are employed at a monthly wage of $400,000 in and around the works.

From the storage bin the ore passes through an automatic sampler; thence to the concentrator plant of 2 great buildings, each housing 4 units comprising Blake crushers, Harz jigs for coarse and Evans jigs for medium and fine concentrates, 4 sets of 55x24″ rolls, 8 Wilfley tables using Butchart riffles, six 8′ Anaconda classifiers, six 7½′x72″ Hardinge mills, each with 225-h. p. motors and using steel linings and steel balls; 6 Dorr classifiers, 4 Minerals Separation flotation machines, each having 15 agitators and 14 spitzkasten with 150-h. p. motors. Anaconda operates under license from Minerals Separation, the royalty being from 4 to 12 cents per ton of ore treated, depending on quantity.

No. 1 section differs from the other 7 in having Hancock instead of Evans jigs, and 8x12′ tube mills using Forbes liners and pebbles.

The coarse concentrate goes to the blast furnace, the fine to settling tank, the flotation concentrate to Dorr thickeners, 12x50′, discharging 60% solids to Oliver filters.

Slime treatment is very fully described in the Mining World, March 4, 1916, and in Transactions of A. I. M. E. for 1916.

There are 2 roaster divisions, one having Evans-Klepetko type of McDougal roasters, each handling 215 tons per day of fine concentrate, fine lime rock and first-class screenings. A Ruggles-Coles dryer prepares concentrate for the acid plant and for converter. Roaster No. 2 contains 28 Anaconda roasters, a modified Wedge-McDougal furnace and treats material from the tank house and Oliver filter cake.

The reverberatory furnace plant is in 2 buildings, each with 4 furnaces and 5 boiler sets. Each furnace is 143x23′ and handles 700 tons material per day when burning 100 tons coal in 24 hours. The coal previously ground in Raymond Bros. 5-roller pulverizer to 100-mesh, is blown into furnaces through Warford burners under 16 ounces pressure. Coal dust firing is much more efficient than grate firing, and each furnace develops 6½ boiler h. p. per ton coal burned, hot gases passing through Stirling boilers. Furnaces are fed from top, banking concentrates against side walls. Slag flows off continuously instead of being intermittently skimmed and matte is tapped at intervals, running into 10-ton ladles trammed direct to converters.

The blast furnace building contains two 51′ furnaces, and one 87′ long, each 56″ wide at tuyeres. The latter handles 3,000 tons per day, the others 1,600.

Converter building contains 7 stands for Great Falls type converters. Latter are 20′ diam., 17′ high, and weigh 450,000 lbs. with magnesite brick lining. The charge for each converter is 85 tons matte, 35 tons ore, blown to blister copper in one converter. Blister copper is poured into 2 casting furnaces, each of 140 tons capacity, with one in reserve. Air at 15 lbs. pressure oxidizes copper which is then skimmed and poled and poured into a casting machine. All handling of material is done by electricity.

The sand leaching plant, 2,000 tons capacity, recovers the copper from sands of the old tailings dump. These sands are roasted in McDougal furnaces, cooled in a rotating drum, wetted to lay dust and conveyed to tanks 50′ in diam. and 14′ deep, each holding 1,050 tons, where it is leached by hot solution of salt and sulphuric acid and copper precipitated from solution by scrap iron.

The arsenic plant treats flue dust in White-Howell rotary furnace, the dust-laden gas going to a Cottrell electrical treater for removal of dusts, then cooled and condensed arsenic trioxide removed by a second Cottrell treatment, the fine powder being discharged by a screw conveyor into barrels.

A brick plant making 11,000 standard fire brick per day and another making 50,000 building brick from retreated tailings is one of the newer features of the works.

The reverberatory costs have been reduced from $1.75 to $1.25 per ton of ore by coal firing and other changes in practice, as compared with $1.35 per ton of charge for the blast furnaces, but so much limestone has to be used in the blast furnaces charge that the cost, per ton of copper ore, is higher.

It has been found that leaching produces cleaner tailings than flotation, though other factors equalize the 2 processes, since for leaching the roasting costs are 25 to 30c., excavating 14c., hauling 8c., and other costs 33c., a total of 80c. per ton, using 65 lb. of 60% acid for 9 lb. copper. Over 500,000 tons of tailing and ore are leached annually.

Full description of the Washoe smelter plant and the technical treatment have been published in the Trans. Am. Inst. M. E. and in Mining & Scientific Press, Feb. 26, 1916, and Mining World, March 4, 1916.

The acid plant produces 200 tons a day of 60% acid, but a much bigger plant will be built in the next few years to supply acid for the zinc plant and other uses.

The changes in the Great Falls plant have been equally important. The refinery has been enlarged 50% and now turns out about 200,000,000 lb. of refined copper a year.

Probably the most important event of recent years was the production on a large scale of high-grade electrolytic zinc. The 10-ton test plant showed such good results that a 2,000-ton concentrator, using flotation, was erected at Anaconda, and a refinery of 100-ton capacity of metal per day at Great Falls. Both company and custom ore is treated. The refinery was increased to 150 tons of spelter daily. In two years plant improvements at all points cost $13,645,908. Changes in practice are ably described by Frederick Laist in "Eng. & Min. Jour." of October 7, 1916.

In 1917, work was started on a new stack at Anaconda, 585′ high, with an inside diameter of 70′ at bottom and 60′ at top. This was finished and connected with the 20 Cottrell electric precipitators in May, 1919. The brick was made from tailings from flotation plants. To treat flue-dust, a 100 by 20′ reverberatory furnace was erected near the Cottrell treaters. Two sets of treaters are connected with this furnace; one removing dust, the other removing arsenic from the gases. This arsenic will be saved in marketable condition.

The copper rod and wire manufacturing plant at the Boston & Montana works at Great Falls, put in operation June, 1918, is the first rod and wire plant to be built in the West, and marks the entrance of Anaconda into a new field, that of manufacturing.

The Chicago, Milwaukee & St. Paul system requires large quantities of wire and rods in connection with its electrification, as will other northwestern railroads, and to meet this demand was one of the reasons promoting the construction of the Great Falls plant, the manufacture of rods and wire at Great Falls obviating the expense incident to shipping refined copper products from Eastern plants to Northwest points.

Five electric furnaces, for the manufacture of ferro-manganese, were erected in October, 1918, but were closed in December, on account of lack of demand resulting from the end of the war. In 1919, this plant was re-modeled for the production of calcium carbide. In January, 1920, manganese ore was again being sent to this plant. The manufacture of fertilizer is also under way, utilizing acid from the reduction works and a deposit of phosphate rock near Maiden Rock, 45 miles from Anaconda. Present production of 50 tons of fertilizer daily will be increased to 1,000 tons daily by end of 1920.

With the proposed 25% increase in the capacity of the zinc reduction plant at Great Falls, which now is capable of producing around 7,000,000 pounds of spelter monthly, the proposed brass works at Great Falls is expected to be considered by the Anaconda, as freight charges east would cost the Anaconda no more than a brass product, which is made up of an alloy of copper and zinc.

In order to secure additional roasting capacity for the zinc plant at Great Falls, 14 of the 28 furnaces for the copper-leaching plant were re-modeled for roasting zinc concentrates.

Production—omitting outside ore and metal, excepting zinc:

Anaconda and Great Falls

Year	Copper ore treated, tons	Copper output, lb.	Gold, oz.	Silver, oz.	Zinc ore treated, tons	Zinc, lb.
1919*	.....	131,421,977	42,593	7,024,757	.....	48,126,679
1918	4,350,446	272,923,031	64,317	10,076,748	393,193	72,131,238
1917	3,906,901	239,014,880	58,545	8,368,180	326,479	50,624,524
1916	5,273,066	307,395,092	92,099	10,790,706	196,680	20,906,439
1915	.....	253,311,574	106,702	9,005,618	.....	.....
1914	.....	223,720,292	99,651	8,314,116	.....	.....
1913	.....	270,303,644	64,898	10,321,296	.....	.....
1912	.....	294,474,161	61,314	11,014,737	.....	.....
1911	.....	259,407,092	48,950	9,731,561	.....	.....
1910	.....	266,608,461	57,260	9,534,888	.....	.....
1895-1919.	.....	3,767,564,570	857,057	134,149,646	.....	.....

* Production curtailed account of market conditions and coal shortage.

About 730,000 tons of ore from outside mines is treated each year at Anaconda.

Electrolytic Refinery at Great Falls

Year	Cathodes produced, lb.	Melted into shapes, lb.	Zinc produced, lb.
1918	191,404,125	189,067,167	72,131,238
1917	141,517,768	132,089,914	50,624,524
1916	127,620,000	56,062,000	20,906,439

Production of the other smelters and refineries will be found under heading of International Smelting Co., a subsidiary.

The Anaconda properties have for years produced one-third of the copper output of the United States and one-sixth of the world's production. The splendid technical force and equipment of the company and the excellent showing of its mines indicate that it will maintain its pre-eminence for years to come. The cost of producing copper is never published, but it is thought that in normal times the cost was around 9 cents per pound.

ATLANTIC MINES CO. **MONTANA**

Company dissolved May, 1916, and properties sold to Anaconda Copper Mining Co., Nov. 1, 1916. Fully described in Mines Handbook, Vol. XII.

BLUEBIRD COMPANY (THE) **MONTANA**

Office: 706 Sears Bldg., Boston, Mass.

Officers: W. B. Dickerman, v. p.; Clarence W. McGuire, sec.-treas.; with F. M. Stone and H. K. McHarg, directors.

Inc. 1893, in New York. **Cap.,** $500,000; shares $5 par; 66,667 shares issued.

Property: 237 acres, in Butte, Mont., shows silver, copper and zinc ores. Company has never operated its property. See U. S. G. S. Prof. Paper 74, by W. H. Weed, for geology, etc.

In 1917 the mine was taken over under bond and reopened. Shipments made in 1918.

BONANZA-BUTTE MINING CO. **MONTANA**

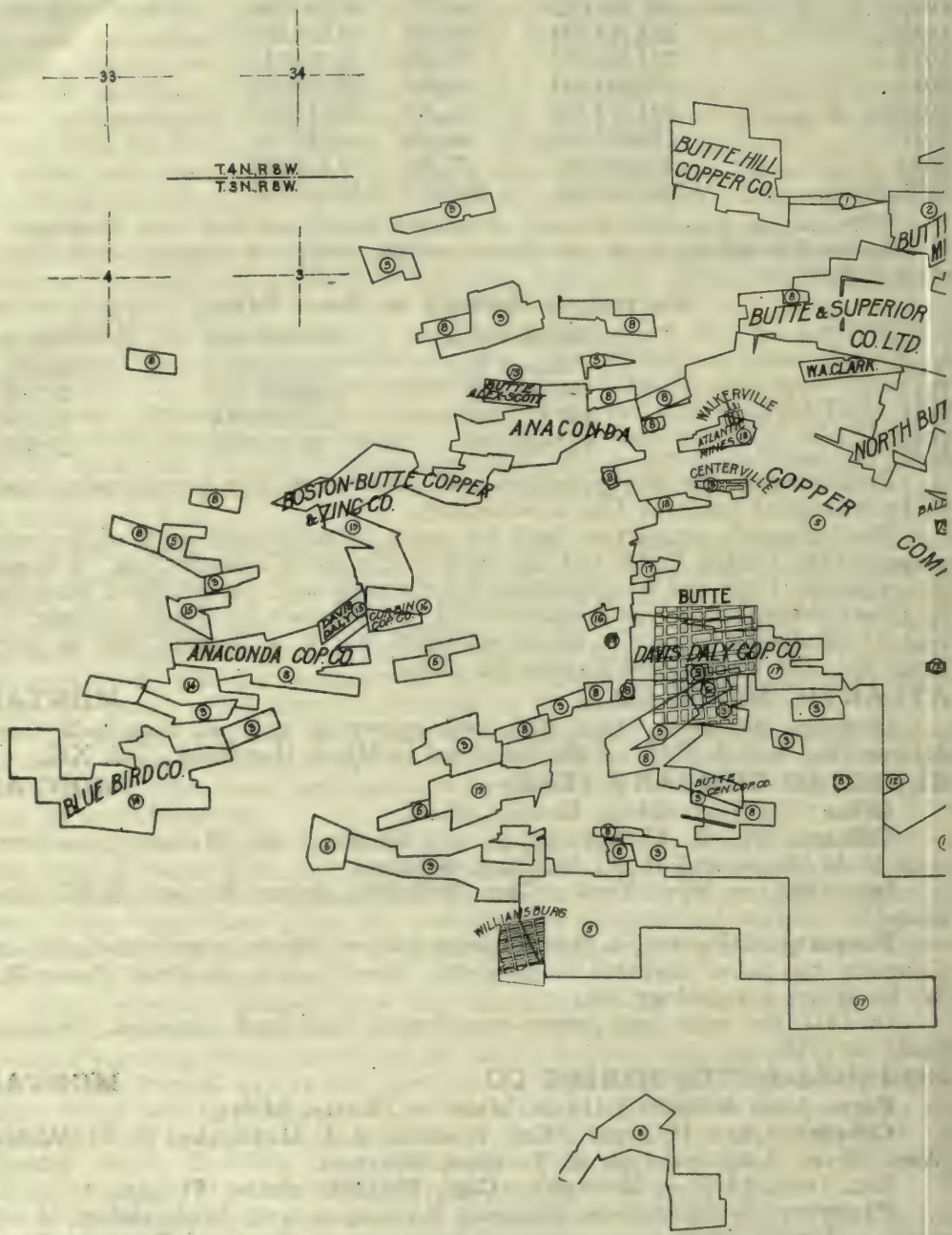
Care: John Kenoffel, 111 S. Main St., Butte, Mont.

Officers: Chas. H. Lane, Wm. Youlden, J. J. McCarthy, H. H. Walrath, Wm. Meyer, John and Geo. E. Johnson, directors.

Inc. June, 1915, in Montana. **Cap.,** $500,000; shares $1 par.

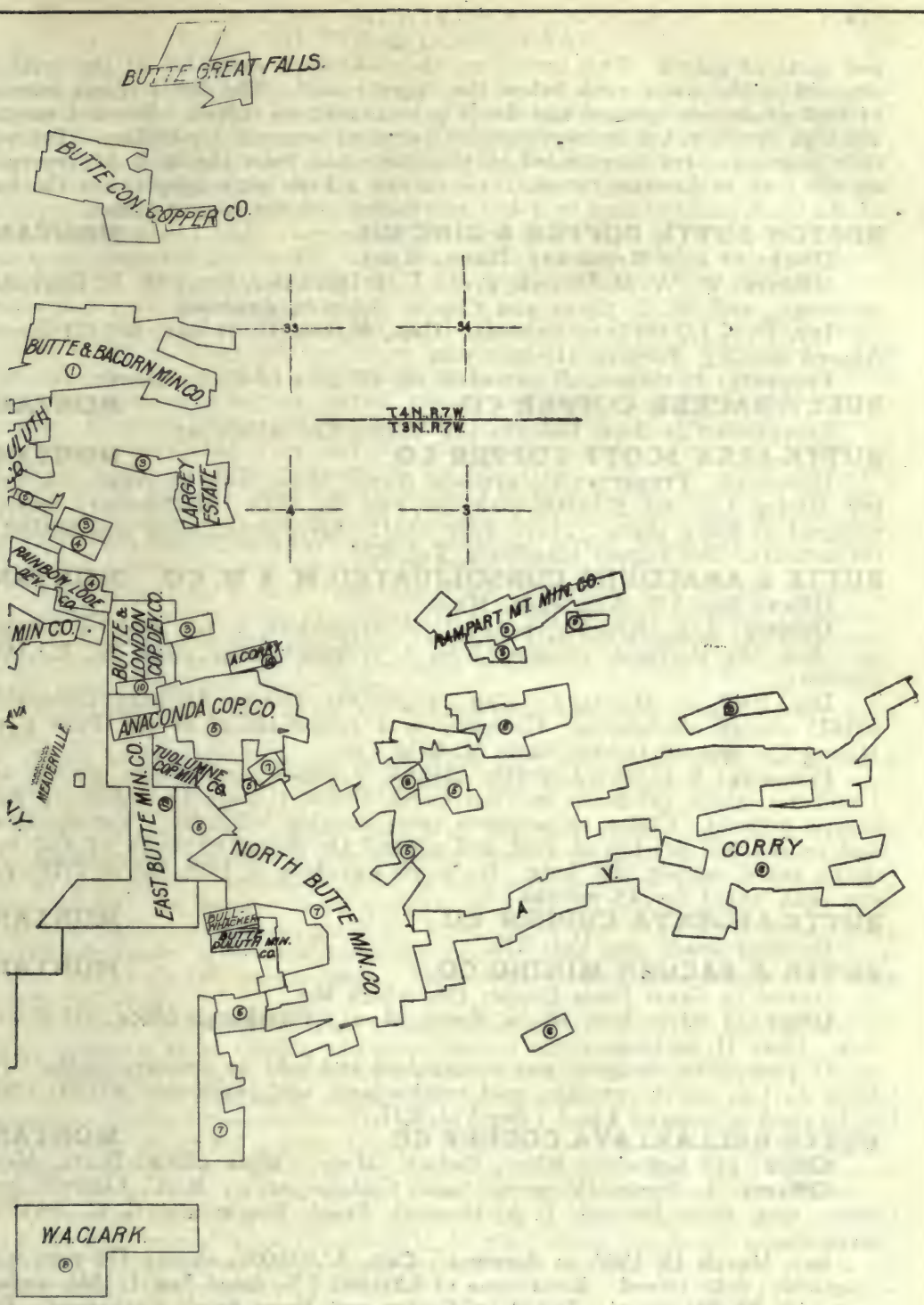
Property: the Bonanza, Bonanza Extension, and Ruth claims, 4 miles north of Butte. Mine under lease and bond to a syndicate of Butte people, who have made one substantial payment on the property.

Development: the Bonanza vein is opened by a 55′ shaft and 300′ crosscut tunnel. A new tunnel, 166′ lower than old tunnel, was over 1,000′ long in 1917, exposing 5 different but parallel E.-W. tourmaline veins, showing stringers



PROPERTY MAP OF

Holdings are as follows: (1) Butte & Bacorn; (2) Butte Duluth; (3) Largey Estate; (4) Rainbow Lode Development; (5) Anaconda; (6) A .V. Corry; (7) North Butte; (8) W. A. Clark; (9) Rampart Mountain; (10) A. V. Corry; (12) East Butte; (13) Butte Alex-Scott; (14) Blue Bird; (15) Davis-Daly; (16) Corbin Copper; (17) Davis-Daly; (18) Atlantic and Raven; (19) Boston-Butte.



BUTTE, MONTANA

Metal production of Butte to the end of 1917 is approximately as follows: copper, 7,150,000,000 lb. worth $1,020,000,000; gold 1,600,000 oz. worth $32,000,000; lead, 40,000,000 lb. worth $2,000,000; silver, 310,000,000 oz. worth $220,000,000; and zinc 610,000,000 lbs. worth $65,000,000; the total value being $1,342,000,000.

and spots of galena. This tunnel cut the downward extension of the oreshoot exposed in the winze sunk below the upper tunnel. The shoot shows bunches of high-grade, fine grained and dense galena, with no copper. Selected samples are high in silver, but average samples are too low-grade for milling. The vein is in a granite area surrounded by rhyolitic rocks, near the B. & M. reservoir, on the road to Lowland creek. Ore carries a little gray copper, but the bulk of the black material seen in it is a tourmaline and not copper glance.

BOSTON-BUTTE COPPER & ZINC CO. **MONTANA**

Office: 46 East Broadway, Butte, Mont.

Officers: W. W. McDowell, pres.; F. J. Dorhofer, v. p.; W. E. Reynolds, sec.-treas., with W. S. Carns and Charles Schmidt, directors.

Inc. Dec. 12, 1912, in Arizona. **Cap.**, $1,000,000; $1 par; 871,775 issued. Annual meeting, January 11, each year.

Property: 13 claims, all patented, on W. side of Butte district.

BULLWHACKER COPPER CO. **MONTANA**

Reorganized as Butte Bullwhacker Mining Co., which see.

BUTTE-ALEX SCOTT COPPER CO. **MONTANA**

Dissolved. **Property:** 4½ acres at Butte, Mont., sold to Anaconda Copper Mining Co., for $750,000 cash, on Feb. 10, 1916. Stockholders received dividend of $10 a share. There were 79,311 shares outstanding and $80,000 in the treasury. See Copper Handbook, Vol. XI.

BUTTE & ANACONDA CONSOLIDATED M. & M. CO. **MONTANA**

Office: Box 138, Anaconda, Mont.

Officers: J. C. Keppler, pres.; J. Winterhalter, v. p.; Andrew Flieger, sec., Box 359, Portland, Oregon; John J. Wegener, treas., with W. R. Allen, directors.

Inc. 1908, in Montana. **Cap.**, $1,500,000; shares $1 par; assessable; 900,015 shares outstanding. Company is a consolidation of the Flint Creek Mining Co., and the Golden Eagle M. & M. Co.

Property: 9 patented quartz claims, 3 unpatented placer claims and 2 millsites, about 240 acres, in Flint Creek Gulch, Granite Co., Mont., 3 miles from a railroad. Claims show quartz veins carrying tellurides. Average assays said to run $25 per ton in gold and silver. Developed to depth of 450′ by 2 shafts and 2 tunnels, 900′ long. No work was done in 1918, but in 1919 property was leased for 18 months.

BUTTE-ARGENTA COPPER CO. **MONTANA**

Probably dead. See Vol. XII.

BUTTE & BACORN MINING CO. **MONTANA**

Owned by Great Butte Copper Co., which see.

Office: 53 Silver Bow Block, Butte, Mont. **Pittsburgh office:** 331 Fourth Ave. Chas. Hyde, treas.

In June, 1916, company was reorganized and sold its property to the Great Butte C. Co., which company paid indebtedness and exchanged 400,000 shares of its stock in ratio of 4 to 1. See Vol. XII.

BUTTE-BALLAKLAVA COPPER CO. **MONTANA**

Office: 510 Sellwood Bldg., Duluth, Minn. **Mine office:** Butte, Mont.

Officers: I. Freimuth, pres.; Gust Carlson, v. p.; R. C. Ogilvie, sec.-treas., with Milie Bunnell, J. A. Percival, Frank Boutin and G. C. Swallow, directors.

Inc. March 15, 1907, in Arizona. **Cap.**, $2,500,000; shares $10 par; non-assessable; fully issued. Bond issue of $200,000, 7%, dated Jan. 1, 1916, authorized with $95,200 issued. Listed on Boston and Butte Stock Exchanges. Paid a 50c. dividend August 1, 1910. Boston Safe Deposit & Trust Co., transfer agt.; Federal Trust Co., Boston, registrar.

Interest on bonds unpaid since June 1, 1917.

Property: the Burke and Ballaklava claims, about 6½ acres in eastern part of Anaconda hill, adjoining Mountain Chief, Modoc and High Ore mines of the Anaconda Copper Co. Property willed to Bishop Carroll of the Catholic Church, who sold it for $400,000 cash to this company.

Claims form a narrow tract 1,860′ long running with the veins on the north-

eastern slope of Butte hill. The Burke vein crosses the claim of that name and has been worked in the Modoc mine. There are 4 veins, but one of which is generally workable. This vein is generally correlated with the Jessie, but complex geologic conditions led to a lawsuit with the Anaconda Co. for ownership of the rich orebody mined on the 800′ level. This suit was settled by a division of the orebody, Nov. 28, 1913.

Development: 1,625′ three-compartment shaft with 12 levels. The mine has been connected on the 800′ level, for ventilation and safety, with the Modoc mine of the Anaconda, and on the 1,200′ level with the West Colusa. This crosscut is used for drainage.

The veins on the 100′ and 300′ levels show ore carrying 5 to 8.5% copper and 45 to 60 oz. silver per ton, from which small shipments were made. The 500′ level shows pyrite and a little high-grade silver ore, and the 700′ level shows stringers of massive bornite, pyrite, glance and some chalcopyrite, all argentiferous. Principal ore production has come from the 800 to 1,600′ levels, inclusive, ore being mainly chalcocite, carrying good silver values. The vein ranges up to 34′ in width, carrying rich ore on the 800′ level; the 1,200′ level shows the vein up to 20′ in width, with ore averaging 4 to 4.5% copper, and the 1,400′ level carries 9′ of chalcocite and bornite of about 7.5% average copper tenor. This vein has been stoped westward to the workings of the High Ore mine, whose stopes are continuous with those of the Butte-Ballaklava mine.

Development by a drift from the High Ore mine, run by the Anaconda Co., opened up a fine body of commercial ore, but inability to reach it with its own shaft and a crowded capacity at the High Ore has retarded ore extraction. Above the 1,680′ level the mine has been practically worked out and the proceeds used to pay off certain debts.

The 2,200′ and 2,400′ levels are worked from the Modoc shaft of the Anaconda Co.

Early in 1916 a winze was sunk from the 1,600′ to the 1,800′ level and a crosscut run to the vein. It was reported that 24′ of 3% copper ore had been found and drifting started.

Plant is electrically driven though an auxiliary steam plant is in reserve.

Equipment: includes a double-drum hoist, operated in counterbalance, driven by a 300-h. p. motor, designed to hoist an unbalanced load of 5 tons, at a speed of 800′ per minute, from a depth of 3,000′. There also are a 165-h. p. auxiliary double-drum hoist, good for 1,500′, and a 10x12″ auxiliary steam hoist, 2 air compressors, with cross-compound air cylinders, each driven by a 100- h. p. motor, and an electric station pump. The auxiliary steam plant includes a cooling tower for water.

Buildings include an engine house, office with warehouse on the ground floor, carpenter shop, smithy, and steam-heated changing house.

Production: begun April, 1910, was continued until stopped by injunction, granted the Anaconda Copper Co., in August, 1910. During this period shipments to the Pittsmont smelter (East Butte), were about 125 tons daily, of ore assaying about 8% copper and 12 oz. silver per ton, this being the highest average grade of ore produced by any Butte mine for that year. Producing about 250 tons daily in 1916, mainly from 800′, 1,000′, 1,200′, and 1,600′ levels.

Company has had a checkered career, being successful at first, then involved in bitter litigation with the Anaconda C. M. Co., which was finally compromised; suceeded by operations which paid expenses until stopped by the big fire in the Modoc-High Ore mines in 1917.

Property idle 1917-19, and foreclosure proceedings by bondholders expected 1920.

BUTTE BULLWHACKER MINING CO. **MONTANA**

Office: Hennessey Block, Butte, Mont.

Officers: A. Frank, pres. and gen. mgr.; H. I. Wilson, v. p.; H Frank, sec.; D. J. Fitzgerald, treas.

Inc. Oct. 24, 1914, in Washington. **Cap.,** $1,000,000; $1 par; assessable; all issued. Annual meeting, second Monday in January, at Butte. Security Transfer & Registrar Co., New York, transfer agents and registrar. Listed on New York Curb. A dividend of 1c. per share was paid Oct. 25, 1917.

Property was leased for one year to East Side Mining Co., incorporated, by I. A. Heilbronner and Patrick Wall, April, 1916. Lease called for royalty of 25% and shipments of not less than 1,000 tons a month. Controlling stockholders also gave an option on 51% of entire stock at 50c. a share, payments in 30 and 90 days and at intervals for 18 months.

Company is a reorganization of the Bullwhacker Copper Co., whose stockholders received share for share in the new company on payment of 15c. a share in six months' installments. This wiped out a debt of $121,200 due the sons of Patrick Clark (Clark Bros. & Klein) and put $20,000 in the treasury. Mine was profitable when leased, but ran into debt for an experimental leaching plant. The Mines Operating Co. secured control by buying three-fifths of East Side stock at 75c. per share.

Property: one claim, 20 acres, on the east side of the Butte district, near the Pittsmont smelter. Easterly part of claim covers a zone of granite impregnated with oxidized copper ores, mined in an enormous open pit 275' across and 75' deep, from which 30,000 tons of 4.07% copper ore were extracted by lessees in 1912-13. It is a highly silicious ore.

Development: by an old 300' shaft with crosscuts beneath the orebody at that level, also several new shafts, proving an extension of the orebody beyond the open pit.

Equipment: includes hoist, compressor and a 75-ton leaching plant, which as yet has not been successfully operated (described by P. E. Peterson in "Min. & Eng. World," Oct. 4, 1913, p. 584).

The orebody is extensive and, though probably not deep, has a large tonnage from which much money should be made. Deep development is expected to show veins carrying copper sulphides. Early in 1919, the company was reported shipping 500 tons of ore daily to the Anaconda company's leaching plant.

BUTTE-CABLE COPPER & GOLD MINING CO. **MONTANA**

Officers: Louis Feldman, pres.; Nicholas Bossnitz, v. p.; preceding officers, Wm. Henthorne, John Strasser, J. G. Kimball and Dan Kowsky, directors. G. W. Peterson, Anaconda, sec.

Inc. Nov. 21, 1906, in Montana. **Cap.,** $1,000,000; shares $1 par.

Property: 6 claims, 4 patented, 15 miles west of Anaconda, near Cable Consolidated Mining Co., show a 3 to 4' vein carrying about 2' of commercial ore, giving assays of 11.9% copper, 156 oz. silver and 0.6 oz. gold per ton. Sullivan & Peterson, of Anaconda, offered stock at 15 cts. a share, Feb., 1913, to raise money for patenting claims. Idle at last accounts.

BUTTE CENTRAL COPPER CO. **MONTANA**

Fully described in Volume XI.

Property was sold to satisfy judgment for $57,000 at sheriff's sale in Nov., 1918, and bought in by Butte Copper & Zinc Co., operated by the Anaconda company. Butte Central, et al. did not redeem property.

BUTTE CENTRAL MNG. & MLG. CO. **MONTANA**

Offices: 27 State St., Boston, Mass.; and Butte, Mont.

Officers: Walter R. McDonald, pres.; William G. Burns, v. p.; Ralph A. Gallagher, treas., with S. S. Carpenter and Harry W. Davis, directors. W. G. Burns, sec.; Carl J. Trauerman, agent and mgr., Butte, Montana.

Inc. Aug. 11, 1914, in Delaware. **Cap.,** $750,000; $5 par; all issued. Bonds: $300,000 1st mortgage 6% 30-year gold bonds, all issued. Fifty-one per cent. of the stock is owned by the Butte-Detroit Copper & Zinc Mng. Co., and 66⅔% of the bond issue by the U. S. Manganese Corp. Federal Trust Co., Boston, Mass., transfer agents. Davison Company, 27 State St., Boston, Mass., registrars.

Property: company formerly owned the Ophir claim, 20 acres, at Butte, once owned and developed by the Butte Central Copper Co.

The Ophir plant and mill were sold by the Sheriff of Silver Bow county, Mont., October 31, 1918, to satisfy an old judgment. It was bid in by the Butte Copper & Zinc Co., a subsidiary of the Anaconda Copper Mng. Co., and not redeemed within the legal period.

BUTTE-CONCORDIA MINING CO. **MONTANA**

Inc. Sept. 8, 1915, in Montana. **Cap.,** $50,000; shares 25 cts. **Directors:** G. F. Pitman, G. W. Deniger, G. Widmer, S. V. Wilking, 615 Phoenix Blk., Butte, Mont. E. C. Schwardner, O. J. Olson, Geo. W. Wall, F. A. Kean and Alfred Pearson, all of Butte, Mont.

No further details obtainable.

BUTTE COPPER CO. **MONTANA**

Address: James H. Rowe, pres., 120 West Granite St., Butte, Mont.

Officers: J. H. Rowe, pres.; E. T. Lawler, v. p., Brookline, Mass.; W. M. Hanson, sec., with R. L. Rhule and B. J. Keenan, directors.

Inc. March 20, 1906, in Montana. **Cap.,** $1,500,000; $1.50 par.

Property: company owns two-thirds interest in the Robert Emmet claim No. 1 and 2; the remaining third being owned by the Anaconda Copper Mining Co. Company also owns approximately one-half of the Anselmo, Anselmo No. 2 and Trifle claims, balance being owned by the Hauswirth family. Property lies directly west of the Gagnon mine and is supposed to carry the extension of the rich veins mined in that property. The group has produced about $700,000 worth of gold and silver ore, the principal development being the 700′ Trifle shaft in which a large vein carrying copper ore was cut at a depth of 375′. The Robert Emmet shaft, 375′ deep, is reported to show 7% copper ore.

The company has been dormant for several years and its relations to the Butte Copper Mining Co. and Butte Copper Montana are not fully understood, though the latter company is supposed to control this one through stock ownership. The president reported, May, 1917, that the property was under lease and bond to Eastern interests who were then operating and developing the ground through the Trifle shaft. No recent information.

BUTTE COPPER CZAR MINING CO. **MONTANA**

Address: R. M. Green, or L. P. Sanders, Butte, Mont.

Cap., $300,000; shares 25c par.

Property: Copper Czar, Sunflower, and Mayflower claims E. of Butte. Examined by A. V. Corry and Morton Webber. In March, 1918, New York people acquired an option on control of shares.

Development: during 1918, work was in charge of Mr. Webber. A station was cut on 300′ level, 510′ of crosscutting done, and 477′ of driving on the vein. In the surface workings the ore-shoot constituted an attractive mining speculation, and its downward prolongation was the crux on which the future possibilities depended. The work done indicated that the shoot did not persist at depth. Highest assays, in spots, were less than 2% copper and 2 to 3 oz. of silver. After this result the New York syndicate dropped its option. A circular issued by the Butte Copper Czar company in 1919, containing proposals for re-financing, is said to contain incorrect statements concerning the work done under Mr. Webber's direction.

BUTTE COPPER KING MINING CO. **MONTANA**

Address: care Beebe Grain Co., Butte, Mont. C. E. Beebe, pres.; A. P. Henningsen, sec.

Inc. April 19, 1906, in Montana. **Cap.,** $1,500,000; shares $1.50 par.

Property: 3 fractional claims, 28 acres, known as the Frenchman No. 2, Rare Steak, and Missouri Girl, west of the Jennie Dell mine. Idle since organization.

BUTTE COPPER & ZINC CO. **MONTANA**

Office: 61 Broadway, New York. Mine at Butte, Mont. Control of company was vested for a period of 5 years (ending Jan. 31, 1920), in the following trustees: A. J. Seligman, Albert Fries, Jacob Oppenheim. Additional directors, Chas. Wimpfheimer, A. S. Bailey and I. N. Speigelberg.

Inc. Nov. 28, 1904, in Maine. **Cap.,** $2,500,000; $5 par; increased to $3,000,000 July 7, 1917; 600,000 shares issued. Shares listed on New York Curb. Bankers Trust Co., New York, transfer agent; Security Transfer & Registrar Co., New York, registrar. Annual meeting, first Wednesday in April.

Financial: net dividends are divided equally wth the Anaconda company:

Year	Ore Sold	Operating charges	Paid Anaconda	Net Profit	Surplus after dividends
1919.....	$666,602	.....	$49,190	$49,190	$8,718
1918 (13 months)	$669,328	$47,582	.....	$619,986	$319,886
1917 (17 months)	1,535,163	1,025,013	$356,222	119,772	119,772

An initial dividend of 50c., $300,000, paid July 30, 1918.

Property: the Emma mine, 13 acres, and other claims totaling over 90 acres in the Butte district, 1½ miles from the main properties of the Anaconda company. Mine was formerly developed to 800′ level, but due to low copper and relatively high zinc content of the ore, was idle for several years. Development resumed by Anaconda by virtue of an option and lease, dated July 8, 1915, given to that company. Terms of lease are as follows: the Anaconda Co. acquired an option for 9 months on all or part of the 88,300 shares of Butte Copper & Zinc Co. remaining in the treasury of the latter company, at a price of $1 per share. The A. C. M. Co. took a lease on the Emma mine for 5 years with privilege of renewal for an additional 5 years, and agreed to install equipment and to unwater mine to the 800′ level. A new lease was obtained by Anaconda on July 6, 1917, to run until 1931. For expenditures actually made by the A. C. M. Co. in developing the Emma mine, the Butte Copper & Zinc Co. agrees to make payment in its capital stock in lots of 10,000 shares or fractional parts thereof, but total payment to the A. C. M. Co. for work and equipment shall in no case exceed 50,000 shares of Butte C. & Z. Co. stock. The A. C. M. Co. shall have a right to abandon the leased premises if it finds working them impractical, or impossible, in which event all machinery or equipment installed and permanently attached to the Butte property shall belong to that company. Further stipulations are provided in the event of a renewal of the lease.

The A. C. M. Co. has fulfilled the terms of this lease and taken up the shares optioned to April, 1916. An additional option on 100,000 shares was also exercised, and Anaconda now owns 217,040 of the 600,000 shares issued.

Development: aggregates several thousand feet from a 1,000′ shaft with levels at 200′, 400′, 500′, 800′ and 1,000′.

The Emma mine is in the heart of the city of Butte, and as transportation facilities were difficult, a crosscut was driven 2,500′ from the 1,800′ level of the Gagnon mine of Anaconda to connect with and develop the Emma orebodies. During 1918, rich zinc ore was opened, also considerable rhodochrosite (pink manganese), which was much in demand, and enhanced the value of the mine. The manganese workings are kept open, as the ferro-manganese made at Great Falls may eventually be sold as far east as Chicago, Reserves amount to several hundred thousand tons of zinc-silver ore and as much manganese ore. The depletion of reserves and their low grade was offset by the ore opened on the 1,000′ level which is reported to be one of the best silver-zinc-lead bodies opened by Anaconda on this property.

Production: in 1918 was 32,293 tons of zinc and 71,364 tons of manganese ore and in March, 1919, ore extraction was at rate of 2,000 tons of 15% zinc and 7 oz. silver ore per month.

Butte Copper & Zinc is rather an attractive property on account of the assured market for its ores. Its stock had a varied speculative career during 1918-19.

BUTTE & CORBIN CONS. COPPER MINING CO. MONTANA

Officers: J. L. Templeman, pres.; Lewisohn Block, Butte, Mont.; Lee Williams, v. p.; J. B. Fitzpatrick, sec.-treas.; at last accounts.

Inc. May 1, 1907, in Montana. **Cap.,** $700,000; $1 par; issued 469,000. Annual meeting, February 4.

Property: 5 claims, 82 acres; also 10 acres timber lands in the Corbin, or Colorado district, on the eastern side of Valparaiso mountain. The ore is a complex mixture of lead, copper, and zinc, occurring as short shoots in fissure veins in granite. Vein reported by company to average 8′ 4″ in width, and to carry 4% copper, 6% lead, 2% zinc, 8 oz. silver, and $1 gold per ton.

Development: by shaft and the 500′ Rarus tunnel, which cut a 10′ vein at 165′ from the portal, assaying 2.5% copper, with paystreak carrying covellite,

averaging 6% copper, 8 oz. silver, and $6 gold per ton. Amount of ore on dump, 7,000 tons of $10 value, according to Ropes & McIntyre.

Idle at last accounts.

BUTTE-CURTIS & MAJORS COPPER MINING CO. MONTANA

Address: Geo. D. Curtis, 35 W. Granite St., Butte, Mont.

Company organized upon a lease and bond to purchase the surface and mineral rights of the Curtis and Majors addition to the city of Butte, the bond price being $125,000. The company went bankrupt and in 1917 owed about $700 labor claims. There are no legal assets and having defaulted on bond payment past due, the company has no rights thereunder, save the sentimental courtesy extended by John Curtis and associates, who would like to see the company rehabilitated and refinanced. Idle at last accounts.

BUTTE-DEER LODGE MINING CO. MONTANA

Address: Phoenix Bldg., Butte, Mont.

Officers: W. L. Hugo, pres.; Simon Bank, v. p.; J. R. Davenport, sec.-treas., with E. F. O'Flynn and Dr. S. Herman, directors.

Inc. May, 1916, in Montana. **Cap.,** $300,000; $1 par; all issued. Annual meeting in June.

Property: 11 claims, 7 patented, 200 acres, 9 miles S. E. of Deer Lodge and 28 miles N. of Butte. Former owners are said to have received over $2,000,000 in dividends.

Development: a 1,400′ incline (35°) shaft follows the ore to the bottom, no crosscuts having been driven. Water, in May, 1919, stood at 600′. Sampling above this level shows 100,000 tons of over $10 silver-gold ore, and dump is said to contain 100,000 tons, that average $4.10 per ton, with silver at 56 cents an ounce.

Equipment: steam hoist, 1,000 cu. ft. air-compressor, mine pump, and concentrator.

Property has not been operated since 1917, when tests were made to devise suitable treatment. A concentration of dump ore, 12 into 1, gave a product worth $40 per ton, with silver at 68 cents. A flotation plant and electric power are contemplated.

BUTTE-DETROIT COPPER & ZINC MINING CO. MONTANA

Office: Dime Bank Bldg., Detroit, Mich.

Officers: J. F. Austin, pres.; Ellery C. Wright, v. p.; Josiah S. Pishon, treas.; W. G. Burns, sec., Boston, Mass. Directors: Walter Colson, Charles A. Wilcox, Ralph A. Gallagher, Brigadier-General Henry M. Pellatt, James E. Simpson, Willard N. Morrison, Joseph Reriham, mgr, and Montana agt.; Carl J. Trauerman, engr., Butte, Montana.

Inc. March 7, 1916, in Delaware. **Cap.,** $2,500,000; $1 par. Transfer agent, Federal Trust Co., Boston, Mass., and United States Corporation Co., New York. Registrars, State Street Trust Co., Boston, Mass., and Equitable Trust Co., New York.

Company owns 51% of the Butte Central Mng. & Mlg. Co. The U. S. Manganese Corp. owns 51% of the shares of Butte-Detroit Copper & Zinc Mng. Co., and has an agreement with shareholders of the latter company to exchange their shares for common stock of the U. S. Manganese Corp. It is probable that U. S. Manganese will eventually own all stock of the Butte-Detroit company.

BUTTE-DULUTH MINING CO. MONTANA

Office: Chas. M. Everett, receiver, Lewisohn Block, Butte, Mont.

Officers: A. B. Wolvin, pres.; C. M. Everett, sec.-treas; with Meyer Genzberger, Al Green, John W. Neukom, directors.

The property is under lease to Mines Operating Co., of Butte, controlled by Alfred Frank and associates, for 5 years, and has been in active operation since July, 1917.

Inc. in Minnesota. **Cap.,** $2,500,000; shares $10 par; 200,000 issued, balance held for redemption of $500,000 bond issue, on which interest is overdue since Dec., 1914, and sinking fund provision not fulfilled. Company went into receiver's hands on friendly suit, March 16, 1915. Receiver's report shows $42,368 liens ahead of bonds and a floating debt of about $190,833 unsecured.

The prior lien is mostly for labor certificates ($39,000) issued in half payment of wages in 1914. Bankruptcy proceedings instituted in March, 1915, were set aside by the Federal Court, Sept. 29, 1915.

Property: Brundy group, at the base of the mountains east of Butte, includes the Macarona, Montgomery, and portions of the Altona, Colleen Bawn, and Amazon claims. These claims aggregate 67 acres and are crossed by the Columbia Gardens street car line and adjoin the Pittsmont mine on the southeast.

The ore thus far mined has come from open-cut work on the hillside back of the mill. This ore is an altered granite stained green and impregnated with silicate of copper with carbonate and oxide of copper in nests and bunches. As mined in the cut it has carried a little over 1.5% copper and with a mechanical loader can, it is said, be put in the mill for 15c a ton.

Development: underground is mainly on the Montgomery claim on which there is a tunnel 1,200′ long and a 200′ shaft, the latter with extensive workings at 100′. The main ore body on Altona hill, to the east of the street car line, has several tunnels, proving the downward extension of the ore on the property.

Equipment: is electrical throughout and includes a 75-h. p. hoist and 750-cu. ft. compressor at the Montgomery shaft.

The Butte-Duluth mill was fully described by C. F. Sherwood in the Salt Lake Mining Review of November 30, 1915. Its total cost was $725,000.

The property has merit, and aside from its leachable ores has a decided prospective value in the veins at depth of 1,000′ below the surface.

In bankruptcy proceedings the former superintendent, Mr. Sherwood, said the mill ran on ore averaging 1.52% copper for 4 months before it was shut down, and that drill cores to a depth of 202′ from the bottom of a 23′ pit ran 0.98% to 2.70% copper. With acid at $12.50 per ton, a saving of 38c per ton could be made in leaching costs.

Production in February, 1915, was 120,000 lb. electrolytic copper and 30,000 lb. of cement copper. In 1918, the daily output was 175 tons of ore containing 1.75% copper which was sent to the leaching plant of the Anaconda company. A year later the quantity was 250 tons, averaging 2%. The mine is operated under a lease that is regarded by certain shareholders, as worse than unfair to company, as the ore reserves are being depleted, and shareholders get nothing. See Mines Operating Co.

BUTTE EAST SLOPE MINING CO. **MONTANA**

Office: 619 Daly Bank Bldg., Butte, Mont.

Officers: E. P. Lomas, pres. and mgr.; M. F. Lyth, v. p.; C. B. Lomas, sec.-treas.; also directors.

Inc. Jan. 28, 1916, in Montana. **Cap.,** $500,000; $1 par. Annual meeting last Tuesday in January.

Property: 5 claims, 3 patented, 100 acres in Jefferson county, on E. side of range next east of Butte.

Geology: the country rock is granite and the vein formation is of the quartz-pyrite type. Ore carries gold and silver, with copper showing at depth. At 90′ in depth vein is 23′ wide and assays $6.10 per ton.

Development: recently started, consists of a 185′ vertical shaft, which is to be sunk to 500′, a crosscut driven at 250′, and hoist erected.

BUTTE & ELK RANGE CO. **MONTANA**

Address: Grant St., Pittsburgh, Pa.

BUTTE EXEMPTION COPPER CO. **MONTANA**

Officers: James H. Lynch, pres.; John A. Poore, v. p.; Butte, Mont.; with W. F. Love, M. J. Cavanaugh, T. P. Poore, and J. D. Crossman, directors.

Inc. in Maine. **Cap.,** $2,500,000; $1 par; 2,010,000 issued.

Property: consists of undivided ¾ interest in the Canyon, Colleen Bawn, Exemption, and the entire interest in Mountain Spur lode claims, approximately 56 acres, situated in the Eastern part of the Butte district, Silver Bow county.

Company has been inactive for a number of years.

BUTTE & GREAT FALLS MINING CO. **MONTANA**

Inactive. **Address:** Box 1393, Butte, Mont.

Officers: E. Bryant Crump, Bloomington, Ill., pres.; R. M. Green, Butte, v. p. and gen. mgr.; Allen Pierse, sec.-treas.; with Ira N. Honnold, L. G. Diehl, J. Cohan, Wm. Richardson, J. W. Beckwith, Louis Lauritson, R. M. Sutherland, J. P. Mondloch, Walter A. Kinney and C. F. Murphy, directors.

Inc. Nov. 28, 1911, in Montana. **Cap.,** $500,000; shares $1 par; assessable; 400,000 outstanding; $32,000 was expended on development work during 1914-15. In December, 1916, an assessment of 5c per share was levied.

Claims show Butte monzonite cut by aplite and traversed by wide, rusty veins carrying tourmaline and occasional specks of chalcopyrite. The Genevieve vein runs S. W.-N. E., with dip of 35° and reported width of 30′. It is mainly decomposed granite with clay and quartz streaks and one 3′ band of quartz and tourmaline carrying occasional sulphides. Has a 1½ compartment shaft, 500′ deep. The Genevieve is said to have a good showing in a 2′ vein on 200′ level, but average of assays is small. The Silver King claim has a 200′ tunnel. Property reported on by Paul Billingsley, Jesse Cohan & Peterson.

Equipment: included electric hoist, good for 1,500′, pump, 10-drill compressor, mine building and dwellings. Mine closed down and hoist sold, September, 1917.

Property: the Genevieve group of 8 claims, 134 acres, in the Lost Child mining district, 3½ miles N. E. of the Butte & Superior property.

Property regarded as a prospect of doubtful merit.

BUTTE HERCULES MINING CO. **MONTANA**

Address: Geo. de Snell, sec., No. 1 North Montana St., Butte, Mont. Stock listed and quoted at 1c a share on Butte Public Stock Exchange. Is a dormant corporation, fathered by Passmore & Co., of 25 W. Granite St., Butte.

Property: 4 patented claims in the zinc-silver area on the western edge of the Butte district, near Rocker.

BUTTE HILL COPPER MINING CO. **MONTANA**

Address: Harry A. Frank, sec., Daily Bank Bldg., Butte, Mont.

Officers: Maurice Eisenberg, pres., 61 Broadway, New York City; J. W. Murphy, v. p., with Duncan MacRae, W. P. Cary, W. H. Hall, Thos. Driscoll and John S. Davies, directors.

Inc. April 18, 1906, in Montana. **Cap.,** $5,000,000; $5 par; $2,950,000 issued. Annual meeting, fourth Saturday in January.

Property: 11 patented claims, 173 acres, in an undeveloped district in granite area, north of Walkerville. Has a 200′ shaft, cutting a vein of 40′ estimated width, showing stringers and bunches of ore assaying up to 4% copper and 19 oz. silver per ton. Has not been worked for several years and power plant is dismantled. Property is well located, has strong veins, and is much nearer developed ground than it was when operating.

BUTTE LODE EXTENSION MINING CO. **MONTANA**

Address: care C. J. Kelly, treas., 805 W. Broadway, Butte, Mont.

Officers: Chas. S. Warren, v. p.; John M. Murphy, sec.

Inc. April 28, 1906, in Montana. **Cap.,** $500,000; shares $1 par.

Property: 4 claims, known as the St. Angus group, 12 miles N. E. of Butte, has a 150′ shaft with a crosscut showing 2 veins. Idle at last accounts.

BUTTE & LONDON COPPER DEVELOPMENT CO. **MONTANA**

Office: 46 East Broadway, Butte, Mont.

Officers: W. W. McDowell, pres.; John D. Haines, v. p.; W. E. Reynolds, sec.; E. S. Passmore, treas.; with Fred. Whiteside, Guy W. Stapleton, W. S. Carns, J. A. Sheldon and Maurice Eisenberg, directors.

Inc. Jan., 1906, in Arizona, as Butte & London Copper Co. **Cap.,** $5,000,000; $5 par; 976,700 outstanding. Annual meeting, third Tuesday in January. Listed on Boston Curb.

Property: 113 acres, known as the Greendale placer claims, lying im-

mediately north of the Pittsburgh & Montana in the valley of Silver Bow Creek, east of Butte. Property claimed by the management to carry the possible extension of the Rainbow lode. Forty acres of the property is said to be valuable for townsite purposes.

Development: 1,350′ three-compartment shaft with 2 crosscuts on the 1,100′ level cutting 9 veins, none carrying ore of commercial value, except a streak that gave assays of 2% copper, 50 oz. silver, and $2 gold, per ton.

The company agreed December 24, 1912, to accept a contract with Thos. F. Cole, for the transfer of all its property to a new company, the Greendale Exploration Co., with a capitalization of $200,000, to be organized by him. The terms of the contract provided that in consideration of sinking the shaft to 1,600′ level, running crosscuts north and south 2,500′ the entire width of the property, and doing other stipulated development work, Mr. Cole was to receive 51% of the stock of the new company, one-half to be paid as the work progresses, the balance remaining in escrow until the work is finished. Mr. Cole spent $300,000 on this development, and contract was completed. Failing to find shipping ore in commercial quantities the property was closed down.

BUTTE MAIN RANGE COPPER MINING CO. **MONTANA**

See Tuolumne Copper Co., which controls and operates the Butte Main Range property.

BUTTE METALS MINING CO. **MONTANA**

Address: Butte, Mont. This company was formed in 1919 to work a group of claims in the S. E. part of Butte, S. of the Davis-Daly mine. The 200 acres include the Otisco, Mary Louise, Syndicate, Railroad, Curtis & Major, and Alliance. In the Otisco workings 4′ of ore was found on one wall of the vein and 6′ on the other; stoping was started, 1920, and a shaft is being sunk on the Mary Louise.

BUTTE-MILWAUKEE COPPER CO. **MONTANA**

Assets sold 1914 to Butte-New York Mng. Co. a Butte & Superior subsidiary, for $500,000. Shareholders were obliged to exchange their stock at the rate of 2½ old for 1 new share, or 30c cash per share. Company paid a liquidating dividend of $0.3278 per share in July, 1914, and is in course of dissolution. Fully described under Butte-New York Mining Co.

BUTTE MINE EXPLORATION CO. **MONTANA**

Officers: Clinton C. Clark, pres., 408 West Granite St., Butte, Mont.; C. P. Connolly, sec., at last accounts. **Inc.** 1901. **Cap.,** $250,000; shares $1 par.

Is no relation to the company of same title formerly holding the Six O'Clock property, in Butte, or to the Butte Mines Exploration Co., formerly having property at Tecoma, Box Elder Co., Utah.

Property: the Pacific quartz lode claim, on which considerable work was done, 1901-02. Company practically defunct, but property was reported under option to the North Butte Mining Co.

BUTTE-MINNESOTA MINING CO. **MONTANA**

Officers: Peter E. Peterson, pres.; Angus McLeod, Butte, Mont.; William Vuoti, J. E. Porthan, A. W. Havela, John Kukko, Emmanuel Autio, John Lampi, Ade Herranen, directors. Mines near Butte and Helena.

Inc. June, 1912. **Cap.,** $750,000; shares $1 par.

Property: 6 claims, about 1 mile south of Rocker, at the western end of the Butte district. Ground shows well-defined veins, 1 of which is traceable for 3,000′ across the surface. Country rock is granite, and part of the same mass as that in which the Butte deposits occur.

Development: 400′ tunnel on the vein and an incline shaft 35′ deep sunk on the vein disclosing well-defined walls, 6′ apart, from which ore has been taken carrying 0.5% copper, 8% lead, 12 oz. silver, and $28 gold, per ton. The property is equipped with a gallows frame, boilers and hoist.

Late in June, 1913, the company bought a group of mining claims in the Wolf Creek district, 40 miles east of Helena, Mont. Reports stated that development on these claims shows more than 100,000 tons of ore assaying

4 to 25% copper blocked out. A mill was to be built, but company has not reported any recent work.

BUTTE MONITOR TUNNEL MINING CO. **MONTANA**

Address: care C. J. Kelly, Daly Bank & Trust Co., Butte, Mont. Described in Volume XIII.

Reported 1919 that mine was purchased by North Butte Mining Co., which see.

BUTTE-NEW ENGLAND MINE **MONTANA**

Property: a fractional claim in the Davis-Daly tract at Butte. In May, 1919, development was under way on the 150′ level, where good silver-copper ore was being opened, but work was suspended in August, possibly because the Davis-Daly might claim apex rights.

BUTTE-NEW YORK COPPER CO. **MONTANA**

Subsidiary of the Butte & Superior Mng. Co., which see.

BUTTE & PLUTUS MINING CO. **MONTANA**

Address: J. R. Moyle, pres.; M. S. Cohen, v. p., Butte, Mont.; D. J. McGrath, mgr.

Property: the Plutus claims N. of Anaconda's Nettie group at Butte, which contain veins of silver and manganese ore; also a half interest in the Jack Knife claims near Philipsburg, carrying manganese ore.

Development: in 1919, the Plutus shaft was being sunk from 160 to 400′. Two feet of good ore was reported opened in the Mapleton claim, at 100′ in depth.

BUTTE RAMSDELL COPPER MINING CO. **MONTANA**

Office: Room 22 Hirbour Bldg., Butte, Mont.

Officers: Henry Meloy, pres.; J. D. Pope, v. p.; J. A. Henshaw, sec.; treas.; Hugh Smith, supt.

Inc. Sept. 17, 1917, in Montana. **Cap.,** $300,000; $5 par.

Property: 64 acres owned and 25 acres leased from Davis-Daly in southeastern part of Butte district. Ore carries gold, silver, copper, and zinc.

Development: by 300′ shaft, which in July, 1919, was reported to be showing a strong vein.

Production: in 1918, averaged over 30 tons of ore daily. This ore carried from 1½ to 7% copper and 5 to 8 oz. silver per ton. In September, 1919, the daily output was a car of 10% ore.

BUTTE & RED EAGLE COPPER CO. **MONTANA**

Officers: Fayette Harrington, pres., Missoula, Mont.; Jas. A. Canty, sec.-treas., Butte, Mont.

Inc. May, 1907, in Montana. **Cap.,** $5,000,000; shares $5 par.

Property: 7 claims, patented, S. E. of the Butte & Bacon and N. E. of the Butte & Superior, the Red Eagle claim having a 400′ tunnel, showing a little ore. Mine shut down since 1907, but company still alive.

BUTTE STANDARD COPPER MINING CO. **MONTANA**

Address: care H. G. Klenze, Box 377, Butte, Mont.

Officers: H. G. Klenze, pres.; A. M. Stephens, v. p.; J. W. MacLane, sec., Butte, Mont., with J. L. Templeman and H. H. Griffith, directors.

Inc. in Montana. **Cap.,** $1,000,000; shares $1 par; 350,000 shares in treasury. Stock being offered at 12½c, August, 1917.

Property: 2 claims in the northern outlying section of the Butte camp and 2 patented claims at Amazon, Jefferson county, Mont., both partly developed and said to carry commercial orebodies. Selling stock in 1917. No news since.

BUTTE-SUMMIT COPPER CO. **MONTANA**

Presumably idle. **Address:** 818 Hornet St., and Excelsior Ave., Butte, Mont.

Officers: Ed. A. Blomgren, Geo. P. Arnold and Wm. H. Smith, all of Lewistown, Mont., directors.

Inc. April, 1916, in Montana. **Cap.,** $3,000,000; shares $10 par.

Property: the Hornet claim on the Yellow Jacket vein and a second vein 180′ to the south.

Development: by 200′ shaft, with levels at 100′ and 200′. Oreshoot on 100′ level. Yellow Jacket 13½′ wide, with 4′ of ore assaying high in lead and silver, with over 20% zinc. On the 200′ level 7′ of commercial ore was opened on the downward extension of shoot cut on 100′ level.

BUTTE & SUPERIOR MINING CO. **MONTANA**

Office: 25 Broad St., New York. **Mine office:** Butte, Mont.

Officers: D. C. Jackling, pres.; Charles Hayden, v. p.; K. R. Babbitt, v. p. and gen. counsel; with F. L. Ames and J. L. Bruce, directors. A. J. Ranaghan, sec.; C. W. Peters, treas. Operating officials: Charles Bocking, gen. mgr.; Angus McLeod, mine supt.; E. V. Daveler, gen. supt.; J. L. Bruce, cons. eng.

Inc. Oct., 1906, in Arizona. **Cap.,** originally $6,000,000; $5 par; reduced December 3, 1910, to $2,500,000; $10 par; increased September, 1912, to $3,500,000. Outstanding December 31, 1919, $2,970,000. No bonds. Stock listed on Boston, New York and Butte Exchanges and on the Paris Bourse. Name changed May, 1916, and new stock issued.

Controls the North Butte Extension Development Co., through ownership of 80% of the stock; also controls the Butte-New York Copper Co., through ownership of more than 55%. Equitable Trust Co., New York, and Old Colony Trust Co., Boston, transfer agents; Guaranty Trust Co., New York, and National Shawmut Bank, Boston, registrars. Annual meeting 3rd Friday in April, at New York.

In 1912 the control of the company passed into the hands of Hayden, Stone & Co. interests, who have been closely identified with the Utah Copper Co., Chino, and other great and successful mining companies, thus ensuring ample finances and competent direction.

Comparative General Balance Sheet—years ending December 31:

Assets.

Year	Prop. Equip. & Devel.	Investments	Current	Deferred Charges	Total
1918.....	$5,816,408	$695,138	$4,335,890	$547,896	$11,395,333
1917.....	5,799,475	749,325	3,384,002	543,256	10,476,058
1916.....	5,245,260	692,063	4,393,668	542,163	10,882,153
1915.....	4,458,133	574,295	5,267,080	486,129	10,785,638
1914.....	4,190,872	338,567	1,269,633	274,330	6,073,402

Liabilities.

Year	Cap. Stock	Current	Prem. on Sales Cap. Stock	Reserves	Undiv. Profits	Total
1918.....	$2,901,845	$451,320	$1,214,106	$1,129,407	$5,698,654	$11,395,333
1917.....	2,901,845	482,331	1,214,106	807,469	5,070,306	10,476,058
1916.....	2,901,872	1,155,337	1,214,222	.....	5,610,722	10,882,153
1915.....	2,726,970	606,317	1,214,386	.....	6,237,965	10,785,638
1914.....	2,726,089	111,985	1,213,985	.....	2,021,944	6,073,402

BUTTE & SUPERIOR MINING CO.

Our Statistical Department will furnish complete information on application.

HAYDEN, STONE & CO.

Members New York, Boston and Philadelphia Stock Exchanges.

25 Broad Street, NEW YORK **87 Milk Street, BOSTON**

Working capital:

Year	Cash and Govt. Bonds	Ore and products	Supplies, etc.	Accounts receivable	Total current assets	Total current liabilities	Excess of assets
1918.....	$2,377,032	$1,203,004	$647,610	$108,244	$4,335,890	$451,320	$3,884,570
1917.....	845,359	1,769,204	728,584	50,855	3,384,002	482,331	2,901,671
1916.....	853,529	3,198,741	325,445	15,952	4,393,667	1,155,337	3,238,330
1915.....	2,128,187	2,912,881	175,457	50,555	5,267,080	606,317	4,660,763

Operating accounts:	1918	1917	1916	1915
Sales of Metals, less freight.	$5,915,245	$6,716,437	$13,141,551	$12,087,117
Operating charges.....	5,263,320	4,595,501	4,349,420	3,012,965
Profit	$651,925	$2,120,936	$8,792,131	$9,074,152
Other income.....	62,874	103,191	81,712	51,796
Total income.....	$714,799	$2,224,127	$8,873,843	$9,125,947
Reserve for taxes, etc.....	86,451	236,647	.....	.....
Balance to surplus account	$628,348	$1,987,480	$8,873,843	$9,125,947
Surplus from previous year..	*5,070,306	5,610,722	6,227,309	2,021,944
Total available.....	$5,698,654	$7,598,202	$15,101,152	$11,147,891
Dividends paid.....	.....	1,567,057	9,490,430	4,908,115
Net surplus.....	$5,698,654	$6,031,145	$5,610,722	$6,239,776

* Adjusted.

Net revenue from metals, etc., in 1919, was $4,537,969, of which $961,115 was profit.

Dividends: in 1914, $611,908; in 1918, $4,908,115, in 4 quarterly payments of 75c each and extra payments of $15 per share; in 1916, $9,490,472 in quarterly payments, 2@75c, 2@$1.25, ea. and extra of $30.00 per share; 1917, paid $1.25 quarterly, for first three quarters, $1.25 extra for first two, and Red Cross of 40c, a total of $6.65 for the year.

Property: 27 mining claims, 164.90 acres, about 2 miles N. E. of the business section of Butte, with the exception of 4 claims, Peake, Parker, Prescott and Pardee, which lie about 3 miles N. W. of Butte. In addition, fractional interests equivalent to 8.88 acres are owned in 11 claims, 60.3 acres, and surface rights only for 34.15 acres. The North Butte Extension Development Co. owns 4 claims and a fractional interest in a fifth, amounting in all to an equivalent area of 29.48 acres.

In November, 1917, a syndicate, known as J. L. Bruce Trustees, was formed to acquire for the Butte & Superior 200 acres of zinc-lead ground W. of the Emma mine of the Butte Copper & Zinc Co.

The Germania-Tzarena claims, 1 mile S. W. of Butte, were worked under lease and option in 1918. Shaft was sunk to 1,000′ and 500′ driven on vein, but payments being due before ground was explored the bond was dropped.

In 1919, three claims just W. of Butte, carrying a vein of rich silver ore, were acquired.

Litigation: Butte & Superior has had eight years of costly litigation, one suit with the Elm Orlu Mining Co. involving extralateral rights of certain orebodies, and the other concerning the patent rights of Minerals Separation in the flotation process. In this latter dispute, B. & S. has really done great service to the whole mining industry, in forcing the patents to be clearly defined.

In 1916, Elm Orlu, through its controlling company, the Clark Montana Realty Co., started suit against the Butte & Superior Mining Co. over rights to certain orebodies in the Elm Orlu claim and in the Black Rock claim of Butte & Superior. The successive steps in this controversy are as follows:

In 1917, the U. S. District Court decided in favor of Elm Orlu, giving

this company the westernmost 301′ along the vein and B. & S. all rights to the Rainbow lode east of the point where it enters the Black Rock claim (B. & S.); subject, however, to the prior rights of the Pyle vein of the Elm Orlu, below its junction with the Rainbow.

The B. & S. appealed this to the U. S. Circuit Court of Appeals at San Francisco in November, 1917, which affirmed the decision of the lower court, and found that ore taken by B. & S. from the disputed ground was worth, with interest, $177,707. Application to the U. S. Supreme Court for a review of this decision, was denied on May 10, 1918; but the Circuit Court of Appeals granted an appeal to the U. S. Supreme Court, who heard the appeal January, 1919, and sustained the decision of the Circuit Court of Appeals. The geological features of this case were presented by R. M. Searles in 'M. & S. Press' of May 10, 1919.

Another collateral issue of the case not wholly determined by the U. S. District Court involved claims on the part of Elm Orlu to certain orebodies developed in the Black Rock claim 550 ft. eastward of the point above referred to by reason of the alleged apex in the Elm Orlu claim of a branch of the Rainbow lode extending into the earth beneath Black Rock claim. This issue was never tried as a settlement was arrived at in August, 1919, and confirmed by the Court. By this agreement, Elm Orlu gets about 1/3 and B. & S. 2/3 of the disputed area, while B. & S. pays Elm Orlu $2,500,000 cash for ore already extracted. Elm Orlu was awarded 186′ additional eastward on the Rainbow vein below 1,200′ and the B. & S. that portion above 1,200′. The Jersey Blue vein west of the new plane below 1,300′ was awarded to Elm Orlu. Each side paid its own costs. The suit involved examining 12 levels in each mine, crosscuts, 6 miles of drifts, 10 raises, 500 to 1,200′ long, and a complexity of vein-intersections and fault-crossings.

Litigation with Minerals Separation over United States patents was first provoked by the installation made in 1911 by James M. Hyde (formerly an employee of Minerals Separation, Ltd.), at the mill of the Butte & Superior Copper Co. (name since changed to B. & S. Mining Co.) In that suit (Minerals Separation v. Hyde) the District Court at Butte, Montana, sustained U. S. Patent No. 835,120 and found infringement as to 7 claims. In 1914, the Ninth Circuit Court of Appeals at San Francisco, reversed this decision; but on writ of certiorari the U. S. Supreme Court on December 11, 1916, unanimously adjudged this basic patent for air-froth flotation valid as to 10 of its 13 claims. The remaining 3 claims, which specified the use of "a small quantity of oil," and which the Court held to be invalid, have since, by disclaimer, been brought within the scope of the Supreme Court's decision.

Following this decision of the Supreme Court in the Hyde case, the Butte & Superior Mining Co. began using oil in minimum quantities of ½ of 1 per cent, contending that this relieved it of liability for infringement. This issue was tried in the suit of Minerals Separation v. Butte & Superior, and on May 4, 1917, the United States District Court at Butte, Mont., again found validity and infringement as to the 10 claims (3 modified by disclaimer) previously litigated. On May 13, 1918, the Ninth Circuit Court of Appeals at San Francisco partly reversed this decision, holding the patent limited to ½ of 1% of oil on the ore. The U. S. Supreme Court reviewed this case on writ of certiorari, and on June 2, 1919, partly reversed the decision of the Circuit Court of Appeals, holding that the patent extended to and covered the use of oils in amounts equal to any and every fraction of 1% on the ore. Pursuant to this decision, the District Court of Montana entered its decree on July 19, 1919, issued a permanent injunction against the Butte & Superior, and held it to account for all profits made by reason of its infringement. This accounting was set for October 27, 1919, but was extended to December 1. In its report filed with the U. S. District Court in November, B. & S. suggested to M. S. the sum of $451,097 for infringement, this not being an admission of the amount saved by flotation, but as an aid in the accounting. On September 8, 1919, the U. S. Circuit Court of Ap-

peals at San Francisco dismissed an appeal of the Butte & Superior Mining Co. v. Minerals Separation. The appeal was against certain provisions of the decision of Judge George N. Bourquin at Butte in September, 1917. In January, 1920, M. S. brought contempt proceedings against B. & S., alleging disregard of injunction.

Geology: ore consists of zinc blende, galena and small quantities of pyrite and chalcopyrite occurring with gangue material, mostly quartz, silicified granite, rhodochrosite and rhodonite as vein replacement of the granite. The ore occurs in parallel or branching ore shoots ranging in thickness from narrow stringers up to orebodies as much as 100′ wide within the limits of a broad general zone of mineralization known as the Rainbow Lode. Near the surface the commercial ore consisted principally of silver ore, which was mined in the early days of Butte mining. The commercial zinc ore shoots as developed during recent years occur downward from approximately the 500′ level, and as far as disclosed by present development increase in horizontal area and in importance as greater depth is gained. Ore actually blocked out ready for mining is maintained at about one million tons, greater development than this being inadvisable owing to the difficulty in maintaining developed drifts and crosscuts for any considerable period before actual mining operations are to be conducted.

The ore carries from 10% to 30% zinc, averaging about 18% zinc, 1.25% lead, 0.2% copper, 8 oz silver and 30c gold. The small amount of iron, lead and copper contents permits of the production of a good grade of zinc concentrates, but the very fine dissemination of the mineral requires fine grinding for efficient concentration, and most of the zinc mineral is afterwards recovered by oil flotation.

The silver content decreases slowly with depth, but thus far the zinc ore continues clean and without appreciable pyrite.

Development:

Year	Total footage	Shafts feet	Total miles workings	Ore reserves tons	Zinc %	Silver oz.
1918.....	33,459	950	29	830,000	17.0	5.70
1917.....	17,730	724	23	1,059,200	17.6	5.90
1916.....	21,838	2,649	20	1,044,850	17.7	5.65

Reserves at end of 1919 show a decrease of 25% due to loss of ground by adverse decision in the Elm Orlu case and not to any diminution of orebodies.

There are three shafts—No. 1 is 1,200′ and No. 2 is 2.050′; No. 3 which is 2,350′ deep is the new main or working shaft. It has concrete skip-pockets on 1,200, 1,300, 1,400, 1,500, 1,600, 1,700, 1,800 and 1,900′ levels. Ore occurs in heavy ground with frequent fault seams and slips, and there is considerable movement as a result of ore extraction. These facts necessitated sinking a new shaft. All 3 shafts are well protected by concrete and cement coating. On the 1200′ station of No. 2 shaft electrically-driven quintuplex pumps handle the mine water. The main ore-shoot has been opened continuously for 2,000′ E. of the ground in dispute with the Elm Orlu. No. 3 shaft is to be sunk to 3,050′.

Normally, 1,200 men are employed underground.

Equipment: at main shaft is a Nordberg hoist designed for an ultimate depth of 5,000′, hauling at 3,000′ per minute, driven by a 2,000 h. p Westinghouse motor, employing the Ilgner and Ward-Leonard systems of balance and control; compressors, complete machine-shops, coarse-crushing plant at No. 3 shaft, and 1,800-ton mill using gravity concentration and flotation. Normally, 430 men are employed in surface operations.

Part of the concentrates are sold under contract to the American Zinc, Lead & Smelting Co., and U. S. Smelting Co. under a toll basis, though small quantities have been disposed of by sale to various zinc retort smelters

throughout the country or to the Anaconda Copper Mining Co. for treatment at its electrolytic plant at Anaconda.

Production: figures for the production of the property prior to 1913 are not available, but the results of operations since that time are as follows:

Year	Tons Milled	Oper. Cost	Tons Concts.	Assay Con., %	Lb. Zinc Concts.	Zinc Rec. %	Aver. Price, c.	Net Total	Profit per share
1919.....	402,436	$9.97	56,703	54.35	113,387,464	95.6	7.04	$961,115	$3.31
1918.....	468,814	11.23	135,543	51.22	139,522,506	92.97	7.58	$651,924	2.25
1917.....	461,953	9.95	138,661	47.36	132,036,735	91.13	8.73	2,347,496	8.08
1916.....	627,370	6.93	171,747	52.87	181,624,842	93.10	12.03	8,873,446	30.57
1915.....	522,300	5.76	158,171	53.61	165,382,921	93.00	12.34	9,125,947	33.47
1914.....	327,210	5.33	101,383	53.16	108,644,120	88.71	5.04	1,417,128	5.21
1913.....	296,940	5.70	106,443	49.00	102,997,916	88.43	5.52	942,988	3.47

Silver production in 1919 was 2,010,000 oz.

This table does not give the lead, copper, and silver in concentrate, which in 1918 amounted to 11,956,951 lb., 1,293,313 lb., and 2,781,394 oz., respectively.

Butte-New York Copper Co.

Controlled through stock ownership by Butte & Superior Mining Co.

General office: 25 Broad St., New York.

Officers: M. M. Ferguson, pres.; R. J. Schaefer, v. p.; W. G. Sargent, sec.-treas., New York; M. M. Ferguson, L. B. Holloway, Philip Lawrence, G. M. Minton, A. J. Ronaghan and W. G. Sargent, directors. Annual meeting 2nd Monday in January.

Inc. Oct. 17, 1906, in South Dakota. Previously a holding company controlling over 95% of the capital stock of the Butte-Milwaukee Copper Co. In 1914 it purchased all the assets of that company, comprising four claims in the Summit Valley mining district, Silver Bow county, Mont., adjoining the property of the Butte & Superior Mining Co., and three claims in the Argenta mining district, Beaverhead county, Mont. Claims aggregate 53 acres. **Cap.** authorized, $1,000,000; outstanding, $582,172; par value $1. The former authorized capital stock was $4,000,000, consisting of 800,000 shares of par value of $5 each; the stockholders, however, voted April 16, 1915, to change the par value from $5 to $1 per share, and to increase the amount of stock by 300,000 shares, making $1,100,000 authorized. The Butte & Superior Mining Co. owns $323,655 of the stock. Stock transferred at company's office. Registrars: Empire Trust Co., New York.

Bonded debt: $150,000 first mortgage convertible income gold 6s; dated June 1, 1916; due June 1, 1925; int. J. & D. (up to and including June 1, 1920, interest is payable only out of income at rate of 6%, but is cumulative for that period; thereafter interest will be paid unconditionally.) Coupon, $100, $500, and $1,000. Authorized, $500,000. The unissued bonds are reserved for future requirements. Convertible at any time prior to maturity into stock of the company at par. Subject to call on and after June 1, 1918, at 105 and interest. First offered ($150,000) to stockholders of record April 19, 1915, at par, on the basis of $100 bond for each 400 shares of stock held. Normal income tax deducted from interest.

Property: holdings consist of 4 claims, patented, known as the Pollock, Colonel Sellers, Florence, and Bird, lying immediately north of the Butte & Superior, and 3 lode mining claims in the Argenta district, Beaverhead county, Mont.

The Colonel Sellers claim has a promising surface showing with strong persistent quartz veins in granite. The Butte & Superior completed the sinking of the 1,200′ Milwaukee shaft on Colonel Sellers claim and connected it by crosscutting with 1,200′ level of Black Rock mine. This work was continued beyond the Colonel Sellers shaft so as to open the Mastodon vein on the Florence claim. The Milwaukee shaft is well equipped with power plant and hoist. The Butte & Superior Co. spent $24,000 in development work on the Butte-Milwaukee property and in return received 205,000 shares of the capital stock of the Butte & New York Co. Development work said to have proved good zinc orebodies.

Surface outcrop on Bird claim is 100′ wide and resembles outcrops of the typical fault veins of the district.

The Pollock mine has 4 veins, 2 more or less developed by a short tunnel and a 730′ three-compartment shaft. A silver vein was opened on the 300′ level and mine is said to have produced, years ago, about $400,000 worth of ore, with values mainly in silver and gold, from above the 200′ level. A little ore running 2% copper and 15 oz. silver per ton, with small gold values was produced, 1906.

BUTTE & ZENITH CITY MINING CO. **MONTANA**

Office: I. Freimuth, Duluth, Minn.; and 30 E. Broadway, Butte, Mont.

Officers: I. Freimuth, pres.; G. T. Paul, v. p.; Sol. Genzberger, sec.; John Killorin, treas.; with W. D. Gibson, C. O. Baldwin and L. S. Loeb, directors. Wm. D. Gibson, supt., at last accounts.

Inc. Oct., 1912, in Montana. **Cap.,** $3,000,000; $10 par; 93,000 shares were paid for 15 claims of the Silver Bow Copper Co. In 1915, 50,000 shares of treasury stock were sold at $3 per share to provide funds for development work.

Financial statement from November, 1912, to May 1, 1919, shows receipts totaling $382,721, of which $319,487 was from sales of shares; $42,446 from sales of machinery, and $11,788 advances from I. Freimuth. For equipment and general mine expenses $342,710 was paid. Cash in banks amounts to $7,815.

Property: 22 patented claims, 343 acres, all in a compact group, about 2 miles west of the developed section of the Butte district and a short distance south of Silver Bow junction, where 4 railroads meet. Ground shows Butte granite and aplite cut by numerous strong and persistent quartz veins, also the later fault-veins, which in the copper district of Butte have proven so productive.

Development: by shaft, 1,500′ deep, with a crosscut at 460′ and crosscuts at 1,000′ level showing good indications, with all surface veins in place. A large flow of water was encountered at 460′, flooding the mine, and costing over $30,000 to unwater and put in pumps. On the 1,000′ level crosscuts were driven 1,004′ north and 801′ south, and veins explored by 1,023′ of drifts. This work disclosed the same veins as at 460′, and of slightly better mineralization. When the shaft reached 1,500′, company's finances were low, and the abnormal conditions of 1918 making further work impossible, the mine was closed and machinery sold. The veins show occasional value at the surface, but not in commercial quantities. The quartz veins are of the silver type, but the cross veins are similar to the copper veins of Butte. In 1919, prospecting for silver ore was under way in the Corinthian claim crosscutting from a prospect shaft 220′ deep disclosed two strong veins, assaying from 2 to 6 oz. silver per ton.

Property is still considered promising, and its exploration a meritorious mining venture.

CLARK MONTANA REALTY CO. **MONTANA**

Address: 20 Exchange Place, New York City.

Is a close corporation, controlled by Hon. W. A. Clark, as a holding company for the Ophir mine, Utah; ½ interest in the Elm Orlu mine, Butte; ½ interest in the Timber Butte Milling Co., Butte, Mont.; Sunset mine, Wallace, Idaho, and in general all the Clark properties in the northwestern States. For litigation with Butte & Superior see that company and Elm Orlu.

COLUSA-LEONARD EXTENSION COPPER CO. **MONTANA**

Is a subsidiary of the Tuolomne Copper Mining Co.

Officers: W. W. McDowell, pres., 804 W. Park St., Butte, Mont.; Guy Stapleton, v. p.; Meyer Genzberger, treas.; W. E. Reynolds, sec.; with J. Kaufman, directors.

Inc. Oct. 1, 1906, in Arizona. **Cap.,** $5,000,000; shares $5 par.

Property: 5 claims, patented, 42 acres, consisting of the Maggie placer, Golden Hematite, Little MacQueen, Undine and Snow Bird placer, about

a mile east of the Colusa and Leonard mines, and near the Pittsmont shafts of the East Butte Copper Co.

Development: by 800 three-compartment shaft on the Little MacQueen claim lying about the center of the group, that has cut several small stringers of ore assaying up to 9% copper, but none of commercial size. There is also a 7′ vein of 2% ore carrying 14″ paystreak said to range 8 to 10% in copper tenor, with small values in gold and silver also some lead and zinc.

Property reopened August, 1916, by the Tuolumne C. M. Co. under an agreement whereby the T. C. M. Co. acquires a 51% interest in the C. L. property for sinking shaft from 800′ to 1,600′ and driving crosscuts on the latter level to the N. and S. boundaries of the group.

See Tuolumne Copper Mining, p. 1005.

COLUSA-PARROT MINING & SMELTING CO. **MONTANA**

Office: Box 1683, Butte, Mont.

Officers: Hon. Wm. A. Clark, pres.; Wm. C. Siderfin, v. p.; W. C. Messiass, sec.; Alex. J. Johnston, treas.

Inc. Nov. 26, 1897, in Washington. **Cap.,** $500,000; shares $50 par.

Company is practically out of business, its only present property being lands, platted as an addition to the city of Butte. Has an asset of considerable value in a million-ton tailing dump at the Butte Reduction Works, which is being treated.

CRYSTAL COPPER CO. **MONTANA**

Officers: 31 Milk St., Room 209, Boston, Mass.; and 73 Hirbour Bldg., Butte, Mont. Matt W. Alderson, mng. dir. A. C. Ray, mgr., Basin, Mont.

Officers: Bowdoin S. Parker, pres.-treas.; George W. Clement, v. p.; Eugene H. Walker, sec., with Louis H. Goddu, Edward P. Barry, and John E. Allen, directors. William D. Gibson, mgr. E. P. Barry, gen. counsel.

Inc. April 4, 1916, in Maine. **Cap.,** $2,000,000; $5 par; increased 1919 from $1,000,000; $5 par; changed November 7, 1918, from $1,000,000; $1 par. Stock listed on New York and Boston Curbs. Security Transfer and Registrar Co., New York, and Federal Co., Boston, transfer agents, Security Transfer & Registrar Co., New York and Old South Trust Co., Boston, registrars. Annual meeting April 1.

Property: (1) the **Goldsmith mine** at Butte, Mont., under bond and lease. The deposit is a quartz lode, on the western split of the Rainbow lode. The main shaft, 367′ deep, developed from the surface 3 veins from which about $1,500,000 worth of silver ore was produced by former owners.

The Anaconda company owns ground adjoining the Goldsmith. Its Alice mine, the richest silver mine of that company, is only 1,500′ away, while W. A. Clark's Moulton mine, reputed to have produced over $6,000,000, is but 400′ distant.

Development: the Crystal company opened and retimbered the old Tong shaft, sinking it to the 500′ level where crosscuts intersect both the northern and southern veins, from which the company has been mining and shipping silver ore since November, 1918. The shaft was deepened to the 600′ level late in 1919, and crosscuts driven to several veins have cut shipping ore, 2′ of it very high grade.

Equipment: the mine has up-to-date machinery and appliances, including a 150 h. p. electric compressor, a 100 h. p. electric hoist, good for a shaft of 1,000′ depth; all mining operations are carried on under the advice of experts in each branch of the business.

(2) The **Crystal mine** and group of claims are about 8 miles N. of Basin, Jefferson county. The company owns an undivided half interest in the Commence and Crystal; one-half and one-sixth of the St. Lawrence and Jack Fraction; the Mammoth claim, total of about 84.39 acres, in the Cataract district. The output is mostly copper ore, but a good grade of silver-lead ore has also been developed, and shipments made.

The gross value of copper ore mined and sold since the Crystal company took over the mine is $70,000, and of the silver ore, $25,000, a total of $122,000.

Development: all work done so far has been devoted to mine development. The upper tunnel has been extended to 1,334′, carrying it within 50′ of the Jack claim. There is over 3,000′ of unexplored vein to be opened by extending the tunnel farther W., the known orebodies on the St. Lawrence claim being over 1,000′ further west. The Lower or Mammoth tunnel, 200′ below the first, enters the vein through the Mammoth claim and cuts the Crystal vein about 900′ from the portal, running on it for 300′ or more. The Mammoth claim dominates the other claims, as the only outlet of the lower tunnel is through the Mammoth.

The copper ore extracted thus far has been of fair average grade for shipping, but there is also in the mine a large tonnage of ore profitable for concentrating. The silver ore obtained from the Crystal mine last year carried from 25 to 45 oz. per ton, indicating that the mine might be operated profitably for silver ore alone.

A great deal of matter was published about this company during 1918 and 1919. In a circular issued on July 17, 1919, and signed by the president, it was stated that the Basin mines were being operated under lease during 1918 and 1919, on a royalty basis. Over $100,000 has been spent at the Butte mine. Ore shipments from both properties are said to meet all operating expenses, and should soon give a surplus for dividends.

DAVIS-DALY COPPER CO. MONTANA

Office: 79 Milk St., Boston, Mass.; and Butte, Mont.

Officers: H. M. Burton, pres.; Wm. Bloom, v. p.; Charles G. Schirmer, sec.-treas.; with F. M. Kimball asst. treas.; and F. A. Schirmer, directors W. L. Creden, cons. eng. J. L. Bruce, gen. mgr..

Inc. Sept. 14, 1908, in Maine, as successor of Davis-Daly Estates Copper Co. **Cap.,** $6,700,000; shares $10 par; assessable; ($8.50 paid), issued, $6,000,000. Listed on Boston Stock Exchange. Annual meeting 4th Tuesday in September. Federal Trust Co., Boston, transfer agt.; State Street Trust Co., Boston, registrar.

For the earlier chapters in the history of the company, readers are referred to description of the Davis-Daly Estates Copper Co., in Vol. VIII and X of the Copper Handbook.

Financial Statement—years ending June 30:

Year	Ore sales, etc.	All expenses	Profit after deciation, etc.	Current assets	Current liabilities
1919	$1,336,777	$1,029,814	$415,963	.....	.....
1918	1,400,219	603,007	457,490	$513,104	$69,929
1917	742,003	578,200	163,803	231,696	41,128
1916	236,991	284,326	.....	140,617	100,778
1915	.....	.....	.....	93,903	20,475

The estimated net profit for quarter ending September 30, 1919, was $364,532; cash in treasury at end of 1919 was $500,000.

Dividends: initial of 50 cents paid June 29, 1918, and toal of 75 cents for that year; 50 cents December 20, 1919.

Property: a small surface area and mineral rights of 320 acres under the city of Butte, adjacent to, but south and west, of the older productive area.

Geology: two main veins have been developed, running in N. W.-S. E. direction corresponding to the Blue vein system to which the Jessie, Edith May and other very productive fault veins belong. There are also several east and west veins on which but a small amount of development has been done until recently. The veins are frequently faulted and a careful study of geological conditions is necessary for recovery of veins beyond the faults.

Development: to a depth of 2,800′ by the Colorado shaft, and workings. Work at the 540′ Hibernia and the 800′ Mt. Moriah shafts having shown the advisability of deep exploration, the Colorado shaft was sunk to 2,000′ and later to 2,800′ with gratifying results. The chief development work is on the Hesperus.

vein, the principal one in the mine, been opened down to 2,100, 2,300, and 2,500′, these levels producing ore running over 7% copper. The 2,500′ level was connected with the Anconda company's Belmont mine in May, 1919, improving ventilation of the Colorado mine. Reserves are said to be equal to an output of 15,000 tons of ore monthly for 3 years. In December, 1919, 6′ of 8% copper and 6½ oz. silver ore was cut on the 2,100′ level of the Colorado mine. Development is at the rate of 9,000′ yearly.

The Davis-Daly ground has been generally considered to contain only low-grade and base zinc-pyrite ores and to be outside the copper section of Butte camp. Developments show, however, that good copper ores exist and that the extensive area of unexplored ground will make this property a profitable one.

The Hibernia mine contains zinc-silver and manganese ore, which will be worked when a pending dispute is over.

Normally, 360 men are employed, of whom 300 are underground.

Equipment: a hoist was installed early in 1917, with a capacity of 3½ tons per trip and speed of 2,000′ per minute at depth of 4,000′. There is an electric-driven air compressor, and a large battery of boilers ready in case electricity is cut off. The ground around the shaft being limited, the output at the mine is conveyed several blocks over a narrow-gauge surface tram to ore bins alongside the Northern Pacific railroad. In the Colorado mine, storage battery locomotives are to be used, also skips.

Production: years ending June 30 (normal output of ore is 300 tons daily).

	Ore mined, tons	Copper, lb.	Silver oz.	Total profit
1919**.....	21,850	3,230,000	126,000	$364,532
1919.....	53,983	8,118,369	340,851	415,963
1918*.....	58,720	5,894,396	390,488	457,490
1917.....	.....	.....	.....	163,803
1916.....	20,511	4.04%	5.37	.....

* Also 1,316,310 lb. zinc and 611,907 lb. lead from Hibernia mine.
** Quarter ending September 30.

In June, 1919, the yield was 775,600 lb. of copper and 31,400 oz. of silver, in August the copper output was 1,300,000 lb. Average grade of the ore during 8 months of 1919 was 9% copper and 6.6 oz. silver per ton.

Davis-Daly is doing well and with normal demand for copper should continue to pay regular dividends.

DULUTH-NEW YORK MINING CO. **MONTANA**

Address: John Zundel, Butte, Mont.

Property: the Excelsior claims in North Walkerville, Butte, and the Amy-Silversmith group nearby. Eastern capital is said to be advancing $650,000 for deepening the Excelsior shaft to 1,500′ and other work.

EAGLE MINING CO. **MONTANA**

Address: Care Harper McDonald Co., Lewisohn Block, Butte, Mont. Hon. Patrick Mullins, Arthur V. Corry, and Thos. Bryant, directors.

Inc. March 10, 1906, in Montana. **Cap.**, $150,000; shares $1 par; is supposed to have increased capitalization, April 29, 1907, to $250,000, shares 50 cts. par.

Property: north of Walkerville, a suburb of Butte, has a 250′ shaft, showing a 5′ vein.

Mine is dismantled, but worthy of further prospect work. Idle at last accounts.

EAST BUTTE COPPER MINING CO. **MONTANA**

Office: 85 Devonshire St., Boston, Mass. **Mine and works office:** Butte, Mont.

Officers: Robt. H. Gross, pres.; Hon. Jas. H. Reed, v. p.; Wm. P. Everts, sec.; Frank P. Son, treas.; Oscar Rohn, gen. mgr., with F. Ward Paine and Wm. A. Paine, directors; L. A. Thulin, asst. treas.; Andrew J. Ray, mine

supt.; John E. Rothwell, mill supt.; Julius H. Warner, engr.; G. E. Burton, geologist.

Inc. Oct. 14, 1905, in Arizona. **Cap.**, $3,000,000; shares $10 par; increased, May 11, 1909, to $6,000,000, shares $10 par; 421,849 issued. State Street Trust Co., Boston, registrar; American Trust Co., Boston, transfer agent. Stock is listed on the Boston Stock Exchange and N. Y. Curb. Annual meeting, first Monday in April.

The East Butte Copper Mng. Co. has no indebtedness. It owns all of the outstanding bonds and all preferred stock of the Pittsmont Copper Co., the latter amounting to $1,000,000 par value; also four-fifths of the common stock, amounting to $4,000,000 par value. East Butte Co. works the property of the Pittsmont Copper Co. under an operating agreement. During 1918, East Butte paid Pittsmont C. Co. $1,000,000 cash for accrued rentals, which was repaid by the purchase of 200,000 preferred shares, $5 par of the East Butte Co., placing part of them in treasury of Pittsmont. This enabled the East Butte Co. to pay a dividend of $1 per share.

Financial Statement, years ending December 31:

Assets.

Years	Property and Equipment	Stock Unissued	Cash and Copper	Accounts Receivable	Total
1918....	$3,401,491	$1,781,510	$1,637,442	$197,936	$7,018,379
1917....	3,298,820	1,792,690	1,947,589	183,837	7,222,936
1916....	3,480,514	1,890,000	2,214,568	11,928	7,597,009

Liabilities.

	Capital Stock	Accounts Payable	Contingent Funds	Total Surplus	Total
1918....	$6,000,000	$283,695	$126,456	$608,227	$7,018,379
1917....	6,000,000	941,187	75,152	206,597	7,222,930
1916....	6,000,000	1,219,600*	36,897	340,513	7,597,009

* $911,080 to Pittsmont Company.

Net quick assets at end of 1919 were about $2,000,000.

Income Account.

	1918	1917	1916	1915	1914
Gross income.....	$5,875,322	$5,397,868	$5,523,688	$2,753,588	$1,455,454
Mining charges, etc....	5,033,178	4,089,710	3,198,317	1,699,603	1,048,856
Development, etc.....	53,739	116,640	294,191	214,692	136,101
Depreciation, etc.....	22,936	169,557	465,411	56,296	48,244
Dividends	632,774	831,731	.....	.....	.....
Surplus	132,595	190,230	1,565,769	782,997	222,253

Dividends: initial of $1 per share Jan. 29, 1917, and total of $2 for that year; $1.50 in 1918; 50 cents in 1919, a grand total of $1,687,396.

Property: the Dutton group, 134 acres, held by placer patent, is in the S. E. part of Butte, near the Pennsylvania mine, and is idle at present.

Principal property is the **Pittsmont group** at Butte, described below.

Miscellaneous holdings include the Swissmont group of 6 claims, near Elkhorn, Jefferson county, Mont., and the Chamounix group, near Austin, Lewis & Clark county, Mont., including the Christina group of 6 claims and the Fannie Parnell group of 33 claims. The Swissmont group has developed a considerable tonnage of low-grade oxidized gold ore carrying an excess of iron over insoluble material, and of value as a flux.

The Chamounix group has shipped some silver-copper ore in the past, but is now idle. Company also has timber operations at Feeley, Mont.

A mill was erected at the Elkhorn property in 1917, but owing to scarcity of labor and increased cost of cyanide, operations have been postponed until conditions become more favorable.

East Butte also has a 49% interest in the Ohio Oil Co., a Standard Oil subsidiary.

Geology: the Pittsmont claims cover 280 acres of flat valley bottom,

about 1½ miles east of Butte and extending outward from the footslopes of the continental divide mountain ridge. The ground is a filled-in valley, the sandy wash and debris being in places several hundred feet deep, so that no outcrops of any kind exist on the ground. The underlying rock is the normal Butte granite (quartz-monzonite) which is cut by 3 systems of veins; Northwest, corresponding to the Blue Vein series. Ore-shoots occur in veins of each series. The zone of oxidization and leaching of copper extends from 500′ to 700′ below the surface. There are 12 principal veins that have been productive. While these are not wide, usually under 5′, the ore-shoots are long and persistent. At least 2 veins on the 800′ level have been stoped almost continuously for 1,500′ in length. Though the 800′ level has been the most productive level opened to date, due both to an increased primary mineralization and secondary enrichment which has affected the lower levels to a much lesser extent, the lower levels continue to yield strong ore shoots of commercial grade, though lower in value than ore from upper levels.

Development: 2 shafts, No. 2 and 3, 1,830′ and 1,240′ deep, respectively. No. 2 is the working shaft, and levels are opened from it at 800′, 1,000′, 1,200′ 1,500′ and 1,800′.

Total workings are over 20 miles, and new work each year averages 10,000 ft. Good ore has been opened on the two bottom levels, but as the 1,800′ level has bad ventilation, and it is difficult to get men to work there, a new shaft was raised from the 1,800′ level to surface.

Ore production comes from the following levels: 800′, 39%; 1,000′, 18%; 1,200′, 15%; 1,500, 23%, and 1,800′, 5%.

Normally, 630 men are employed underground.

Equipment: consists of hoisting plant, flotation plant, and smelter. The above includes a 2,000-h. p. steam plant, 2,000-h. p. electric plant, 600-h. p. steam hoist good for 2,000′, and 50-h. p. steam hoist good for 1,500′; two 25-drill air compressors, and 50 machine drills. Electric power is used for practically everything except hoisting. There are about 20 buildings, which include the smelter, sintering plant, 2 engine rooms, change-house, boiler-room, concentrator, flotation plant, carpenter, machine and electric shops, sampling mill, laboratory and office building. The smelter building contains one 600-ton blast-furnace and one 300-ton furnace with 3 basic-lined converters. The sintering plant contains one 42″ Dwight-Lloyd machine. Concentrator is equipped with crushers, jigs, tables, etc., and flotation plant is equipped with tube-mills and Janney machines. The capacity of concentrator is 600 tons and of flotation plant 800 tons, the additional capacity of flotation plant to be used in reworking tailings, of which 123,520 tons were treated in 1918, carrying 0.7 lb. copper per ton, at cost of $1.29 per ton.

The Pittsmont reduction plant is the only operating smelter in Butte and does a considerable amount of custom business, treating ore from several independent mines, including Davis-Daly. About 350 men employed on surface.

Production: normally, the daily output of ore is 900 tons.

	1918	1917	1916	1915	1914
East Butte ore tr., tons.	178,948	181,904	256,196	146,083	71,918
Average copper, per cent.	4.25	4.31	3.67	4.28	4.72
Custom ore treated, tons.	83,038	30,851	79,861	34,980	39,074
Copper yield, lb.....	24,599,890	20,013,900	18,340,713	12,542,058	9,175,597
Silver, ounces.....	776,818	581,190	556,542	318,124	242,347
Gold, ounces.....	1,419	1,825	3,844	2,696	2,219
Cost per lb. copper, cents	19.71	17.70	16.89	....	....

Copper production for 1919 was 20,000,000 lb., a decrease due to abnormal conditions.

Management gives out little information about its work, but developments seem to be favorable and dividends should be resumed soon. The revenue from custom smelting helps swell profits considerably. Company has also bought oil-lands in Kansas, Texas and Wyoming, which are said to be productive ground.

EAST BUTTE EXTENSION COPPER MINING CO. **MONTANA**

Office: 113 Hamilton St., Butte, Mont

Officers: Chas. J. Schatzlein, pres.; Philip A. Breen, v. p; Frank H. Cooney, sec. and gen. mgr.; Dr. C. E. Blackburn, treas., with Chas. N. Joyce, directors; A. F. Munroe, engr.

Inc. April 10, 1906, in Arizona. **Cap.**, $1,000,000; shares $1 par; issued, $550,000. Paid, October 1, 1906, a 1% dividend, amounting to $2,486. Stock listed on Butte Exchange.

Property: various fractional claims, 4 acres, lying between the Belmont, Pennsylvania and Ground Squirrel mines of the Anaconda developed by 6 shafts, deepest the 250′ two-compartment No. 6 shaft, begun 1909, with about 500′ of crosscuts. The Westlake and Wall mines are said to have produced, under former ownership, about $300,000 worth of ore. The two-compartment No. 1 shaft is 170′ deep, and the 200′ No. 2 shaft shows ore assaying up to 13% copper and 1 oz. silver per ton. No. 3, 1,040′, known as the Westlake, has a small precipitation plant.

Lessees shipments of 40 tons daily, with net smelter returns of $37,360, yielded the company a net royalty of $12,881.83 in 1917. Company also owns a divided one-half interest in the Centerville claim, and interests as follows; one-half in Malone; eleven-sixteenths in Little Evelyn; one-sixth in Valley Forge; one-half in Gregory; one-fourth in Simon; one-eighth in Eureka First; three-fortieths in Lost Fraction, and three-fortieths in Katy T.

Leasers operating in 1916 shipped several carloads of 8% copper ore from the 200′ level. East Butte Extension is reported to receive 15% royalty on all ore shipments. No recent returns available.

ELK GOLD MINING CO. — MONTANA

Address: R. Lee Kelley, sec. and gen. mgr., Deer Lodge, Mont.

Officers: J. C. Conlin, pres.; Tobias Schurtz, treas.; with J. E. Neville, C. E. Asyling, S. P. Wilson, directors.

Inc. March, 1913, in Montana. **Cap.**, $800,000; $1 par; assessable; 400,000 shares issued.

Property: 2 claims, 1 patented, 20 acres, 10 miles S. E. of Deer Lodge, Powell county, and 17 miles N. of Butte, Mont. Claims show small stringers of oxidized ore on surface, which at depth of 40′ are reported to assay from 4-7% copper, 1 oz. gold and 7-14 oz. silver per ton.

Development: by 100′ shaft. Shipped 15 tons of ore in 1915 netting $30 per ton. No recent returns.

ELM ORLU MINING CO. — MONTANA

Office: Miner Bldg., Butte, Mont.

Officers: W. A. Clark, Jr., pres. and gen. mgr.; W. A. Clark, v. p., owners; W. D. Mangam, sec.-treas.; J. C. Pyle, cons. engr.; R. J. White, mine mgr.

Inc. 1907. **Cap.**, $100,000; shares $10 par. Statements filed with Assessor of Silver Bow county for years ending May 31:

	Ore	Value	Expenditure				Net
Year	Tons	per Ton	Mining	Const.	Trans.	Reduct.	Profit
1918.....	135,130	$18.20	$1,105,363		$351,338	$871,588	$43,790
1917.....	175,236	22.65	846,568	199,439	492,375	1,563,745	867,333
1916.....	200,752	18.52	1,011,537	18,029	408,823	1,783,352	495,751

Property: company owns the Elm Orlu mine adjoining the Butte & Superior holdings, and the Badger State mine of the Anaconda Copper Co. in the N. E. section of the Butte district. The Poser claim is owned by a separate company.

Geology: the Elm Orlu covers part of the Rainbow lode and several other veins containing large bodies of copper ore and immense bodies of zinc ore. Copper occurs as chalcocite both in secondary fault veins and in veins of the Rainbow lode, and also as chalcopyrite mixed with zinc ore.

Development: by 2,200′ shaft and several miles of workings, principally below the 900′ level.

An important development during 1919 was the opening of the Northwestern vein on 2,200′ level. It carries copper, and the apex is below depth of 2,000′.

Litigation: in 1916, Elm Orlu, through its controlling company, the Clark Montana Realty Co., began suit against the Butte & Superior Mining Co., which had been mining ore beneath the Elm Orlu claim. The history of the controversy ended 1919, is as follows:

The U. S. District Court, in 1917, decided in favor of the Elm Orlu, giving the company the westernmost 301' along the Rainbow lode, west of the point where it enters the Black Rock claim (B. & S.); subject, however, to the Elm Orlu prior rights to the Pyle strand below its junction with the Rainbow.

The B. & S. appealed to the Circuit Court of Appeals, which affirmed the decision of the District Court and gave judgment for $177,707 against the Butte Superior Co. On appeal to the U. S. Supreme Court the decision of the Circuit Court of Appeals was confirmed. The geologic features of this case were ably illustrated by R. M. Searles, in Mining & Scientific Press of May 10, 1919.

A collateral feature of the case involved orebodies in the Black Rock claim 550 ft. eastward of the point above noted.

The case was settled by payment of $2,500,000 to the Elm Orlu. Elm Orlu gets 1/3 and B. & S. 2/3 of the disputed area, while Elm Orlu takes 186' additional eastward on the Rainbow vein below the 1,200' and the B. & S. that portion above 1,200'. The Jersey Blue vein of the new plane below 1,300' also goes to Elm Orlu. Each side paid its own costs.

Litigation with the Anaconda company concerning part of the Emily vein in the Pilot-Butte mine is the next apex suit of Elm Orlu.

Equipment: is exceptionally complete and recent additions include electrically-driven hoist with 2 drums 10' diameter by 8' face, designed to wind 3,500' of rope at a speed of 2,500' per min. The motor is of 1,800-h. p., operating in conjunction with a motor-generator flywheel set.

The output of the mine is treated in the mill of the Timber Butte Milling Co. (which see), also owned by Senator and W. A. Clark, Jr.; zinc concentrates go to the National Zinc Co.'s plants at Bartlesville, Okla., and Springfield, Ill. Copper ore is shipped direct to the Anaconda smelter, the mine yielding from 50 to 100 tons a day when working full time.

Normally, 380 men are employed underground and 73 on surface, producing 730 tons of ore daily.

Timber Butte Milling Co.

Is the corporation owning the mill in which the ores of the various Clark properties are concentrated.

Officers: W. A. Clark, Jr., pres. and gen. mgr.; W. A. Clark, v. p.; W. D. Mangam, sec.; J. K. Heslet and A. J. Johnston, directors; W. N. Rosenburg, supt.

Cap., 1,000 shares; $100 par. A close corporation.

The mill was erected to concentrate zinc ores of the Elm Orlu mine. Capacity 750 to 1,000 tons daily. Process, gravity separation and flotation. Crushing is by rolls and Hardinge mills; separation by tables and Minerals Separation flotation machines. Electric power is supplied by the Montana Power Co. Mill began operations about May 1, 1914. Recovery over 93% and concentrates average 52% zinc.

GREAT BUTTE COPPER CO. MONTANA

(Successor of Butte & Bacorn Copper Co.)

Address: 53 Silver Bow Block, Butte, Mont.

Officers: F. W. Bacorn, pres.-mgr.; H. H. Robinson, sec.; Charles Hyde, treas., with W. B. Schiller, C. W. Brown, Henry Fownes, R. C. Patterson, J. B. Eisaman, and C. G. McIlvain, directors.

Inc. 1916, in Montana. **Cap.,** $1,000,000; shares $1 par; all outstanding; non-assessable. The Great Butte took over the property of Butte & Bacorn in July, 1916.

Property: 23 patented claims, one mile N. of the Butte & Superior mine. Holds under option the Calumet, Moonlight, and Jasper lode claims of 46 acres.

Development: exploration is in progress at the Calumet shaft, which is 2,000' deep with crosscuts and drifts at that level.

Company is making a praiseworthy attempt to develop commercial ore in strong veins on the outskirts of the Butte district. See Butte and Bacorn Copper Co. in Vol. XIII.

GREENDALE EXPLORATION CO. **MONTANA**

See Butte & London Copper Dev. Co.

Controlled by Rainbow Lode Development Co. When the Rainbow Lode Dev. Co. wished to acquire the Butte & London property at Butte, Mont., several years ago, it was not practicable to recall a majority of the outstanding stock of that company and the Greendale Exploration Co. was organized to meet the emergency. The property of the Butte & London was transferred to this company, the Rainbow Lode Dev. Co. receiving 51% of the stock in return for certain development work (see Rainbow Lode Dev. Co.); the remaining 49% is held by B. & L. C. Dev. Co.

MINES OPERATING CO. **MONTANA**

Office: H. A. Frank, sec., Daly Bank Bldg., Butte, Mont

Officers: Alfred Frank, pres. and gen. mgr.; C. W. Whitely, v. p.; with John MacGinniss, and E. L. Newhouse, Jr., directors; B. H. Grant, supt.

Inc. 1916, in Delaware. **Cap.**, $100,000; $100 par.

Company is operating the Butte-Duluth (which see) mine on E. side of Butte, under bond and lease. In September, 1919, daily output to the Anaconda company's leaching plant was 250 tons of 2% ore. Is a highly successful operating company whose head is a brilliantly successful financial engineer. What the Butte-Duluth bondholders will have left, on expiration of the lease, is better left unsaid.

NORTH BUTTE EXTENSION DEVELOPMENT CO. **MONTANA**

Office: 24 Broad St., New York. **Mine office:** O'Rourke Estate Bldg., Butte, Mont.

Officers: H. G. Bell, pres.; A. J. Ronaghan, sec.: with I. A. Heilbronner, Elbridge L. Adams, David Angus and C. W. Peters, directors.

Inc. Oct. 10, 1908, in Maine. Cap., $1,500,000; shares $1 par; issued, $1,349,036. Is a reconstruction of the North Butte Extension Mng. Co. A controlling stock interest of $800,000 was sold, March, 1910, to the Butte & Superior Mng. Co. Annual meeting in September.

Suit was instituted by the Butte & Superior interests against the promoters of the North Butte Extension Development Co. to recover shares of stock claimed to have been illegally issued and a proposal to return 50,000 shares was made and accepted by the company.

Apparently, the company's only present property is the Overman claim, the Black Crow fractional claim of 2½ acres and the Clipper and Assay mill sites.

Development: by a 700′ shaft, planned to be deepened to 1,000′.

Most of the ground on which the various North Butte Extension companies were organized was held only under options which were forfeited. The Occidental claim was developed by a long crosscut from the Butte & Superior shaft, but nothing of importance was found and after payments of $90,000 the claim was abandoned. Much of the original ground held by the company is now owned by the Rainbow Development and Butte & Superior companies.

According to the contract with the Butte & Superior, the latter company drove a crosscut on the 1,200′ level through the Four Johns claim and through the entire length of the Overman claim belonging to the North Butte Extension Co. The total exploration E. of the 1,221′ crosscut of the Butte & Superior was 3,318′, after which work was abandoned at the property.

NORTH BUTTE MINING CO. **MONTANA**

Business office: Suite 3300, 120 Broadway, New York. **Statutory office:** 1500 Alworth Bldg., Duluth, Minn. **Mine office:** 14 West Granite St., Butte, Mont.

Officers: Robert Linton, pres.; Joseph B. Cotton, v. p. and gen. counsel; Frederic R. Kennedy, sec.-treas.; Henry B. Paull, auditor; Norman B. Braly, gen. mgr.; Lester D. Frink, supt. Directors: Robert Linton, Francis DeC.

Sullivan, William D. Thornton, Joseph B. Cotton, William F. Bartholomew, G. Ashley Tomlinson, Thomas F. Cole, Henry B. Paull and Frederic R. Kennedy. Transfer office: American Trust Co., Boston. Registrar: Old Colony Trust Co., Boston. Stock is listed on Boston Stock Exchange.

Inc. April 5, 1905, in Minnesota. **Cap.**, $9,000,000; $75 par; 430,000 issued.

Comparative General Balance Sheet—Years ending December 31:

Assets.

	Property	Granite Mtn. shaft	Invest.	Metals on hand	E. Side Devel.	Other Current	Total
1919....	$9,185,185	$172,275	$121,082	$2,683,328	$415,749	$189,999	$12,767,618
1918....	9,172,586	188,845	90,000	1,688,157	233,384	498,906	11,871,878
1917....	8,983,930	214,292	99,600	707,969	99,117	1,382,580	11,487,488
1916....	8,980,470	231,765	9,600	2,766,435	.....	733,317	12,721,587
1915....	8,986,265	256,945	9,600	1,569,643	.....	259,032	11,063,485
1914....	8,921,783	228,239	9,600	1,074,819	.....	88,357	10,322,798

Liabilities.

	Capital Stock	Current	Surplus Reserve	Total
1919.....	$6,450,000	$1,051,580	$5,265,092	$12,767,618
1918.....	6,450,000	720,194	4,701,684	11,871,878
1917.....	6,450,000	184,349	4,853,139	11,487,488
1916.....	6,450,000	984,575	5,287,018	12,721,588
1915.....	6,450,000	731,067	3,882,418	11,063,485
1914.....	6,450,000	731,027	3,141,771	10,322,798

Comparative Income Account.

	Revenue	Operating expenses	Net income	Dividends	Surplus	Reserve for deprec.	Total Surplus & reserve
1919.....		$6,450,000		$1,051,580	$5,265,092		$12,767,618
1918.....		6,450,000		720,194	4,701,684		11,871,878
1917.....	4,615,216	3,974,090	641,126	1,075,000	(d)433,874	1,387,869	4,853,139
1916.....	7,121,259	4,640,664	2,479,595	1,075,000	1,404,595	.....	5,287,018
1915.....	4,155,522	3,027,875	1,217,646	387,000	740,646	.....	3,882,418
1914.....	3,084,774	2,726,559	358,215	635,000	(d)276,785	.....	3,141,771
1913.....	5,182,674	3,744,897	1,437,777	820,000	617,777	.....	3,418,556

(d) Deficit.

Dividends: paid since organization of company per share: $1.25 in 1905; $7.25 in 1906; $6 in 1907; $3 in 1908; $4 in 1909; $1.10 in 1910; $1.20 in 1911; $1.70 in 1912; $2 in 1913; $1.50 in 1914; 90c in 1915; $2.50 in 1916; $2.50 in 1917, and $1 in 1918. Total, $35.90 per share, or $14,657,000.

Property: consists of two groups of claims, the Speculator group of about 220 acres on Butte Hill, and the East Side or Sarsfield group, about 936 acres. Also owns a smelter-site consisting of 2,216 acres, near Whitehall, and water-rights about 18 miles from Butte, 8 miles from Anaconda, and near the tracks of the C. M. & St. P. Railway and the Northern Pacific Railroad.

In order to give a more regular outline to the company's property and to avoid controversies over extra-lateral rights, exchanges of acreage have been made between the North Butte and Anaconda companies and agreements have been made between the North Butte and Tuolumne companies covering the ownership and rights to certain parts of the Jessie vein. An undivided one-half interest in the Granite Mountain claim was acquired from the Lewisohns, the company to sink at its own expense the existing shaft from the 500′ to the 2,000′ level and make certain connections and explorations, the title to the shaft remaining with the North Butte company. During 1912 and 1913 company purchased by cash payments and 20,000 shares of the company's stock the entire undivided interests in the lode claims in the Butte East Side mineral area; and in 1917 also purchased the property of the Butte-Monitor Tunnel Mining Co., consisting of 8 claims.

Eastside Group

Eastside Group: It is believed that these claims carry the easterly extension of numerous big ore-bearing veins opened in properties contiguous to this tract. The group lies about 2 miles east of Anaconda hill, and covers the mountain slopes between the bed of Silver Bow creek and the Continental Divide; it is adjacent to the A. C. M. Co.'s Tropic mine, the Butte Main Range Co. and the

Pittsmont mine of the East Butte Co. Development work has been in progress at this property for the past two years, and includes a 900′ four-compartment shaft sunk on the Sarsfield claim at a point about 150′ east of the Continental Divide. At this level, over 1,500′ of cross-cutting has been done in two directions, to explore the ground on both sides of the Continental fault.

Eastside equipment consists of a 125 h. p. electric hoist, compressor, and two 225 h. p. electric pumps of 600 gal. capacity, one on the 700′ and one on the 900′ levels.

Late in 1919 the company was preparing to work the Bertha claim on the east side, and ship silicious ore to the Anaconda leaching plant.

Speculator Group.

The Speculator Group, or Butte Hill property, is traversed by a number of fault-veins, mostly belonging to the Blue Vein series. These veins carry high-grade ore in shoots, which have thus far been remarkably persistent in depth. The ores carry much primary chalcocite, frequently massive, with considerable quantities of enargite and smaller proportions of other sulphides. All ores carry silver and lesser values in gold. The veins are 'heavy,' requiring close attention and timbering with square-sets, monthly timber used being about 1,000,000′ board measure. No waste is hoisted, all being used for dry-filling.

Exploration of the vein system has shown the necessity of thorough drifting along the veins at considerable depth, and development on all levels down to the 3,400′ has opened profitable orebodies.

The principal ore supply comes from the following veins, named in their order of occurrence from the south boundary of the mine northward; Speculator, Adirondack, Edith May, Gem, South Croesus, North Croesus, Snowball, and Berlin. Of these, the Speculator, Adirondack, South Croesus, and Snowball belong to the older or Anaconda vein system; the others are well-known members of the Blue Vein, or Northwest fault-vein series. The Edith May and Jessie veins were the principal ore producers of the North Butte in the early operations of the company.

The *Edith May* vein is opened on the 700 and 800′ levels, and at 200′ intervals from the 800′ level to the 3,400′ level. The vein varies in width from 5 to 42′, the greater width occurring above the 2,000′ level. A good body of ore has recently been opened on the 700′ level, where a width of 8½′ averages 3.6% copper for a distance of 240′. Below the 700′ level the vein was of little value until the 1,200′ level was reached, after which a marked improvement was noted. Many of the stopes above the 2,000′ level were practically all first-class smelting ore for a distance of 1,000′. The 2,000′ level showed a slight decrease both in value and in length of ore-shoots. At the 2,200′ level the vein splits into a hanging and a foot-wall vein. Metal contents of the foot-wall vein are low below the 2,400′ level, while the hanging-wall vein carries good ore on all levels down to the lowest level now opened. On the 3,200′ level, 5′ of ore has been exposed for a distance of 210′, the average assay being 4.3% copper. The 3,400′ level development has encountered ore of a similar character.

The *Jessie vein* ranks next to the Edith May in production. Where opened on the 700′ level in the Gem crosscut, the Jessie vein was 10′ wide and held bunches of 6% ore. The ore-shoot found on the 1,200 and 2,200′ levels was high grade, 8′ wide and nearly 1,000′ long, changing in character below this depth and showing considerable sphalerite in the drifts to the west. On the 2,200′ level the vein is about 12′ wide, showing some ore up to 5% in copper tenor, but averaging materially lower than the ore in the workings above. The west drift on the 2,000′ level opened a 150′ ore-shoot 6′ wide, carrying 6% copper and 7.5 oz. silver. The 2,200′ level shows low-grade ore only. The 2,600′ drift west showed 4′ of 3.5% copper ore, displaced by a fault 15′ from the crosscut and not yet recovered; while 300′ of drifting east disclosed only small bunches of high-grade ore. On the 2,800′ level the vein where cut by a crosscut from the Granite Mountain shaft showed a total width of 6′, with 3′ of ore assaying 11% copper and 10.0 oz. silver per ton.

The *North Croesus vein* is opened by drifts on all levels from the 1,600 to the 2,800′, developing a large and important orebody. On the 1,800′ level the

ore-shoot is 8½′ wide, averaging 3% copper and 8 oz. silver per ton; on the 2,000′ level it is 300′ long, averaging 10′ thick, 3% copper and 6 oz. silver. This shoot has been developed down to 2,200′, and on the 2,400′ level another shoot, 300′ east of the one just mentioned, shows 2′ of 3% ore with 7 oz. silver per ton. This shoot has been opened on the 2,600′ level for a length of 400′, varying in width from 3 to 5′, and averaging 3.5% copper. The vein also contains considerable quantities of zinc ore, from which shipments have been made from time to time.

The *South Croesus* vein has been mined from 1,600 to the 2,400′ level, with the best showing at the 2,200′. Here two shoots are developed, one 270′ in length with an average width of 2′, the ore containing 5.5% copper and 5.5 oz. silver per ton; the other, 240′ long, averaging 3½′ in width and assaying 3.2% copper and 4 oz. silver per ton. On the 2,400′ level, a 3′ body of ore has been driven on for 200′, averaging 2.5% copper.

The *Gem vein* showed no ore of commercial importance above the 1,600′ level, and the 1,800′ level had about 6′ of 4.5% ore. It is developed to a small extent on the 1,800, 2,000, 2,600 and 2,800′ levels, both value and width increasing with depth, the 2,800′ level showing 12′ of 5.3% ore carrying 2.2 oz. silver per ton. The vein is irregular in size, and where developed has been broken by cross-faults. The Adirondack vein, like the Gem, shows no commercial ore above the 1,600′ level, but has been mined from this horizon down to the 2,800′. On the 2,400′ level the ore has been opened for 600′, varying in width from 2′ to 12′, and averaging 4% copper. On the 2,600′ level the shoot is over 200′ long, varying in width from 4′ to 7′, and containing 3% copper. On the 2,800′ level there is a width of 4′, averaging 3% copper. About 500′ west on the 2,000′ level a new shoot has recently been opened, a distance of 119′, showing an average width of 5′ of ore assaying 4% copper and 2.1 oz. silver.

The *Snowball* vein has characteristically high silver content. It was first cut on the 1,800′ level in 1910, since which time it has been developed and worked from the 1,400′ down to the 2,800′ level. The shoot varies in length from about 800′ to over 2,000′. On the 2,200′ level it has been worked for a length of over 2,000′, of which 740′ averaged 5′ of ore assaying 8% copper. On the 2,600′ level the shoot is over 1,000′ in length, varying in width from 2 to 4′ and averaging about 4% copper. On the 2,800′ level the vein has been exposed showing 265′ of ore 3′ wide assaying 4.3% copper and 7½ oz. silver per ton.

The *North Berlin* vein was opened in 1916 on the 2,200′ level. Since that time this vein has been developed on all levels from the 1,800 to the 2,800′, inclusive. On the 1,800 and 2,000′ levels drifting exposed bunches of ore, but none of commercial value. On 2,200′ level, an ore-shoot 500′ long and 4′ wide has been developed, with an average assay of 5.5% copper and 11 oz. silver. On the 2,400′ level the shoot now developed is 510′ long, of an average width of 3′, and assays 4.2% copper and 5.5 oz. silver. On the 2,600′ level ore has been exposed for a distance of 395 ft., having an average width of 3½′ and assaying 2.6% copper and 3.8 oz. silver. The crosscut on the 2,800′ level has reached the vein, which shows high-grade ore.

Development: is extensive, aggregating many miles of workings. New development for 1918 amounted to 23,046′, compared with 12,175′ in 1917, and 21,694′ in 1916. The four-compartment Granite Mountain shaft, which is the principal working shaft, is 3,700′ deep, with levels opened at the 400, 600, 700, 800, and at 200′ intervals down to and including the 3,600′ level. In 1915 a new electrict hoist was installed at the Granite Mountain shaft, the largest electrically-driven hoist in America. It is capable of operating to a depth of 5,000′, hoisting 7 tons of ore, and making a round trip in about 2 minutes.

Following a serious fire at the Granite Mountain shaft in 1917, the work of fire-proofing this shaft was commenced and completed in January, 1918. This work consisted of 1,500′ of concrete of monolithic construction, while the chippy compartments of the upper part of the shaft were gunited (cement coating sprayed on).

The Speculator shaft, the other operating shaft, has been deepened to 3,000′, with levels at 200′ intervals, from and below the 1,400′ point, developing all the

veins in the mine. The Speculator shaft has a 128′ steel head-frame standing on a 41 by 60′ concrete foundation, equipped with self-dumping skips and pockets, with daily capacity of 1,500 tons of ore. No waste is hoisted, as it is used for underground filling.

The 500′ Jessie and 500′ Adirondack shafts are idle, and of no present value. The Gem shaft, 2,200′ deep, is used for ventilation, and a connection has also been made with the Rainbow shaft on the 2,000′ level for purposes of ventilation. These two shafts, as well as the Speculator, are provided with reversible fans. The whole system of ventilation in the mine has been greatly improved, and good working temperatures prevail.

In the East Side property, favorable developments were reported in August, 1919, especially on 700′ level, which crosscut is being connected with the Main Range mine of the Tuolumne Copper Co. Four feet of the vein assays 4.5% copper. Development in October was yielding over 10 tons daily.

Equipment: the main machinery plant and buildings are at the Speculator shaft. The engine-house has a 20-ton traveling crane, and a 32 by 72″ Nordberg-Corliss duplex-cylinder hoist, operating two cages, in counterbalance, with two 8-ton Kimberly skips swung under, and good for a depth of 3,500′. An 18 by 36″ duplex-cylinder auxiliary hoist operates a double-deck cage in a third compartment, for handling men, material, and timber, and the shaft has a fourth compartment for ladders and pipes.

The compressor-house has air-compressors with piston efficiency of 9,860′ of free air per minute, reduced to a pressure of 80 lb. per sq. in., capable of operating 100 to 150 rock-drills. Another large one was erected late in 1919. The boiler-house has two 500 h. p. and five 100 h. p. boilers. Miscellaneous buildings include a machine-shop, smithy, carpenter shop, planing mill, and a plate-shop for repairing skips, all thoroughly equipped.

An average of 1,550 men were employed in December, 1918. The North Butte ore is smelted at the Washoe works of the Anaconda company under a contract by which the company pays the smelter charges to Anaconda, and the copper itself is turned over to North Butte and sold by the United Metals Selling Co. for its account.

Production:

	Ore, Tons	Copper, lb.	Silver, oz.	Gold, oz.	Copper, per lb. Net Cost, c.	Copper, per lb. Sell. Price, c.
1919.....	.....	14,351,067	.....	....	....	....
1918.....	453,338	20,680,695	891,157	1,374	20.92	24.73
1917.....	296,750	14,493,452	662,845	959	17.36	27.18
1916.....	560,673	24,498,181	1,049,574	1,712	15.57	23.29
1915.....	378,161	19,235,285	940,632	1,122	13.12	16.70
1914.....	337,372	18,421,761	1,092,300	1,107	11.50	13.74
1913.....	454,984	28,318,321	1,602,164	1,567	9.76	15.08
1912.....	425,248	26,480,123	1,377,468	1,367	9.65	16.37
1911.....	410,694	24,816,669	1,134,300	1,281	9.97	12.56
1910.....	408,528	25,267,092	988,190	1,196	10.36	12.77

Zinc production in 1916: 1,652 tons of ore for 412,953 lb. spelter.

Although the grade of the ore mined is lower than that produced in the early years of the company's operations, the total amount of copper now produced compares very favorably with the record year. The high price of copper has made it possible to mine ore of a grade much lower than in previous years, and these ores will be mined in the future as long as the price of copper will justify it, although by so doing, the average grade of ore is obviously lowered and the cost of production raised.

PILOT BUTTE MINING CO. MONTANA

Company dissolved. See Vol. XII.

In December, 1919, it was reported that former shareholders might have to pay $209,344 to the Federal Government, alleged to be overdue as delinquent income tax, a retroactive levy from time of sale.

PITTSMONT COPPER CO. **MONTANA**

Controlled by East Butte Copper Co., which see.

Office: 1126 Farmers Bank Bldg., Pittsburgh, Pa. **Mine office:** Butte, Mont.

Officers: R. H. Gross, pres.; J. H. Ree, v. p.; F. Ward Paine, sec.-treas.; R. T. Rossell, asst. sec.-treas.; Oscar Rohn, gen. mgr., with Wm. A. Paine, directors.

Inc. April 21, 1906, in West Virginia, as Pittsburg & Western Copper Co., and changed name, Jan. 21, 1908, to present title. **Cap.,** $6,000,000; par value $5, divided into 1,000,000 shares common stock and 200,000 shares 6% cumulative preferred stock, all issued.

The East Butte Copper Co. owns $4,002,800 of the common and all the preferred stock. $910,716 bonds outstanding December 31, 1916, were retired, February, 1917. Annual meeting, first Monday in April, at Pittsburgh.

Company acquired the property of the Pittsburgh & Montana Copper Co., under foreclosure proceedings, July, 1909, selling it to the East Butte Copper Mining Co., which agreed to purchase bonds enough of the Pittsmont Copper Co., to fund its floating debt, aggregating at that time $2,300,000, and also agreed, until these bonds were fully paid for, to advance all funds necessary for development and operation of the property and interest on the company's indebtedness. In consideration of this agreement the Pittsmont Copper Co. contributed $4,000,000 of its common stock to the East Butte Copper Mining Co., the latter purchasing $1,000,000 of Pittsmont preferred stock and $110,000 of demand notes, issuing own stock therefor. This debt has now been paid off.

During 1918 East Butte paid Pittsmont $1,000,000 on account of rentals accrued. The latter in turn purchased from the former its entire issue of 200,000 preferred shares, $5 par.

RAINBOW LODE DEVELOPMENT CO. **MONTANA**

Office: 807 Lonsdale Bldg., Duluth, Minn. **Mine office:** 14 West Granite St., Butte, Mont.

Officers: Edward C. Congdon, pres.; G. A. Tomlinson, v. p.; James Wanless, sec.-treas., with Thomas F. Cole, Walter B. Congdon, directors.

Inc. Nov. 9, 1912, in Delaware. **Cap.,** $1,500,000; increased June 1, 1915, from $800,000; shares $10 par, issued $800,000. **Bonds:** $400,000, 1st mortgage 5-year convertible 6% due June 1, 1920, convertible into stock at par, and $80,000 2nd mortgage authorized, $47,000 issued. Annual meeting, first Tuesday in June.

Property: 10 claims, including the Third Sphinx, Michigander, Moral, Valley Queen, Carn Brea, Sarah, Wedge, Hidden Treasure and Wanda claims, with fractional interest in the Lone Star Claim. The group lies east of the Butte & Superior property and is supposed to carry an extension of the Rainbow lode.

Equipment: at Rainbow shaft includes a 300-h. p. double drum hoist good for 2,500′, 2 electric hoists, air compressors, combined capacity of 1,650 cu. ft. per min., one 400 gals. and one 200 gals. pump, blacksmith shop, carpenter shop, change house and office.

During 1916 the company completed its Butte & London contract, and now owns 51% of the Greendale Exploration Co. stock, which latter company owns the Greendale Placer claim and the Six O'Clock claim immediately south. It paid for this stock according to the contract by sinking the Butte & London shaft to 1,600′ and crosscutting to the north and south boundaries of the Greendale Placer claim on the 1,500′ level.

The crosscut at the 1,500′ level of the Rainbow shaft was extended to the north boundary and a few feet of drifting done from it along veins which looked promising. The drainage drift on that level from the North Butte was completed.

While favorable indications of the possible proximity of ore shoots were found, according to the statement of engineers familiar with Butte, no ore of any commercial grade was discovered. The indications above mentioned consisted of quartz-filled veins of various dimensions and in several parts of both

the Rainbow and Butte & London, open cuts gave trifling assays of gold, copper and zinc, nowhere running over 8% zinc or 2% copper or an ounce or so of silver.

In order to complete the Butte & London contract, it was found necessary to raise more money than was provided for in the first mortgage. Consequently, the second mortgage was authorized, and the amount outstanding on it, $47,000, was advanced by two of the large stockholders so that the contract might be completed and the Rainbow company get control of the Glendale placer claim.

The company is now inactive, as it seemed best to await possible developments in the neighborhood of its property, which might renew the interest of the stockholders of the company to an extent which would lead them to assist in further necessary financing.

While development has been disappointing in that no ore has been found to a depth of 1,500′ on the Rainbow group and 1,600′ on the Greendale Placer claim, nevertheless, the officers feel that still deeper development will reveal pay ore.

RAMPART MOUNTAIN MINING CO. **MONTANA**

Office: 821 Security Bldg., St. Louis, Mo.

Officers: J. P. Meyer, pres.; Felix Coste, v. p.; E. C. Rowse. sec.

Cap., $500,000; shares $1 par; $250,000 outstanding.

Property: 10 patented claims, 135 acres, in Park canyon, Silver Bow county, Mont., about 4 miles east of Butte, said to show fissure veins in granite. Ore contains gold, silver and copper. The Rocky Mountain claim is reported to show a vein about 100′ wide, supposedly the continuation of the Spread Delight vein of the Main Range.

Development: by 1,500′ of workings to depth of 400′. Tunnel said to show copper ore assaying up to 7% with high silver value.

Is a promising tract for deep development by tunnel work, as the veins show pay ore at the surface.

RAVEN COPPER CO. **MONTANA**

Property sold, August, 1915, to the Anaconda Copper Co., for $65,000, and company liquidated. Fully described in Vol. XI., Copper Handbook.

SMOKEHOUSE MINING CO. **MONTANA**

Subsidiary of the Davis-Daly Copper Co., Butte, Mont., q. v.

SOUTH BUTTE MINING CO. **MONTANA**

Address: Butte, Mont. John G. Williams, M. E. Riley and Arthur Howell, directors, at last accounts.

Inc. May 25, 1906, in Minnesota. **Cap.,** $500,000; shares $100 par. Company was organized by the Great Northern railway interests and has had much litigation, with various individuals and corporations, including the Butte Central Copper Co., East Butte Mining Co., P. D. Morgan and others, winning practically all of the suits. Property was leased to the Montana Consolidated Mining Co., but nothing of particular value was developed, and the latter-named company was liquidated.

Property: includes the Surprise placer claim, but company's chief asset consists of mineral rights to a narrow strip along the Great Northern right-of-way. Idle, at last accounts.

SYNDICATE COPPER CO. **MONTANA**

Described in Volume XIII. Company dissolved. See Tuolumne Copper Mining Co., Hirbour Block, Butte, Mont.

TUOLUMNE COPPER MINING CO. **MONTANA**

Principal office: Hirbour Bldg., Butte, Mont.

Officers: Ed. Hickey, pres.; Wm. P. Jahn, v. p.; J. J. Harrington, sec.; Frank K. Wilson, treas.; Paul A. Gow, mgr.; Walter Harvey Weed, cons. engr. Directors: Ed. Hickey, Wm. P. Jahn, Frank K. Wilson, Paul A. Gow, John Harrington, James A. Canty, Charles R. Leonard.

Inc. June 4, 1906, in Arizona. **Cap.,** $800,000; shares $1 par. Company reorganized in May, 1916, with capital of $2,500,000, shares $1 par; outstanding

1,960,015 shares. A bond issue of $500,000 6% convertible into stock at $2 a share, was authorized December, 1919. Listed on Boston Stock Exchange and the New York Curb. State Street Trust Co., Boston, transfer office; Beacon Trust Co., Boston, registrar. Annual meeting, second Monday in March, at Butte, Mont.

Dividends: 45c per share in 1911, 20c per share in 1913.

History: company was formed to acquire and mine the Tuolumne claim, which carries the Jessie vein. This and other veins were worked from 1909 to 1918, to a depth of 2,680′, with a production of 207,969 tons of ore yielding 21,761,190 lb. copper, 658,194 oz. silver, averaging 5.25% copper and 3.11 oz. silver. All work was stopped January 1, 1918, because increased cost of operating and declining grade of ore did not permit sufficient profit.

Following a reorganization of the company in 1916 the Main Range and Colusa-Leonard Extension groups were taken over on very favorable development contracts, and in 1918 all outstanding interests in these groups were acquired and properties deeded to Tuolumne Copper Mining Co.

The Colusa-Leonard Extension group consists of 6 claims—the Maggie Placer, Golden Hematite, Little McQueen, Undine, Snowbird Placer and Syndicate. The property, though practically undeveloped, has a two-compartment shaft 1,200′ deep. A connection has been made from this shaft to the Main Range shaft on the 700′ level. The property is well equipped, and during 1919 was unwatered and developed on the 1,200′ level. The claims contain the westerly extension of the Spread Delight vein at depth, and the Sinbad vein also traverses this tract.

The Main Range group consists of the 7 claims—Sinbad, Main Range Fraction, Spread Delight, Tent Peg, Rory O'More, Kingstella, and Lillie. This property has been partly developed from the Main Range shaft to the 1,200′ level. A large orebody varying in width from 10 to 35′ and 350′ in length has been developed in the Spread Delight vein on the 700 to 1,200′ levels. Stoping operations on orebody above the 800′ level up to June 1, 1919, yielded 50,218 tons, which contained 2,303,866 lb. of copper, 419,859 oz. of silver, and 382 oz. gold, yielding $491,144 in net smelter returns. During the year 1919 the Main Range shaft was sunk to the 1,200′ level and a large amount of development work done on the vein on the 1,000′ level.

Development: includes two 1,200′ shafts, about 1,000′ apart. The eastern or Main Range shaft has levels at 700, 800, 1,000 and 1,200′ depth, with drifts on the veins at each level. Considerable ore has been mined from above the 800′ level, mainly from the Spread Delight vein, the figures being given in the accompanying table.

On the 800′ level the vein was 110′ thick and showed a 6-8′ orestreak on one wall which has not yet been developed. The main oreshoot in the middle of the vein shows from 15-35′ of ore which has been stoped out up to the 700′ level.

On the 1,000′ level this vein is explored by a 590′ drift and the oreshoot was found to be leached and broken by faulting, the ore averaging 15 oz. silver and 2% copper with a 6′ band of 70 oz. ore on the sill floor.

On the 1,200′ level the Spread Delight vein shows less quartz, and so far as drifted on, shows all commercial ore.

In 1919 the company operations included 425′ of shaft sinking, 1,931′ of crosscutting, 999′ of drifting, besides station cutting and raises. Returns from all ore mined above the 800′ level, up to January 1, 1920, amounts to $577,456.

In addition to the Spread Delight vein, four other large veins have been cut in this property, but they are as yet undeveloped. Shipments have been made from the Sinbad vein, which shows a width of 20′, and the Rory O'More vein 40′ wide, shows an ore-shoot 15′ in width.

The Main Range mine is well equipped, the surface plant consisting of a large double-drum electric hoist, 2,500 cu. ft. electrically-driven compressor, framing and carpenter shop with framer and saws electrically driven, blacksmith shop, machine-shop, warehouse, boiler plant, change-house, office, 80′ head-frame and ore-bins.

Main Range Mine.

	Ore, tons	Copper, lb.	Silver oz.	Gold, oz.	Average Copper, %	Average Silver, oz.	Average Gold, oz.
1916.....	446	22,101	2,346.65	3.323	2.467	5.257	0.0074
1917.....	10,774	424,894	101,519.58	83.810	1.972	9.422	0.0078
1918.....	23,534	1,060,493	189,934.15	177.600	2.253	8.082	0.0075
1919.....	26,515	1,110,286	215,520.00	199.400	2.094	8.128	0.0075

Operations in 1919 were interrupted by labor troubles. Production for 314 days was 28,655 tons, yielding net smelter returns of $217,796 or $8.215 per ton.

The east side holdings of the company, embracing 13 claims in the Colusa-Leonard Extension and Main Range groups, or a total of over 80 acres, are on the easterly extension of the copper vein system of the Butte hill. The property adjoins that of the Anaconda, East Butte, and North Butte, lies to the west of the Continental fault, and the extensions of the largest veins of the Butte hill have been proved in this property. Development has shown the existence of large orebodies of good grade, and the policy of vigorous development that has been adopted by the company will, it is believed, result in making another large producer and dividend payer in the Butte district.

Butte Main Range Copper Mining Co.

Officers: J. J. Harrington, pres.; A. F. Rice, v. p.; Frank X. Giard, treas.; Geo. E. Palmer, sec., with M. C. Smetters, Lyman J. Roscow, Herbert M. Fay, and E. P. Pennebaker, directors.

Inc. August, 1912, in Montana. Annual meeting second Monday in March.

Cap., $1,500,000; shares $1 par; 38,140 outstanding.

Property: all mining property held by company consisting of 37 acres in Butte district has been sold to Tuolumne Copper Mining Co. Assets of company now consist of 19,070 shares of the capital stock of Tuolumne Company.

Colusa-Leonard Extension Copper Co.

Office: 46 E. Broadway, Butte, Mont.

Officers: W. W. McDowell, pres.; Guy W. Stapleton, v. p.; W. E. Reynolds, sec.; Meyer Genzberger, treas., with Jacob Kaufman, directors.

Inc. 1906, in Arizona. **Cap.**, $5,000,000; shares $5 par; 957,028 shares outstanding.

Property: all property formerly held by company consisting of 43 acres in Butte district transferred to Syndicate Copper Co. for stock of latter company. Syndicate company stock was sold to Tuolumne Copper Mining Co. for 239,257 shares of its capital stock. 213,229 shares of block of Tuolumne stock thus acquired have been distributed to stockholders of the Colusa-Leonard Extension Copper Co., and the balance of 26,028 shares, which now constitute the sole assets of the company have been deposited in the First National Bank of Butte, Montana, for distribution to the holders of 104,112 shares of Colusa-Leonard Extension stock who have not yet participated in the distribution of the company's assets.

Syndicate Copper Mining Co.

All of the capital stock was acquired in 1918 by the Tuolumne Copper Mining Co.; the assets consisting of 42 acres in the Butte district were transferred to the latter corporation and the Syndicate Copper Co. was dissolved in January, 1919.

TZARENA GROUP — MONTANA

Address: J. A. Murray, owner, Butte, Mont.

Property: 7 claims, 79 acres, 2 miles S. W. of business center of Butte, and midway between the Gagnon, Bettie and other producing mines of the Anaconda company. Examined by W. H. Weed.

Ground is crossed by the strong outcrop of the Emma or Ancient vein, 80 to 100′ wide, which, judging by its geologic and other features, should contain as big and rich orebodies as the Rainbow lode. The eastern claims of property have all the essential characteristics observed on the eastern end of Butte & Superior ground. The country rocks are granite and aplite. Silver-bearing zinc ore should be found.

Development: the Brittania claim has a shaft 400′ deep, with temporary hoist and other machinery.

Property is considered one of much promise.

UNITED STATES MANGANESE CORPORATION **MONTANA**

Offices: 27 State St., Boston, Mass.; Montana Bldg., Helena, Mont.; and 832 Colorado St., Butte, Mont.

Officers: Austin M. Pinkham, pres.; Ellery C. Wright, v. p.; C. Phipps, treas.; James Quinn, sec. Directors: Frank Eichelberger, Carl J. Trauerman, Harold G. Gallagher, Charles E. Fryberger and Brig.-Gen. Henry M. Pellett. Board of managers: Frank Eichelberger and Charles E. Fryberger, mng. engrs., Helena, Mont., and Carl J. Trauerman, mng. engr., Butte, Mont. Transfer agent and registrar, U. S. Corporation Co., 65 Cedar St., New York.

Inc. May 17, 1918, in Delaware. **Cap.,** $7,000,000; shares $10 par; consisting of 1,000,000 8% preferred, non-cumulative, participating, and 600,000 common shares; 40,000 preferred and 500,000 common outstanding. Of the latter, 250,000 shares were set aside for acquiring the 2,500,000 shares (par $1) of Butte Detroit Copper & Zinc Co. Butte Detroit shares were exchanged at par in U. S. Manganese on a payment of 10 cents cash., i. e., Butte Detroit holders had to turn in 10 shares and $1 in cash to obtain one share of U. S. Manganese common stock, thus paying $250,000 cash to convert their stock into that of U. S. Manganese.

Dividends: 2% was paid April 27, 1919; and 2% July 27, 1919, 8% non-cumulative stock.

Business: this is a honding company ostensibly organized to acquire and develop manganese properties and treat ores of same. Before the plans of company could be fully completed, the armistice was signed and it had to give up its manganese projects. It is at present examining and acquiring meritorious precious-metal properties. It holds 50% of the stock of the Liverpool Silver Mines Co., 51% of that of the Monarch Mining & Power Co., all of the shares and 55% of the bonds of the New York-Montana Testing & Engineering Co., 51% of Butte-Detroit Copper & Zinc Mining Co., and 66 2/3 of $300,000 bond issue of the Butte Central Mining & Milling Co., all of which are separately described. The outstanding shares of the U. S. Manganese Corporation includes the stock necessary to complete conversion of the Butte-Detroit Copper & Zinc Mining Co. shares.

Company will, it is said, endeavor to develop the field for high-grade manganese ore for dry batteries and chemical uses, a product commanding high prices in a domestic market, consuming 25,000 tons annually.

Property: in taking over the Butte-Detroit, the U. S. Manganese got the Ophir mine, which had been extensively opened to depth of 1,100′, showing considerable zinc and manganese ore. (For details of development, see Vol. XIII). The Butte Central M. & M. Co., the operating company for Butte-Detroit, had an old judgment against it, and late in 1918 the Ophir mine and mill, on which U. S. Manganese depended for its output of manganese, was sold to the Anaconda company for $57,000 at public auction. By law, the owners of the Ophir were allowed a year for redemption of the mine. According to the Davison Company, of Boston, which is promoting this bunch of interlocking companies, the Ophir mine contains 1,000,000 tons of black manganese, and pink manganese ore. The Butte-Detroit mill is reported to be capable of crushing 600 tons of ore and concentrating 250 tons daily. Crude ore carries 30% Mn. and concentrate 50%. On a delivery of 100 tons daily at Chicago "a net profit of $1,570" was expected, basis of manganese at $1.20 per unit ($60 per ton).

In January, 1919, it was announced that U. S. Manganese had a contract for the output of the Valley Forge mine in Montana, and the Monarch mine near Elliston, Powell county, Montana, 25 miles from Helena. A mill is being erected at the latter. The company's plans are ambitious, but———

NEVADA

The mines of Nevada are not confined to a few districts as in many other States, but occur in all parts of the commonwealth. The descriptions of mining companies are, therefore, arranged alphabetically, excepting those of the chief mining district, viz.: Goldfield, Tonopah, Rochester, Ely and the newer camps of the Simon and Divide districts. A nearly complete roster is presented of the corporations of these two districts, so that the reader may readily find out what is known concerning the many companies, many of them "wild cats," organized in 1919 to develop claims in these districts.

The State continues to be a great silver producer and its total output of other metals is less than that of the white metal. In 1918, the output of the mines of the State was valued at $48,528,124, and mining companies paid $8,000,000 in dividends, or 17% of the gross value. The 1919 output was but $23,634,000, a decrease of 50%. The 1919 gold output was $4,718,000, compared with $6,619,937 in 1918, and the silver production 7,177,000 ounces, compared with 10,000,599 in 1918; the mine output figures being 4,927,000 and 6,686,152, respectively.

ADELPHIA M. & M. CO. NEVADA

Address: Ed. Arkell, mgr., Reno, Nev.

Property: in the Wedekind district, a few miles from Reno, Washoe county. Company is said to be well financed, and is sinking a shaft to open a gold-bearing vein.

ALASKA IMPROVEMENT CO. NEVADA

Office: Room 302, No. 65 Second St., San Francisco, Cal.

Bonded Rip Van Winkle mine, at Lone Mountain, Elko county, Nev., to Lone Mountain Mining Co., in March, 1916. Property produced $13,813 net to the Alaska Investment Co., making a total of $42,000 to date.

No recent returns.

ALBANY COPPER CO. NEVADA

Address: Morningstar, Lyon county, Nev.

Officers: John E. Lutz, pres., treas. and gen. mgr.

Inc. June 29, 1907, in Nevada. **Cap.**, $200,000; shares 10c par; non-assessable. Annual meeting, first Tuesday in November.

Property: 700 acres, with 400 acres miscellaneous lands, giving total holdings of 1,100 acres, 3 miles from a railroad, in the Buckskin district, showing orebodies, carrying nickeliferous malachite and melaconite, estimated by management to average 3.5% copper, 2% nickel, 0.2 oz. silver and $2 gold per ton.

Development: includes 5 shafts, of 30′, 37′, 54′ and 253′ and 8 tunnels of 30′ to 188′ length, with total underground workings of 1,400′.

Equipment: includes a 15-h. p. gasoline hoist, good for 800′ depth. Idle for years.

ALLIED MINING & MILLING CO. NEVADA

Office: Lewistown, Mont.

Officers and directors: Albert J. Heinecke, pres.; Dave Trepp, v. p.-treas.-mgr., Goldfield, Nev.; E. G. Ivins, sec.

Inc. April, 1919, in Montana. **Cap.**, $500,000; shares 10c par; 2,650,000 shares outstanding.

Property: the old McNamara mine located in 1880, consisting of 16 claims, 300 acres, on N. slope of Palmetto Mountains, Esmeralda county, about 17 miles S. of Silver Peak.

Geology: ore occurs in a contact vein between limestone and granite, the reported average content being 4.28 oz. silver and from 5 to 50% lead. Four carloads of ore shipped in 1918 returned $70 per ton.

Development: by several tunnels and 225′ shaft, with a total of 2,000′ of workings. On 225′ level 10′ of 5 oz. silver ore was opened in 1919.

Company plans sinking to 400′ level and installing power equipment in 1920. Mine examined by Mark Bradshaw and J. E. Spurr.

ALPHA MINE NEVADA

Owned by Elko Mining Co., which see.

ALTA SILVER MINING CO. **NEVADA**

Address: 1026 Mills Bldg., San Francisco, Cal.

Directors: Geo. S. Sturges, Edw. B. Sturges, R. B. Worthington and Chas. H. Seoy. Geo. S. Sturges, Nevada agent.

Outstanding stock, September, 1917, 78,383 shares. A 3c assessment called in 1916. Assessments levied have furnished necessary capital for repairs and de-development work. Listed on New York Curb.

Property: in Gold Hill section of the Comstock, Storey county, Nev.

Development: old workings and 1,150′ shaft said to show gold-silver-lead ore. Drainage connection is made with the Sutro tunnel at 1,100′ level. Idle because owners are developing other mining enterprises, which require all available capital.

AMALGAMATED PIOCHE MINES & SMELTERS CORP. **NEVADA**

Office: 63 William St., New York. **Mine office:** Pioche, Nev.

Officers: H. R. Van Wagenen, pres.; Wm. B. Randall, v. p.; E. S. Snow, sec.-treas.; Wm. F. Roberts, asst. sec.-treas.; H. S. Van Wagenen, supt., at last accounts.

Inc. July 27, 1911, in Maine, to take over the properties of the Nevada-Utah, Prince Cons., Ohio-Kentucky, and Pioche Cons. companies. It is the operating company of the Cons. Nev.-Utah Corp.; property is described under that title.

Cap., $1,000,000; shares $1 par.

Operates the Pioche Pacific R. R. and Pioche Water Works, and derives income from lease on the Panaca claim granted the Combined Metals, Inc., which see. In September, 1919, Tom McCormac started suit against company for $13,100 damages, alleging that after he had shipped 297 tons of ore the company refused to lease mine to him, as promised.

AMERICAN MINING & EXPLORATION CO. **NEVADA**

Office: Imlay, Nev.

Officers: M. J. Finnegan, pres.; Geo. H. Morgan, v. p.; E. A. Vail, sec.; B. F. Bauer, treas.; H. E. Clement, gen. mgr.

Inc. Aug. 1917, in Utah. **Cap.**, $1,500,000; $1 par.

Property: the Imlay mine, 29 claims and 2 mill sites; also operating the Rye Patch mine, owned by the Rye Patch Mines Co., near Imlay, Humboldt county, Nev. The latter is an old time producer, formerly held by the Eccles interests of Ogden and credited with production of $16,000,000 in silver.

Ore: contains gold and silver and occurs in fissure veins and in the Rye Patch as bedding plane deposits in limestone.

Development: by 200′ vertical shaft on the Imlay and 1,200′ tunnel on the Rye Patch.

Equipment: includes 25-h. p. gasoline hoist, oil-compressor, 100-gal. pump and 50-ton dismantled Imlay mill.

AMERICAN PROSPECTING CLUB **NEVADA**

Address: J. B. Kendall, Goldfield, Nev.

Board of governors: Warren R. Porter, A. G. Raycraft, Louis O'Neal, H. W. Huskey, W. C. Ralston, J. B. Kendall, and L. O'Neill.

Inc. 1919, in Nevada. **Cap.**, 10,000 units of $100 each.

Company organized to finance and outfit prospecting parties to examine and prospect promising properties in various parts of Nevada. It is proposed to pay prospectors the regular wage of the district and give a bonus for discovery. The Club will also acquire and develop leases in proven areas.

AMERICAN STANDARD COALITION M. CO. **NEVADA**

Address: Lorin Hall, Salt Lake City, Utah.

Property: controlled by the above, with Willard and John W. Scowcroft, of Ogden, Utah, is at Schellbourne, 40 miles N. of Ely, White Pine county. A 60′ vein carrying silver has been traced for 600′ on surface. Development by tunnel and some rich ore sacked in 1919.

ANDES SILVER MINING CO. **NEVADA**

Office: 381 Bush St., San Francisco, Cal.; and Virginia City, Nev.

Officers: H. Zadig, pres.; Wm. Bannan, v. p.; J. W. Twiggs, sec.; Wells

Fargo National Bank, treas.; W. W. Turney, Wm. Bannan and W. H. Moise, directors; Frank Higginson, supt.

Inc. Dec. 18, 1873, in California. **Cap.**, authorized and outstanding, $100,000; shares $1 par; assessable. Assessment No. 86 levied in 1916. Registration Security Co., San Francisco, registrar. Annual meeting, December 20th, at San Francisco. Stock is listed on New York Curb and San Francisco Exchange.

Property: 2 claims, patented, 22 acres, in the Virginia mining district, Virginia City, Storey county, Nev.

Company is operating and producing, but details are lacking.

ANTELOPE GROUP **NEVADA**

Held by Louis W. Trankle, Yerington, Nev. Includes 23 unpatented claims, 430 acres in the Buckskin Range, Douglas county, 16 miles from Yerington.

Geology: the ore-bearing formation is a monzonite belt 4,200′ wide, extending N. 7° W., dip 47° to east, for 1½ miles, with diorite on the west and andesite on the east. This monzonite is highly altered, showing strong kaolinization and sericitization to depth of 150 feet, deepest working. Surface shows scanty copper carbonates throughout length and breadth, with small streaks of copper sulphide ore near footwall side. Water encountered in lower workings shows strong copper content.

The property is a promising prospect. Has been examined by L. A. Wright, V. A. Hart, E. R. Richards, Fred Alsdorf, and W. H. Weed.

ANTELOPE SPRING MINING CO. **NEVADA**

Officers: Wm. H. Fitch, pres.; Gust Holm, v. p.; John W. Geiger, sec. and mgr., Frisco, Utah; Allen C. Eakin, treas.; preceding officers, Edith B. Brounzell, Fred Hubbard and E. R. Reitsch, directors.

Inc. April 11, 1906, in Utah. **Cap.**, $300,000; shares $1 par; assessable; 200,000 issued; 8 assessments levied, amounting to 13c per share.

Property: 17 claims, partly patented, 15 miles from Humboldt House, Pershing county, developed by 3 crosscut tunnels, each reaching the 2 principal ore-shoots.

Ore: carries lead, silver, copper, zinc and a little gold. The oreshoots occur on a limestone-shale contact, one shoot carrying zinc sulphide, the other, 20% lead ore containing gold and copper.

Equipment: includes 75-ton concentrating and flotation mill.

Property idle owing to lack of funds.

ANTIMONY KING MINE **NEVADA**

Owned and operated by J. M. Pine, Austin, Nev.

Property: 8 miles S. of Austin, in Cottonwood canyon, Battle Mountain district, has been worked intermittently since 1871, and by present owner since 1912.

Ore: antimony, occurs in true fissure vein, filled with white and dark quartz, associated with stibnite and traceable for 900′ on the surface. Country rock is a fine-grained silicious limestone, bluish-gray in color, with a little disseminated pyrite. Geology fully described, U. S. G. S. Bull. 594, pp. 75-76.

Development: by 250′ tunnel and 150′ shaft, reported to have opened up a 6½′ vein of shipping ore. The commercial value of these antimony deposits has yet to be proved. Presumably idle.

ANTIMONY & SILVER MINES CO. **NEVADA**

Address: at last accounts, care J. H. Stallings, gen. mgr., 2176 S. 7 E. St., Salt Lake City, Utah. Directors: Judge A. J. Weber, Dr. O. W. French and G. Y. Bullock.

Property: 3 groups, about 400 acres in Galena Canyon, near Battle Mountain, Lander county, said to carry large deposits of milling ore averaging $20 p. t. in gold-silver and high-grade antimony.

Development: consists of 1,500′ of workings, main tunnel being 350′ in length.

Equipment: includes 60-ton amalgamation and concentration mill. Presumably idle.

ANTIMONY SYNDICATE **NEVADA**

Address: Mill City, Nev.

Property: the Black Warrior and Bloody Canyon antimony mines, 2 claims, 40 acres, in Pershing county, Nev. The Black Warrior mine in the Buena Vista district is developed by several tunnels to depth of 150′, with total workings amounting to 2,000′. Ore, partly oxide and partly sulphide, occurs in fissure veins in porphyry, with N. S. course and dip of about 80°. Equipment consists of 25-ton mill.

Output amounted to $92,500 in 1915, and $230,000 in 1916, the ore averaging 62½% in 1915, and 40% in 1916. Production for 1917 amounted to 161¼ tons.

The Bloody Canyon mine in the Star district is developed by 2,500′ of tunneling to depth of 300′. See Pioneer Exploration Co.

ARCANE MINING CO. **NEVADA**

Idle.

Mine office: Pioche, Nev.

Officers: H. W. Rand, pres.; A. M. Cheney, v. p.; S. P. Kinney, sec.-treas.; preceding officers, Frank Holman, Frank Manning, directors. H. E. Freudenthal, res. agt. **Cap.,** $100,000; shares 10c par.

Property: five claims, adjoining the properties of the Ohio-Kentucky and Amal, Pioche, through which the Susan Duster lode of the Ohio-Kentucky extends, with 45° dip to the south. The ore from the lode on the O. K. property is said to have had an average assay value per ton of 7% lead, 20% zinc, 20 oz. silver and $2.50 in gold.

Development: 1,200′ of underground work has been done. Company said to plan sinking a vertical double-compartment shaft to the 650′ level, at which depth it expects to cut the Susan Duster lode, 200′ distant from the Arcane-O . K. line. The O. K. company is said to have followed the lode to the property line.

Equipment: power house, blacksmith shop, 40-h. p. gasoline engine and air-compressor.

ARGENTUM MINING CO. OF NEVADA **NEVADA**

Company inactive. Mines and mill under bond and lease to Candelaria Mines Co., which see.

Property: includes Northern Belle and Holmes Mines, in camp of Candelaria, Mineral county, Nev., 9 miles from Redlich, on Tonopah & Goldfield R. R. Fully described, Volume XIII.

ARIZONA EXTENSION SILVER MINES CO. **NEVADA**

Address: 265 Russ Bldg., Bush St., San Francisco, Calif.

Officers: (same as Arizona Silver Mines Co.), E. S. Van Dyck, pres., F. W. Lockman, v. p.-supt.; C. D. Olney, sec.; M. E. Pratt, chief eng.

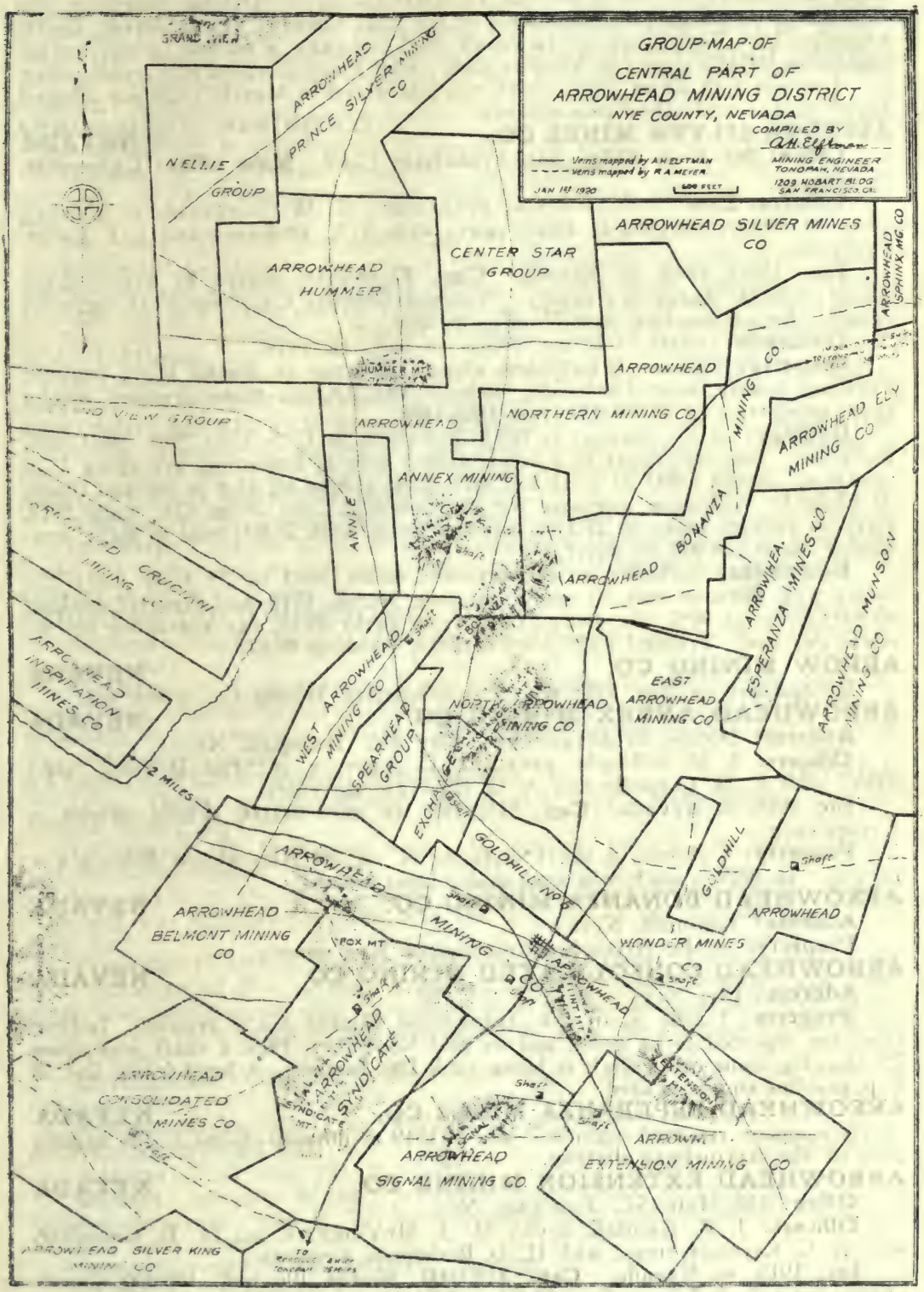
Inc. in 1919, in Nevada. **Cap.,** $1,000,000; $1 par. Listed on Boston Curb January 10, 1920.

Property: 8 claims and 3 fractions, 170 acres, between the Arizona Silver, Cons. Silver, Inc., and Silver Reef Mines Co., in Buena Vista district, near Unionville, Pershing county. Reported on by J. S. Coupal on December 29, 1919. Ground was worked in the 60's and 70's and is said to have yielded $200,000 in silver.

Geology: flat bedded limestones between two rhyolite dikes, contain two flat orebodies that are partly developed. A fault-fissure running N. W.-S. E. across the property also shows some good ore. Deposits are stated to be of "blanket" and "fissure" types.

Development: includes merely a dozen short tunnels, three of them on one blanket vein. An 80′ shaft cut this same vein 300′ from the outcrop, and the total work on this orebody, assuming an average thickness of 12″, is said to block out 15,000 tons of 12.1 oz. ore. The "fissures" carry more gold than the blanket veins.

The Arizona Silver company's vein is looked for 200′ below the Silver Reef vein. Property is considered by Coupal better than the other two properties in the blanket area. As part of Van Riper's publicity campaign, he published in the daily papers an open letter to Thomas W. Lawson of Frenzied Finance fame,



PROPERTY MAP OF THE ARROWHEAD DISTRICT, NEVADA.

who is said to have sent two engineers to the mine and subsequently given Van Riper the choice of selling to him 1,010,000 shares of Arizona Extension for $505,000 or of taking 1,010,000 shares of the final company (Cons. Silver, Inc?), provided Van Riper gave to Lawson's final company a 60-day option on the remaining 990,000 shares at 50 cents each. Van Riper accepted this second offer.

Lawson Van Riper, and others, were arrested in March, 1920, for alleged fraud in this and allied promotions.

ARIZONA SILVER MINES CO. **NEVADA**

Office: 265 Russ Bldg., San Francisco, Calif. **Mine office:** Unionville, Nevada.

Officers: Edw. S. Van Dyck, pres.-mgr.; F. W. Lockman, v. p.-supt.; Chas. D. Olney, sec.; M. E. Pratt, engr., with A. L. Holbrook and J. J. Lodge, directors.

Inc. April, 1919, in Nevada. **Cap.,** $1,000,000; shares $1 par; 108,485 issued; 550,000 shares in treasury. National Security Co., New York, transfer agents. Annual meeting, first Monday in May.

Dividends: initial of 3c per share on Dec. 15, 1919.

Property: 8 claims, 2 patented, about 120 acres, in Buena Vista canyon, Pershing county, near Unionville, includes the Arizona mine, credited with a gross production of $5,000,000 from 1868-1880.

Geology: of the district is fully described in U S. Geo. Sur. Bull. 414, Ransome. The ore occurs in a solid blanket vein in limestone, averaging 3′ in thickness. About 5,000′ of work has been done, almost all of it in ore and report by Chas. D. Wilkinson, engineer for the Goldfield Cons. Mng. Co., made 1918, gives an average assay of 27.3 oz. silver per ton, with 26,600 tons in sight, containing about 728,900 oz. silver.

Equipment: includes air-compressor, drills, mill of 35 tons daily capacity with flotation unit, in operation since March, 1919, and reported making an extraction of 90%, the concentrates from 20 to 30 oz. ore averaging 150 oz. silver per ton. Treated 1,231 tons in 1919, yielding $8,075.

ARROW MINING CO. **NEVADA**

Reorganized in May, 1918, as the Southeastern Mining Co., which see.

ARROWHEAD ANNEX MINING CO. **NEVADA**

Address: Divide Brokerage Co., Box 416, Tonopah, Nev.

Officers: J. M. Gilfoyle, pres.; B. D. Luce, v. p.; Pat Mooney, sec.-treas., with F. H. Connolly and A. G. Raycraft, directors.

Inc. 1919, in Nevada. **Cap.,** $150,000; 10c par; 100,000 shares offered at 7 cents each.

Property: 4 claims, a short distance N. of the Arrowhead Mining Co. ground. In 1919, a shaft was sunk and a hoist erected.

ARROWHEAD BONANZA MINING CO. **NEVADA**

Address: Tonopah, Nev.

Property: in the Arrowhead district of Nye county.

ARROWHEAD CONSOLIDATED MINING CO. **NEVADA**

Address: Ely, Nev.

Property: 1 mile S. of the Arrowhead Mining Co.'s ground. Indications are reported to be good, and by mid-November, 1919, a shaft was down 75′ showing some ore. Shaft is being sunk 100′ further. A head-frame and 18 h. p. gasoline engine is used.

ARROWHEAD ESPERANZA MINES CO. **NEVADA**

A company reported organized late in 1919 to develop claims in the eastern part of the Arrowhead district.

ARROWHEAD EXTENSION MINING CO. **NEVADA**

Office: 130 Main St., Tonopah, Nev.

Officers: J. B. Kendall, pres.; M. J. McVeigh, v. p.; H. B. Chessher, sec.; A. G. Raycraft, treas., with H. D. Budelman, directors.

Inc. 1919, in Nevada. **Cap.,** $150,000; shares 10c par; 100,000 shares offered for sale at 7½c each on October 18, but not to be released until another 100,000 was sold at 15c or better.

Property: about 100 acres of unpatented ground adjoining the Arrow-

head mine on the south and east. Surface showings "pronounced unusually promising by various and reputable mining men." Assays yielded from $1.20 to $67.50 and $71.55 per ton, the second and third sample being taken by W. H. (Bill) Hart and J. B. Kendall, respectively. All reports furnished by company are highly optimistic. A shaft down 50′ by mid-December, said to be nearing the sulphide zone.

ARROWHEAD MINING CO. **NEVADA**

Address: W. P. Clendennin, Tonopah, Nev.

Officers: R. L. Johns, pres.; G. A. Gernick, v. p.; C. A. Blumenthal, sec.; W. P. Clendennin, treas., with J. D. Sloan, directors. Pete Fox, supt.

Inc. Sept., 1919, in Nevada. **Cap.**, $150,000; 10c par.

Property: 4 claims in the new Needles district, 60 miles E. of Tonopah, Nye county, and 4 miles S. of Twin Springs on the Lincoln Highway, between Tonopah and Ely. The general formation is andesite, and the ore is a silver sulphide, said to be similar to that of Tonopah. Examined in November, 1919, by A. H. Elftman.

In December, 1919, a shaft was down 170′, and has cut ore, and a winze sunk from the 100′ level cut 4′ of $100 to $209 ore.

ARROWHEAD SILVER SIGNAL MINES **NEVADA**

A new company, whose ground has good surface indications, is sinking a shaft to expose the vein in the camp re-named Arrowhead district.

ARROWHEAD WONDER MINES CO. **NEVADA**

Address: W. H. French, pres., 1865 Sacramento St., San Francisco, Cal.

Property: 7 claims N. E. of the Arrowhead Mining Co. Early in 1920 shafts are to be sunk on two promising veins, one of which said to show 2′ of $110 ore at depth of 25 feet.

ASHDOWN GOLD MINING CO. **NEVADA**

Address: Denio, Oregon. Geo. D. Mathewson, lessee, or T. S. O'Brien, Ashdown, Nev.

Property: in northwestern Humboldt county, 15 miles from Nevada-Oregon line, reported to have 125,000 tons of $5 milling ore blocked out. Small shipments of gold made in 1917-18. An old mine opened by 9 tunnels. A mill was contemplated in 1919.

ATLANTA-HOME GOLD MINING CO. **NEVADA**

Idle. **Office:** 111 Broadway, New York City.: **Mine office:** Atlanta, Lincoln county, Nev.

Officers: F. R. McNamee, pres.; M. Justice, sec.; E. M. Bray, treas.; J. J. Stumenbord, supt.

Inc. 1915, in Delaware. **Cap.**, $2,500,000; outstanding 500,000 shares. Company was organized to take over the holdings of the Atlanta Cons. Gold Mng. Co.

Property: 11 claims, patented, 180 acres, at Atlanta, Lincoln county, 47 miles northeast of Pioche, show a contact deposit between porphyry and limestone, that is said to average from $2 to $4.50 per ton in gold, and is 50′ to 80′ wide, proven for a length of 300′ and depth of 200′. Ore reserves claimed to be 320,000 tons.

Development: two shafts sunk 300′ apart, with drifts and crosscuts totaling 1,600′.

Equipment: includes a steam hoist and compressor.

AUREOLA MINES CO. **NEVADA**

Address: P. O. Box 791, Reno, Nev.

Officers: Anthony Elffner, pres.-gen. mgr.; Chas. Madison, v. p.; P. Y. Gillson, sec.-treas., with R. W. Stoddard and M. S. Gillson, directors. A. I. D'Arcy, cons. engr.

Inc. in Nevada. **Cap.**, $100,000; 10c par.

Property: 5 unpatented lode claims, in Mineral county, 5 miles S. E. of Sodaville, the nearest rail point. According to Mr. D'Arcy, the ground shows 7 veins from 1 to 4′ wide, in grano-porphyry. Veins contain high-grade gold-silver ores. Two test shipments made to Western Ore Purchas-

ing Company ran $67.61 and $148.38 per ton, respectively, the gold content averaging 1 ounce to each 20 ounces silver. Property is to be developed to prove extent of orebodies.

AURORA CONSOLIDATED MINES CO. **NEVADA**

A subsidiary of the Goldfield Cons. Mines Co.

Office: Reno, Nev. **Mine office:** Aurora, Mineral county, Nev.

Officers: Geo. Wingfield, pres.; J. H. Miller, v. p.; with H. M. Hoyt, Chas. E. Knox, E. A. Julian and F. M. Manson, directors.

Inc. in 1912, in Utah. **Cap.,** $100,000; shares 10c par; assessable; 685,550 shares issued. June 30, 1914, 87% of the issued stock of the Aurora Cons. Mines Co. was sold to the Goldfield Cons. Mines Co. for $763,000, by Jesse Knight and associates.

Annual report for 1918 shows: Total earnings, $297,114; total operating expenses, $386,103; operating loss, $83,988; deficit, Dec. 31, 1918, $305,548.

Property: at Aurora, is a group of claims in the Sierra gold belt, back of Hawthorne, containing several old and well known mines, with gold quartz veins in sheared andesite, slate, etc.

Development: 400′ vertical shaft, connecting with main working tunnel, 4,500′ long.

Mill and cyanide plant: 40 stamps with daily capacity of 500 tons, weight of stamps 1,580 lb since dismantled.

Production: in 1916, 173,270 tons; in 1917, 175,447 tons; in 1918 (to September), 104,086 tons. Operations showed a loss of 65c per ton in 1918, as against a loss of 10 cents in 1917, and a profit of 43 cents in 1916. Total production for last five years amounted to 633,332 tons, yielding $1,842,482 at a cost of $1,856,624.

All operations ceased October, 1918, as company could not make a profit owing to increasing high cost and low tenor of ore. The assets of the Aurora Cons. are to be liquidated and the proceeds applied on its indebtedness to the Goldfield Cons., amounting to $457,500, December 31, 1918.

Mill sold, 1919, to Goldfield Dev. Co. and moved to Goldfield.

AURORA MINES CO. **NEVADA**

Property sold and company out of business. Fully described, Vol. XIII.

AUSTIN DAKOTA DEVELOPMENT CO. **NEVADA**

Address: Valley City, North Dakota. **Mine office:** Austin, Nev.

Officers: C. E. Garvin, pres.; A. B. Cox, supt.-v. p.; with C. A. Newman, H. R. Bruns, S. H. Nelson and T. Carter Griffith, directors. F. W. Schlaberg, sec.-treas.; C. F. Littrell, supt. G. J. Babcock, cons. engr.

Cap., $1,500,000; shares $1 par; 1,200,000 shares issued.

Property: 800 acres in the Reese River mining district, at Austin, Lander county, Nev. Ore is gold-silver in chlorite zone, in 2 parallel ledges, each 20′ thick and cut by several mineralized dikes in granite. Workings for about 400′ expose a quartz vein varying in thickness from 6 to 24″, and averaging $6 to $7 per ton.

Development: by the X-Ray 2-compartment shaft, 330′ deep with 2,000′ of laterals; the O. K. incline shaft, 350′ deep, the 250′ Dalton shaft, sunk on a 6′ vein of milling ore and the 150′ Tesora shaft, sunk about 800′ from the Dalton. Drifting on 300′ to reach the main or Dike vein, in April, 1919.

Equipment: pump, 80-h. p. hoist, ore bins, compressor, storehouse and stable. Construction of a mill was under consideration in August, 1919.

Production: reported to aggregate $1,000,000.

AUSTIN GOLDFIELD MINING CO. **NEVADA**

Owns the Watt mine, operated by H. Lemaire, under lease, at last accounts.

Property: on N. side of New York canyon, Reese River district, Lander county, Nev.

Development: 300′ inclined shaft with 3 levels. Vein in dark quartzite ranges from 4″ to 12″ wide and consists of white quartz containing tetrahedrite, pyrite, chalcopyrite, and some blende and galena; dip 25° to 45° N. E.; strike

N. 45° W. To end of 1915 over $15,000 worth of ore shipped by lessees is said to have averaged about $125 per ton, chiefly in silver.

Equipment: includes a 25-h. p. gasoline hoist.

AUSTIN MANHATTAN CONS. MINING CO. NEVADA

See Austin Manhattan Cons. Silver Mines.

AUSTIN MANHATTAN CONS. SILVER MINES NEVADA

Formerly the Austin Manhattan Cons. Min. Co., successor to the Manhattan Silver Mng. Co.

Address: Wm. A. Marshall, res. agt., Austin, Nev.

The Austin Manhattan company purchased the principal mining properties, first operated in the early 60's and credited with a production of $19,000,000, in and adjacent to Austin, Nev., in 1908, and started development work, but on too large a scale commensurate with the limited money on hand. See Copper Handbook, Vol. XI, and Bulletins 208 and 408, U. S. Geol. Survey. Result was a receivership begun in 1911, culminating in a public sale of the property 3 years later. It was purchased by one of the largest creditors, H. C. Fownes, German Nat'l Bank Bldg., Pittsburgh, Pa., who organized the present company after expiration of the redemption period.

Property: 115 claims, 1,200 acres, 73 claims patented, in the Reese River mining district, at Austin, Lander county, shows in the Lander Hill section, a vein system of 5 fissure veins in granite, or quartz monzonite, N. W.-S. E. strike, dip 25° to 60° N. E. Maximum width of veins is 6′. Ore, sulphide of silver, occurs in lenticular shoots. Examined by A. W. Daw, of London.

Development: 6,000′ tunnel, shafts and miles of crosscuts and drifts. Mine contains little ore blocked out. Workings were largely caved and inaccessible; but in October, 1919, W. A. Marshall had found rich ore and was cleaning out drifts, preparatory to resuming development work, and ore extraction.

AUSTIN NEVADA CONS. MINES CO. NEVADA

Address: H. G. Richardson, Austin, Nev., pres.-gen. mgr.

Inc. in Nevada. **Cap.,** $3,000,000.

Property: Austin-Nevada group on Lander hill section of Austin, Lander county.

Development: by over 3,000′ of tunneling, including a new tunnel, 600′ long, to be driven 350′ further to cut the main vein, said to be 73′ wide at surface and to average $15 to $20 per ton in gold and silver. A compressor plant and drills were installed in 1919 and a mill is planned for 1920.

AZALIA MINING CO. NEVADA

Address: F. M. Berry, sec.-treas., Union Oil Bldg., Los Angeles, Calif.

Officers: F. W. Cole, pres.; S. E. Vermilyea, v. p.; with John Woodson and S. L. Carpenter, directors; Dee W. Minier, supt., at last advice.

Cap., $1,000,000; shares issued, 700,000.

Property: 4 claims, 8 miles N. W. of Platina, Yellow Pine district, Clark county, covering a vein in limestone, containing zinc-silver ore, for 3,000′. Developed by an 80′ incline shaft which passed over the ore ,said to be 6′ thick and faulted at a depth of 30′. Operated under lease by C. E. Cree in 1917.

Company was also developing a group of 9 claims about 1 mile below the Cerro Gordo mine, in the Cerro Gordo mining district, Inyo county, Calif, where a 750′ tunnel was driven to reach the contact. No recent returns.

AZURITE MINING CO. NEVADA

Address: J. W. McFatridge, mgr.-sec.-treas., 941 W. 35th St., Los Angeles, Cal. **Mine address:** Goodsprings, Clark county, Nev.

Officers: A. C. Black, pres. and purch agt.; T. D. Knights, v. p.; preceding officers, M. P. Erwin, M. M. McFatridge and Samuel Yount, directors.

Inc. Feb. 7, 1911, in Nevada. **Cap.,** $1,000,000; $1 par; 60,769 issued.

Property: 9 claims 174 acres and a 3-acre smelter site, in the Yellow Pine district, sections 26, 27, 34 in T. 24 S.; R. 57 E., 12 miles from Goodsprings and 20 from Jean on the Salt Lake Route. The mines adjoin the Boss mine on the east. Company bought the Nevada Copper Realty property, February 7, 1911.

Geology: carries plumbojarosite, a very rare mineral, carrying gold and platinum (see U. S. Geol. Survey Bull., 620). Ores carry gold, silver, copper, lead, zinc and platinum, lowest assay at the Azurite copper mine said to be $3.60 gold, $4.50 silver, 27% copper, .03 oz. platinum. Ores occur in replacement orebodies of irregular size and shape, the largest 35x40′ and 8 to 10′ thick in thick-bedded limestones cut by porphyry dikes.

Development: by 3,160′ of workings, including several tunnels, estimated to block out 8,800 tons of 20% copper ore and 30% lead ore.

Shipments during 1914-'16 returned $38,000. In 1918-'19 the mine was operated by lessees on a 15% royalty basis.

BAMBERGER EXPLORATION CO. NEVADA

Name changed in November, 1919, to Simon Bamberger Co., owns the Gusset Patch group at Pioche, Lincoln county, leased until February, 1923, to Black Metals Mines, Inc., which see.

BATTLE MOUNTAIN MINES & DEVELOPMENT CO. NEVADA

Office: 617 Merritt Bldg., Los Angeles, Cal. **Mine office:** Battle Mountain, Nev., F. E. Perry, manager.

Officers: M. H. Whittier, pres.; F. B. Sutton, sec. Is a close corporation and no details of organization are made public.

Property: 20 claims, 9 patented, in Lewis mining district, Lander county, 16 miles south of Battle Mountain. Ore carries silver as stephanite, in shoots in quartz vein. Average value reported as 20 oz. silver and traces of gold and copper.

Development: by tunnels, from 700′ to 4,670′ long with a total of 28,000′ of underground work, said to have blocked out 50,000 tons of ore.

Equipment: included 200 h. p. Diesel engine, compressor and 125 ton mill, with flotation unit.

No work done during past 2 years, and equipment to be sold and mine leased.

BELCHER MINING CO. NEVADA

Merged with Jacket-Crown Point-Belcher Mines Co. (which see), March 10, 1915.

BELMONT BIG FOUR MNG. CO. NEVADA

Address: Carlin, Nev.

Officers: F. W. Spear, pres., P. O. Box 5, Santa Monica, Calif.; P. E. Dairs, v. p.; A. A. Willison, sec.-treas.; with Geo. W. Jacobs and W. E. Maul, Wm. Painter, directors. Frank Fagan, lessee, Carlin, Nev.

Inc. 1916, in Nevada. **Cap.,** $125,000; 10c par; 800,000 shares outstanding.

Property: 16 claims, 320 acres, 7 miles west of Belmont, Nye county. Claims show granite cut by a N. S. fissure vein, which is 20′ wide, and dips at 30°. Molybdenite occurs disseminated through quartz and averages 2% MoS_2 besides silver and copper values.

Development: 150 and 400′ tunnels. Mine operations were resumed July, 1919, under 5-year lease to Frank Fagan on a 20% royalty basis.

BELMONT MILLING CO. NEVADA

Dissolved February, 1917, and all property and assets taken over by the Tonopah Belmont Dev. Co., which see.

BEN EZRA COPPER & GOLD M. & S. CO. NEVADA

Address: Santa Paula, Calif., or Searchlight, Nev.

Officers: H. P. Balcom, pres.; J. L. Crane, v. p.; A. H. Stovall, sec.; Wm. Mackenzie, treas.-mgr.; with Wm. Schiells, E. A. Chase, Chas. Beckwith and A. Everett, directors.

Inc. Sept. 3, 1909, in Nevada. **Cap.,** $1,000,000; $1 par; 883,000 outstanding. Annual meeting 3rd Saturday in August.

Property: 15 claims, 10 patented, 300 acres in Nob Hill section of Eldorado mining district, Clark county, 17 miles N. of Searchlight.

Ore: occurs in fissure vein and porphyry dike said to be 100 to 150′ wide. Values are mainly in silver, with some copper and gold averaging $15 to $20 per ton.

Development: by 2,400′ of workings, including 660 and 500′ adits. A prospect.

BENTON-RADFORD-SMITH GROUP **NEVADA**

Address: A. I. D'Arcy, Goldfield, Nev. A. L. Bocherding, mgr.

Inc. 1919, in Nevada. Cap., $40,000. Is an association of 20 members.

Property: placer claims in Tule canyon. Esmeralda county, containing gold bearing gravel at a depth of 20′ with some $6 material at 7′. Ground will be worked by drifting.

BEOWAWE SILVER MINING CO. **NEVADA**

Address: R. L. Colburn, 341 Bush St., San Francisco, Cal.

Inc. 1919, in Nevada. **Cap.**, $150,000; $1 par.

Property: 11 claims near Beowawe, Eureka county.

Development: by 140 and 180′ shafts. From mid-1917 to Aug., 1919, the mine yielded $85,000 worth of ore, with two cars ready at that date.

BERUNDY TUNGSTEN MINES CO. **NEVADA**

Address: Mina, Nev.

Officers: L. B. Spencer, pres.-mgr.; C. E. Noble, sec.; with F. J. Siebert, directors.

Cap., $200,000; 10c par; assessable; 1,300,000 outstanding. Operating expenses for 1918 amounted to $5,000.

Property: 1 claim, 20 acres, in the Gold Range mining district, Mineral county, 10 miles S. W. of Sodaville.

Ore: occurs as scheelite in a quartz fissure vein in diorite, said to assay 2 to 4% tungsten. **Development:** by 200′ tunnel. **Ore reserves:** estimated at 3,000 tons of 2% tungsten ore.

Plan developing to depth of 400′.

BIG CASINO LEASING CO. **NEVADA**

Searchlight, Nev.

Operating property of the Big Casino Mining Co., under lease and bond, see latter title.

BIG CASINO MINING CO. **NEVADA**

Office: 1314 Widener Bldg., Philadelphia, Pa. **Mine office:** Searchlight, Nev.

Officers: M. W. Johnson, pres.; H. C. Gibson, v. p.; Samuel Rosenbaum, sec.; S. Krelstein, treas., with John M. Sailer, J. H. Shinn, A. M. Townsend, Geo. D. Lewis, W. A. L. Barker and Geo. Flint, directors. Hamilton B. Sharps, mgr., 719 Drexel Bldg., Philadelphia, Pa.

Inc. Sept. 14, 1914, in Delaware. **Cap.**, $1,500,000; shares $1 par; nonassessable; 1,000,000 shares outstanding.

Property: 10 contiguous lode claims and 2 millsites, situated about 4 miles E. of Searchlight, Clark county. A zone of altered andesite cutting granite-porphyry contains a fissure vein, 5′ wide, carrying gold, silver, copper, lead and zinc ore.

Development: main shaft about 550′ deep, with 4 levels at 100′ intervals, a total of 3,000′ of workings. Ore reserves are estimated at 5,000 tons averaging $9.50 per ton.

Equipment: includes compressor, hoist, pump and 50-ton mill with K. & K. flotation unit, installed 1918, by the Big Casino Leasing Co., operating the Big Casino property under lease and bond. The mill ran 1 shift 4 days per week, June, 1919, owing to water shortage. Concentrate said to average 4.2 oz. gold; 14.1 oz. silver, 17.9% lead, 5.5% coppr, 19.4% zinc.

BIG CHIEF CONS. MINES CO. **NEVADA**

Controlled by Clarence and Frank Berry, 250 First St., San Francisco, Calif. Jerry Coghlan, supt.

Inc. 1919, in Nevada. **Cap.**, $2,000,000.

Property: Missing Link, Rico, Jackson, and General Grant group, in Gold Circle district, Elko county. **Ore:** carries gold in quartz in the Jackson, and silver in the Missing Link. A 15′ orebody proved for 250′ on

the 150′ level of the General Grant is said to assay as high as $105 per ton. Examined in August, 1919, by L. K. Kennedy, of San Francisco.

Development: 250′ shaft and drifts. Equipment installed April, 1919. A cyanide mill is planned as an addition to 1920. Recent developments reported satisfactory.

BIG PINE MINING CO. NEVADA

Idle. Formerly operated by Mushett and Wittenberg.

Property: Big Pine claim at Manhattan, Nye county, covering the mineralized schist belt for 1,000′.

Development: the Mushett & Wittenberg 200′ vertical shaft, sunk 350′ from north end line of chain. Dimensions of the glory-hole show ore equal to 240,000 tons from surface to the 200′ level. South of the shaft the known extent of the ore zone to the 200′ level is 400′ long and 60 to 75′ wide, equal to 370,000 tons.

Mill: equipped with a 5x20′ tube-mill, plates, classifiers, etc. Heads averaged $5.60, gold tailing 40c per ton. Tube-mill consumes 170 lb. pebbles per day.

BILL NYE MINING CO. NEVADA

Address: Goodsprings, Nev. W. E. Allen, pres.;

A report for the year ending December 31, 1918 showed: receipts, $2,121; cash on hand $1,476; expenses, $1,225.

Property: the Akron group in Goodsprings district, Clark county, reported held under 3-year lease from November, 1918, with an option to purchase at $40,000.

BI-METALLIC MINE NEVADA

Idle. Owned by M. G. Bradshaw, Crown King, Yavapai county, Ariz., and P. A. Simon, Mina, Mineral county, Nev. Mine is located at Candelaria,, Columbus district, Mineral Co., Nev.

Property: 3 claims, 47 acres, unpatented, shows a vein in slate, course of vein is N. 5° W., dip 65°. Ore occurs in shoots and lenses, and is said to average 28 oz. silver.

Development: 2 incline shafts, 280′ deep, equipped with gasoline hoist. Mine was operated by leasors in 1917, who closed down in 1919, but owners plan resuming operations. Is a promising property.

BISCUIT MINING CO. NEVADA

Property: in Cherry Creek district, White Pine county, an old producer credited with a production of $1,000,000 in silver. Developed by 1,100′ incline shaft.

The mine was reopened in 1919, together with various adjoining properties that have patiently waited for a return of high silver prices.

BLACK DIAMOND COPPER MINING CO. NEVADA

Dead. Fully described Vol. XIII.

BLACK EAGLE MINING CO. NEVADA

Henry Johnson, mgr., Rawhide, Nev.

Property: Black Eagle mine and mill at Rawhide, Mineral county, Nev., said to show gold ore. Treating 50 tons daily at the mill at last reports. Presumably idle, 1918-'19.

BLACK METALS MINES, INC. NEVADA

Main office: 516 Felt Bldg., Salt Lake City, Utah. **Mine office:** Pioche, Nev.

Officers: W. F. Snyder, pres.; Chas. Read, v. p.; J. C. Jensen, sec.-treas., with E. H. Snyder and H. H. Fields, directors. Geo. W. Snyder, mgr.; Fritz Erickson, supt.

Inc. May 5, 1918, in Nevada. **Cap.,** $99,000; shares 10c par; assessable; 640,000 shares outstanding. Stock listed on Salt Lake City Stock Exchange. Annual meeting 1st Tuesday in January.

Property: about 250 acres, N. W. of Pioche, Lincoln county, includes 6 unpatented claims, also the old Day mine group of the Uvada Copper Co., held under a 2-year lease and bond, and the Gusset Patch group of

the Bamberger Exploration Co., held under a 5-year lease from February, 1919.

The Day mine, formerly owned by the Day Bristol Cons. Mines Co. (fully described Vol. XI) and credited with a production of $2,000,000, was closed down several years ago because of threatened apex litigation with the Bamberger Exploration Co. (now the Simon Bamberger Co).

Geology: ore occurs in a replacement deposit of irregular dimensions in limestone, the mineralized area extending to depth of 900′. Values are mainly in silver, with a little copper. The ore is desirable as a smelter flux.

Development: about 2 miles of workings, including 600′ tunnel and 1,200′ shaft.

Equipment: includes hoist, 50-h. p. oil engine, drills, and compressor.

Reported shipping 50 tons daily in 1919, mainly from the 700′ level of the Day mine. Twenty men employed.

BLACK METALS MINING CO. **NEVADA**

Property: an old silver producer in Black Metal canyon, 3 miles N. of the Exchequer in Cherry Creek district, White Pine county, reopened in 1918. Operated under lease by F. W. Fletcher.

Production: about 800 tons during 1918.

BLACK PANTHER EXTENSION MINING CO. **NEVADA**

Address: Woodson & Carson, fiscal agents, 440 Gazette Bldg., Reno, Nev.

Officers: Kit Carson, pres..; E. H. Abrams, v. p.; Marle Woodson, sec.-treas.; with J. D. Finch and R. H. McIntosh, directors.

In February, 1920, 20,000 shares were offered at 5 cents each.

Property: 5 claims, 3½ miles N. of Reno, Washoe county, said to carry the extension of the Black Panther vein.

BLACK PANTHER MINING CO. **NEVADA**

Address: C. H. Duborg, Reno, Nev.

Officers: C. H. Duborg, pres.; B. M. Lewis, v. p.; Marle Woodson, sec.-treas.; with Kit Carson and I. T. Weir, directors. Al Marsal, supt.

Property: copper-bearing claims 3½ miles N. of Reno, Washoe county.

Development: by 150′ shaft, to be sunk to 300′. Chalcocite was opened at depth of 135′; at 150′ the shaft was in andesite. Some 12% copper and 1.4 oz. silver ore was cut during sinking. Mine is equipped with an electric hoist.

BLACK ROCK MINE **NEVADA**

Office: 526 Main St., Racine, Wis. Mine 6 miles east of Yerington, Nev. Property privately owned by Wm. D. Thompson, of Racine, Wis.

Property: 3 patented claims, 52 acres, in Mason district, Lyon county, show 3 parallel fissure veins in quartz-monzonite 2 of which of 6 to 10′ average width are traceable 2,600′. Developed by shafts, 80′ and 120′ deep, showing chrysocolla and chalcopyrite said to give returns averaging 6%-7% copper per ton.

The property is to be equipped and active work started in 1920.

BLUEBIRD CONSOLIDATED MINING CO. **NEVADA**

Address: John Rost, pres., Reno, Nev.

Property: the old Mexican mine at Ellsworth, Nye county, 11 miles miles W. of Ione and 14 miles N. of the Simon mine. A large production is reported from former operations and dumps are said to contain 17,500 tons of $39 silver ore. Tailings are said to be worth treating again—the third time.

Development: by 500′ tunnel connecting with old shaft.

BLUE DICK MINING CO. **NEVADA**

Address: Don H. Petty, mgr., Hilltop, Nev.

Property: Blue Dick mine at Hilltop, 20 miles S. E. of Battle Mountain, Lander county, reported to be shipping about 10 tons of 42 oz. silver ore daily during part of 1918. An air-compressor and machine drills were installed early in 1919.

Shipments of fluxing ore also made to Mammoth smelter, Kennett, Calif.

BLUE LIGHT COPPER CO. NEVADA

Address: care C. W. Marsh, pres., Washington, D. C. **Mine office:** Mina, Mineral county, Nev.

Officers: Henry L. Dollman, v. p.; F. M. Baker, Carson City, Nev., sec.; Wm. C. Osborne, treas.; preceding officers, Chas. N. Van Cleave, Chas. E. Test and Richard Stegemeier, directors.

Inc. Oct., 1907, in Nevada, as successor of Blue-Light Mining Co. **Cap.**, $2,500,000; shares $1 par; non-assessable.

Property: 14 miles from Mina, Mineral county, developed by 600′ shaft from which several carloads of rich carbonate ore have been shipped. Shaft reached sulphide zone in 1917, but workings have not yet passed through leached material. Mine is equipped with hoist, buildings, etc. Examined by R. W. Hadden. No recent returns secured.

BLUESTONE MINING & SMELTING CO. NEVADA

Office: 42 Broadway, New York City. **Mine office:** Mason, Nev.

Officers: D. M. Steindler, pres.; S. W. Cohen, v. p.-gen. mgr.; with J. B. Woddell, C. D. Kaeding, and Sir M. B. Davis, directors. H. M. Thompson, sec.-treas.; M. V. Summerhayes, supt.

Inc. May 18, 1917, under laws of Maine. **Cap.**, $2.000,000; $10 par; 100,000 outstanding.

Property: 440 acres, 380 patented, including the Bluestone mine and a group of 20 claims adjoining the Mason Valley mine in Lyon county. Formerly owned by the late J. D. DeLamar. The Bluestone is the oldest property in the district, claims having been patented previous to 1890.

Geology: ore is mainly chalcopyrite, associated with considerable epidote, in a garnet-limestone gangue, there being practically no oxidized ores, even at the outcrop. Ore is uniform in character, and after a light roast is well adapted to magnetic separation. Drill-holes proved that ores extend to 750′ depth.

Development: mine has been opened to a depth of 540′ and has 2 miles of workings, including a 1,300′ main haulage tunnel, cutting an ore-shoot about 300′ wide and 500′ long at a point 300′ below the apex. This shoot is said to carry an 80′ paystreak of high-grade ore, ranging up to 20% in tenor, with balance of ore carrying 2.5% copper. Management estimated 1,600.000 tons of ore in sight, averaging 2.6% copper, in 1917.

Equipment: includes a 50-h. p. hoist, 25-drill electric air-compressor, and 800-ton flotation plant, which supersedes the old magnetic plant.

Company built 2½ miles of railroad from Mason to the mine in 1916.

Production: in 1919, up to time of stopping work, due to the market, monthly output was about 1,750.000 lb. of copper. Operations resumed September, 1919, but suspended in March, 1920.

BLUSTER CONSOLIDATED MINING CO. NEVADA

Address: Pavlak, Nev.

Officers: T. B. Beadle, pres. and gen. mgr.; Frank Benan, v. p.; H. L. Rummel, sec.; J. D. Goodwin, treas.

Property: at Jarbridge, Elko county, shows gold ore in 7′ veins, said to assay $10 to $40 per ton.

Ore reserves: management estimated 100,000 tons of milling ore, valued at $12 per ton, blocked out and on dumps, January, 1915.

Equipment: 10-stamp mill, sawmill, aerial tramway, electric power. Tailing were impounded for cyaniding at a later date. No recent information.

BONANZA MINING CO. NEVADA

Mail returned 1919 from former mine office, Winnemucca, Humboldt county, Nev. Company was controlled by Chas. Baagoe and D. F. Shiveley at last accounts.

Property: 5 claims, 5 miles from Winnemucca, shows a contact fissure

vein 11-22′ wide and proved for length of 115′, between diorite-porphyry hanging wall and lime shale footwall. Development includes 3 shafts, deepest 215′ with crosscuts, a tunnel driven east from No. 2 shaft, 37′ deep and a winze sunk all in ore. Mine has no equipment.

BOSS EXTENSION MINING CO. **NEVADA**

Address: Al. E. Buys, gen. mgr., Goodsprings, Nev.

Inc. Nov. 12, 1914, in Nevada. **Cap.**, $1,000,000; $1 par; 558,500 issued. In December, 1916, company sold 100,000 shares, which were offered to the public at 11 cts.

Property: 3 claims, 60 acres, adjoining the Boss mine and between it and the Oro-Amigo mines in the Yellow Pine mining district, Clark county, Nev. Claims show a porphyry dike, whose mineralized contact with limestone is said to carry platinum gold ore, similar to that of the Boss mine.

Development: by 40′ shaft and 2 tunnels (250′). No recent returns.

BOSS GOLD MINING CO. **NEVADA**

Address: Goodsprings, Nev.

Officers: S. E. Yount, pres.; O. J. Fisk, v. p.; Lane C. Gilliam, sec.-treas.-mgr., with N. K. Potter and F. J. Kent, directors.

Inc. 1914, in Nevada. **Cap.**, $1,000,000; $1 par; 408,500 outstanding. Annual meeting third Wednesday in January.

Financial statement January 1, 1918, showed cash in bank, $3,725; Liberty bonds, $10,000; due from smelters, $1,149. Smelter returns: in 1916, $45,725; in 1917, $70,806; in 1918, $17,546. Revenue from January to June, 1919, inclusive, totaled $15,327. In July there was $11,096 on deposit plus $10,000 of Bonds.

Dividends: $8,170 in 1916; $32,680 in 1917; $20,425 in 1918.

Property: 5 claims, 85 acres, unpatented, 12 miles W. of Goodsprings, and 3 miles from Platina.

Geology: orebodies consist of oxidized copper ore, mostly chrysocolla and limonite, and of gold-platinum-palladium ore in fine-grained silicious gangue. The later ores contain a small quantity of bismuth plumbojarosite (a hydrous sulphate of iron and lead). The shoots can be mined separately. The orebodies occupy a nearly vertical zone of fracturing in the horizontal strata of dolomite. The zone is 30′ wide on surface, 100′ long, with precious metal shoots confined to the 12′ resting on the footwall. For further details see 'Eng. & Min. Journ.' of August 20, 1919.

Development: by tunnels and over 6,000′ of workings. Reserves in one shoot, according to W. L. Uglow, were 1,000 to 2,000 tons, averaging 3.46 oz. gold, 6.4 oz. silver, 0.70 oz. platinum, and 3.38 oz. palladium. During first half of 1919, there was 330′ of work done.

Production: in 1916, 451 tons copper ore and 295 tons platinum-bearing ore; in 1917, 443 tons of ore yielded 107 oz. platinum (0.24 oz. per ton), and 400 oz. of palladium (0.9 oz. per ton); in 1918, 605 tons copper ore and 90 tons platinum-palladium ore, netting $6,040; in 1919, two cars of copper ore realized $1,139, and three cars of platinum-palladium ore $22,365.

The Overmire mill proved a failure, and the cost of handling the ore was so much higher than expected that the Palau Co. ceased operations early in 1918 and the mill has since been dismantled.

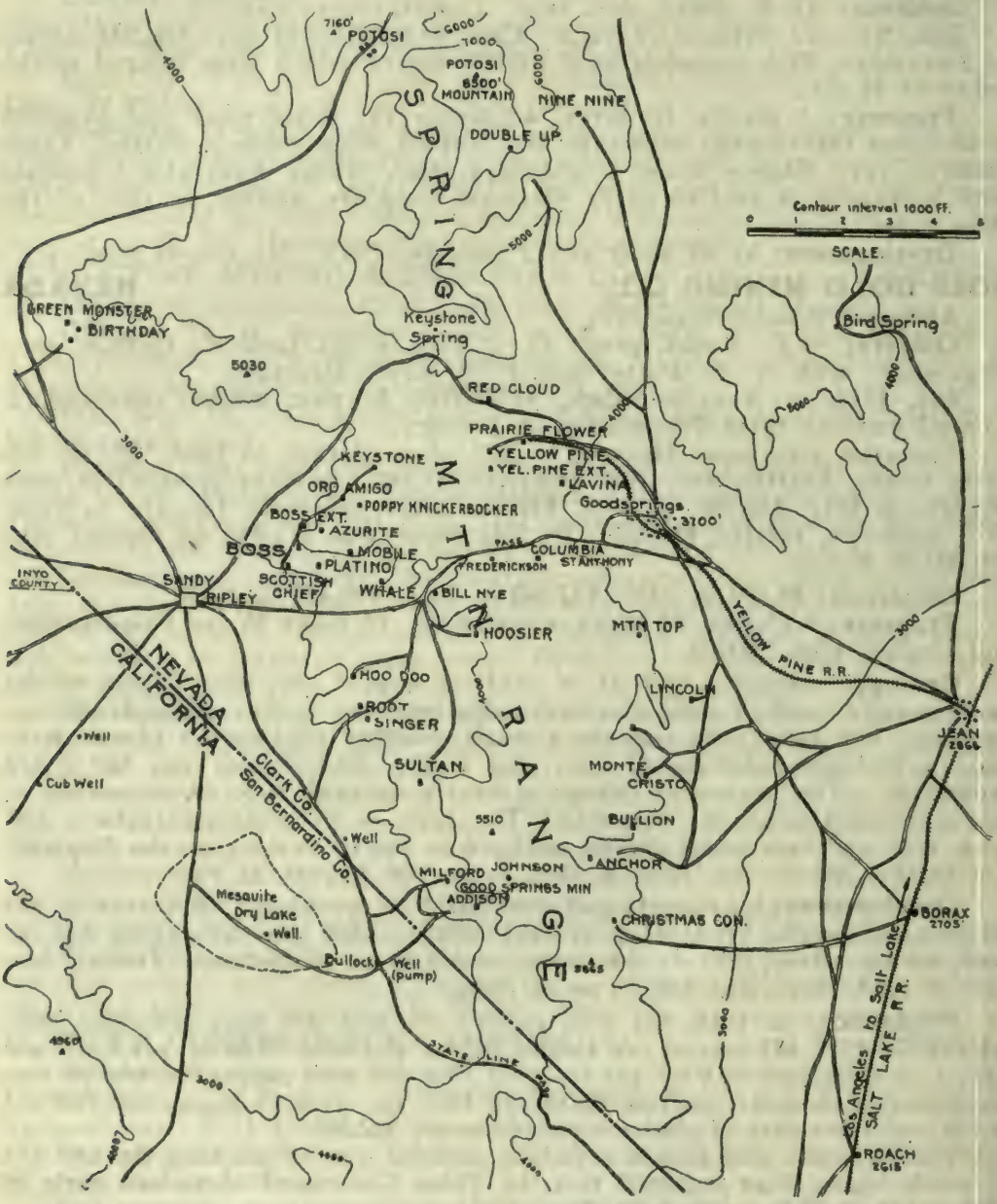
The present management has been prospecting for new orebodies during 1919, but with little success to date.

BOYER COPPER MINES CO. **NEVADA**

Address: Boyer, Churchill county, Nev. Arthur Howe Carpenter, cons. engr., 210 Noble Ave., Crafton, Pa.

Property: 49 claims, 1,000 acres, also a 10-acre millsite and 160 acres of placer lands, at Boyer, about 30 miles from Wonder, Nev., and 75 miles south of the S. P. R. R. at Winnemucca, in the copper belt of the Piute mountains, controlled by Crofton Umacke, of Reno, Nev., at last accounts.

Geology: covers a mile of the western end of a contact between whitish andesite and an underlying greenstone, or andesite, which shows copper pyrite peppering the rock. The ore bed has a dip of but 20° and a thickness of 100′ and is much altered, the footwall being a hard, silicious band. The lower 30′ carries 5% copper, but the orebody developed was figured by Prof. Carpenter and A. H. Carpenter to assay 1.7% copper and about 70 cts. per ton in gold.



MAP OF SOUTH-EASTERN NEVADA, INCLUDING YELLOW PINE DISTRICT

High-grade ore occurs in small iron-capped veins which extend up through the porphyry and carry a breccia of rock fragments cemented by copper glance and bornite.

Development: by tunnels, now inaccessible. Present company has done about 500′ of work on Treasury Box hill and exposed on a faulted block of 200′ length, 100′ width and with 500′ depth on the dip, assaying as above. Property promising when railroad facilities are provided.

BRISTOL CONSOLIDATED MINES & SMELTING CO. **NEVADA**

Dead.

Company originally owned 21 or more patented claims in the Bristol mining district, Pioche, Lincoln Co., Nev. In 1911 practically all this property was transferred to the Day Bristol Cons. Mines Co. In 1914 the latter company went into receivers' hands and the property passed to the Cons. California-Nevada Co., which company was succeeded in 1915 by the Uvada Copper Co. In 1918 the Day mine was leased to the Black Metal Mines, Inc., which see.

BROKEN HILLS MINING CO. **NEVADA**

Jas. Stratford and Jos. H. Arthur, owners. Property in Broken Hills district, S. E. of Fairview, Churchill county, 70 miles from rail.

Ore is silver sulphide in a 4′ vein with streaks of high-grade ore, carrying small gold and lead values.

Development: by 150′ shaft, all in ore, with drifts on the 50, 100, and 150′ levels.

Under development by owners since 1913, and reported to have shipped about $30,000 worth of ore to Hazen sampler. Small force employed.

BROOKLYN MINING CO. **NEVADA**

Address: E. S. Shields, sec.-treas., 125 W. Broadway, Butte, Mont. Mine near Contact, Elko county, Nev. S. V. Kemper, pres.; W. A. Kemper, v. p.

Inc. 1898, in Montana. **Cap.**, $500,000; shares $1 par; 213,000 shares issued.

Property: 7 claims, 75 acres in the Contact district, with ore deposits occurring on the contact between limestone and porphyry. This ore belt is about 18′ wide, runs E.-W. for several thousand feet, dips at 75° and is said to contain 8% copper with about 2 oz. silver and $1 gold per ton.

Development: by 196′ shaft with 600′ of workings, said to have developed 2,000 tons of ore. Idle for several years, awaiting the advent of railway, which is 40 miles away. Equipped with 25 h. p. boiler, 15 h. p. gasoline engine and hoist.

BUCKHORN MINES CO. **NEVADA**

Buckhorn, Nev. Property shut down permanently, Feb., 1916. Plant dismantled. **Address:** George Wingfield, owner Reno, Nev.

BUCKHORN SYNDICATE **NEVADA**

Address: E. B. Bronson, 111 Broadway, N. Y. City.

Property: a group of claims, 30 miles north of the Tonopah-Ely stage road. Shows ruby-silver ore in a deposit in porphyry. Developed to depth of 150′ by tunnel and winze. Claims have abundant water and pine timber, and are about 2 miles west of the Stone Cabin Valley.

BUCKSKIN NATIONAL GOLD MINING CO. **NEVADA**

Address: W. J. Bell, National, Humboldt county, Nev.

Property: at the S. end of the National gold district, under development in 1919.

BUFFALO VALLEY MINES CO. **NEVADA**

Address: Lovelock, Nev. John T. Reid, mgr.; O. P. Richards, supt., Volney, Nev.

Inc. Jan. 7, 1916, in Arizona. **Cap.**, $500,000; shares $1 par; 225,000 shares outstanding.

Property: 25 claims, 500 acres, about 18 miles S. of Volney. Ore occurs in a quartz vein in limestone; is 1 to 25′ wide with N. S. course, and dip 35° W. Pay-ore occurs in shoots 100′ long and said to average $7.75 in gold.

Development: by 300′ shaft, reported to prove ore reserves of 25,000 tons.

Idle since 1917. Management plans resumption of operations as soon as normal working conditions prevail.

BULLION MINING CO. **NEVADA**

Address: Goodsprings, Nev. **Gen. office:** 61 S. Main St., Salt Lake City, Utah.

Officers: F. L. Copening, pres.; R. P. Morris, v. p.; A. O. Jacobson, mgr., with H. W. Pingree and Willard Scowcroft, directors. M. C. Morris, sec.

Stock assessable. Four 1-cent assessments levied in 1918.

Property: at Goodsprings, Clark county, 8 miles from rail.

Ore: occurs in ledges between white and blue lime on bedding plane, carrying lead and zinc, and about 10 oz. silver to the ton.

The mill was closed down September, 1917, and no ore shipments made, only development work being done; 8 men employed. Late in 1919 there was a change of control, and operations were to start at once.

BULLSHEAD MINING & SMELTING CO. **NEVADA**

Address: 221 I. O. O. F. Bldg., Reno, Nev., or P. O. Box 67, Wells, Nev.

Officers and directors: C. E. Mack, pres; Mrs. M. M. Johnson, v. p.-treas.; L. E. Johnson, sec.; Herman Davis, mgr., Clover City, Nev.

Inc. Nov. 29, 1918, in Nevada. **Cap.,** $10,000; 1c par; assessable; 613,675 issued.

Property: the Bullshead mines, 10 claims, 4 patented, in Spruce Mtn. mining district, Elko county, 16 miles from W. P. Ry., said to show lead-silver ore in fissure vein in carboniferous limestone cut by igneous rocks. Ores assay 4.8% lead and 28.4 oz. silver. Waste dump samples average 3.1% lead, 15.5 oz. silver per ton.

Development: by 1,900′ Scorpion tunnel No. 2 and 4,200′ of workings. Reserves were estimated Oct., 1919, at 10,000 tons, worth $600,000.

Equipment: complete; a 50-ton smelter commenced operations in Nov., 1919, using a fuel consisting of 60% mountain mahogany and 40% of coke. The first campaign produced thirty-two 100-lb. pigs of lead-silver bullion, each 8-hour shift.

Appears to be a meritorious promotion according to report of Herman Davis.

BURLINGTON-NEVADA COPPER CO. **NEVADA**

Idle. Property at Mason Pass, a few miles from Yerington, is developed by a 100′ shaft, from which ore was shipped to the Mason Valley smelter.

BUTTE & YERINGTON COPPER CO. **NEVADA**

Office: care W. E. Wright, sec.-treas., 410 Phoenix Bldg., Butte, Mont. Mine at Yerington, Lyon county, Nev.

Officers: at last accounts, were W. C. Siderfin, pres.; preceding with Dr. Thos. B. Moore, Dr. Donald Campbell, John D. Pope, and Wm. Mitchell, directors; L. W. Trankle, supt.

Inc. Jan. 29, 1907, in Montana. **Cap.,** $1,000,000; shares $1 par; fully paid; issued, $351,520. Annual meeting, third Wednesday in January.

Property: 2 groups of patented claims, one of 14 claims, about 4 miles east of and across the valley from Yerington and south of the Copper Mountain mine. The land has attractive surface showings, but is without deep development work.

The second group of 9 claims, is in the heart of the camp adjoining the Mason Valley mine and the Yerington Malachite Co.'s ground. This property is well located and has attractive showings of ore in the tunnels and on the surface outcrops. It has been idle since 1914.

CACTUS CONSOLIDATED SILVER MINES CO. **NEVADA**

Address: J. B. Kendall, Goldfield, Nev.

Inc. Dec., 1919.

Property: the Cactus View claims adjoining the Cactus Nevada on the N. W. corner. Surface exposures are said to show ore assaying from $10 to $900 per ton. Work was to be started early in 1920.

CACTUS NEVADA SILVER MINES CO. **NEVADA**

Controlled by Jos. B. Nenzel, Rochester, Nev. John R. Magill, gen. supt.; Sol Camp, mine supt.

Officers: Jos. B. Nenzel, pres.; F. M. Phelps, v. p.; with J. A. Mackenzie, William Koenig, and E. O. Lindblom, directors.

Inc. 1919.

Property: Bailey group of 7 claims, discovered in 1904, in Cactus min-

ing district, Nye county, 24 miles east of Goldfield and 29 miles southeast of Tonopah. Ore occurs in contact deposit of rhyolite and andesite, with the silver in sulphide form. Several shallow shafts sunk by former owner show an orebody 2,000′ long and from 2½ to 6′ wide, said to average $25 per ton mainly in silver, but with a little gold.

Development: by 150′ shaft to be deepened to 500′; management also plans 3,000′ of lateral work.

In November, 1919, it was announced that an Eastern syndicate, headed by Joseph Fynney and Albert H. Cutter of 149 Tremont Street, Boston, had arranged to put up $280,000 for development and equipment of the property. It was stated that sufficient work has been done to ensure a production of over $2.000,000 in precious metals for each 100′ of depth gained, which is "going some" for a prospect.

CALAVADA COPPER CO. **NEVADA**

Suite 926, No. 111 Broadway, New York. Mine near Luning, Mineral Co., Nevada.

Officers: E. B. Bronson, pres.; B. E. Page, Los Angeles, Calif., v. p.; F. C. Hart, sec.-treas.; H. A. Geisendorfer, Luning, Nev., mgr., with H. Richardson, Boston; C. J. Bender, Philadelphia; and W. D. Kent, directors.

Inc. 1913, in Delaware. **Cap.**, $2,500,000; $5 par; 35,000 shares held in treasury. Security Transfer & Registrar Co., New York, transfer agent.

Financial statement of March 1, 1917, showed mine development, $114,435; mine equipment, $16,421; development fund, $90,000; accounts receivable and cash, $12,254; current mine accounts, $7,000; profit and loss were given as $16,234. Up to March, 1919, $364,044 had been spent on property.

Property: Copper Mountain group, 24 patented and 10 unpatented claims, 500 acres, in Sante Fe mining district, 8 miles E. of Luning, Mineral county, Nev., on the So. P. R. R., and the Darwin Unit, 9 patented claims, 180 acres at Darwin, Inyo county, Calif. This group is not being developed at present.

Geology: copper occurs as oxide and carbonate in vein, 40′ to 150′ wide, with sulphides at depth, in contact deposit between granite and limestone. Considerable oxidized ore has been developed between the 700′ and 1,000′ levels which is sufficiently high-grade to mine and ship at a profit under normal conditions. Ten carloads from development work were shipped to the Tooele smelter in Utah, which ran from 6 to 10½% copper with small amounts in gold and silver.

Development: 1,000′ shaft, Copper Mtn., 100′ Cyclone shaft and prospect tunnels. Underground workings total 4,000′. Since February, 1915, 4,900′ of work was done, including 300′ of shaft sinking from the 700′ down; crosscutting and drifting on the 700′ and 1,000′ levels, and a winze sunk 400′ below the 1,000′ level. No large body of commercial ore was found.

Equipment: 60 h. p. hoist, air-compressor, mine and office buildings. Plan deepening the main shaft. Temporarily closed down.

CANDELARIA MINES CO. **NEVADA**

Main office: 43 Exchange Place, New York; Reno, Nev.; Candelaria, Nevada.

Officers: William H. Barnard, pres.; Chas. D. Kaeding, v. p.-mgr.; W. H. Campbell, sec.-treas., with J. T. Mann and R. C. Wariner, directors. T. D. MacNamara, supt.

Inc. Jan., 1918, in Nevada. **Cap.**, $3,000,000; par $1; issued 2,625,000. Stock listed on Boston Curb and traded in on New York Curb.

Property: about 395 acres in the Candelaria district, Mineral county, on a branch of the Southern Pacific R. R., 20 miles long connecting at Mina with the Tonopah & Goldfield R. R. The company owns outright the Lucky Hill group, Blanch claim and H. & G. millsite of 85 acres, the Lake and Doris Lode mining claims. Also owns under lease and bond the Mt. Diablo group, 115 acres, the Argentum group, 72 acres and the Esmeralda Water & Milling Co., which latter supplies the camp with water from the White mountains by a pipe line, 27 miles in length. Workings total over 60 miles.

Geology: a pre-Cambrian complex, consisting of schists and various

granite-porphyry intrusions, ranging from quartz-diorite to true granite, is overlain by a thick series of Paleozoic beds. These rocks are extensively intruded by dikes and masses of granite porphyry. The vein system is extensive and well defined with outcrops traceable for thousands of feet on the surface, and underground workings proving continuity downward, and large size of oreshoots.

Development: the Lucky Hill mine is partly developed by a crosscut tunnel 350′ long intersecting two veins, whose width is stated to vary from 8′ to 40′, and by a shaft 300′ deep, showing good milling ore to a depth of 60′ below the tunnel level, at which point vein dips out of shaft. Old workings contain much milling ore of fair grade, estimated at 100,000 tons of 15 oz. ore. During 14 months in 1917-18, shipped 6,000 tons unsorted ore averaging 22 oz. silver per ton.

The Argentum mine has been developed to a depth of 1,460′, and from 1878 to 1893 is said to have produced 300,000 tons of $50 silver ore from a continuous ore shoot. The Mt. Diablo is developed to a depth of 1,000′. Ore: the principal value is in silver, occurring as chlorides and bromides with about $1 gold per ton. Recent developments on the 200′ level on the Baldwin vein at the Lucky Hill mine have opened a shoot of shipping ore 4′ to 11′ wide and 100′ long.

Reserves: the company's engineers estimate reserves, including ore in place, fills and dumps as follows:

Lucky Hill, 157,000 tons, average 15 oz.; Argentum, 381,000 tons, average 14 oz.; Mt. Diablo, 478,920 tons, average 15 oz.

Equipment: Lucky Hill mine is equipped with compressor plant, machine-drills, motor-trucks, and 40-stamp mill to be enlarged to 500 tons daily.

Production: prior to August, 1918, the Argentum and Diablo are estimated to have produced 445,000 tons of high-grade ore, and the Lucky Hill, 9,000 tons shipping ore. Since August, 1918, the Lucky Hill mine has maintained weekly shipments of 50 tons of ore averaging 20 to 40 oz.

In July, 1919, the mine was reported undergoing a thorough examination, previous to the formulation of plans for future development work and installation of equipment. In December, about $550,000 had been secured from sale of treasury shares, and machinery had been installed.

CARRARA MINING, MILLING & LEASING SYNDICATE NEVADA

Dead. Fully described in Vol. XIII.

CARRIE SILVER-LEAD MINES CORPORATION NEVADA

Address: C. R. Murdock, First National Bank Bldg., Tonopah, Nev.

Officers: W. W. Travis, pres.; L. A. Rose, v. p.; C. R. Murdock, sec.-cons. eng.

Inc. in Nevada. **Cap.**, $100,000; 10c par. Listed on Salt Lake and San Francisco Exchanges, and New York Curb.

Property: 5 claims, 10 miles N. W. of Millers and 8 miles from the T. & G. railway. Mine is an old one (1897). An incline shaft has been sunk to 230′, and drifting reported under way in good ore. Assays returned up to 293 oz. silver, 16% lead, 10% copper, and $8 gold.

Equipment: 40-h. p. engine, hoist, compressor, etc.

CARSON FREE GOLD MINING & MILLING CO. NEVADA

Address: E. E. Roberts, Carson, Nev.

Officers: E. E. Roberts, pres.; B. A. Boucher, v. p.; E. M. Perry, sec.; with Theo. Peterson and R. G. Affleck, directors.

Property: the Lucky Strike gold claims in Muldoon canyon, 1½ miles W. of Carson, Ormsby county. A shaft 80′ deep in July, 1919, showed 18″ of rich ore; development work is in progress.

CHARLESTON HILL GOLD MINING CO. NEVADA

Address: J. P. Clough, National, Nev.

Property: of this company was operated under lease by the Charleston Hill National Mng. Co. in 1914, and under bond and lease in 1917, by the National Leasing Co (q. v.), a George Graham Rice promotion, which came to grief in 1918. In October, 1919, a shipment of 5 tons sent to Selby, averaged $993.30 per ton. On dumps were 130 tons of $70 ore.

CHARLESTON MINING CO. **NEVADA**

Address: Goodsprings, Nev.

Inc. August, 1917. One-half of the issued stock is owned by the Yellow Pine Mining Co.

Property: 9 claims, 36 miles from Las Vegas, said to show a 3′ vein of lead-zinc ore. Developed by shallow shafts, and worked under lease by Jas. McCoy on a 20% royalty basis, 1918-19

CHEROKEE CONSOLIDATED COPPER CO. **NEVADA**

Officers: D. W. Jeffs, pres.; W. P. Silver, v. p.; R. T. Thurber, sec.-treas., with M. E. King and R. A. Brown, directors, all of Salt Lake City.

Inc. July, 1917.

Property: four patented claims and a millsite in Lincoln county, Nev., 30 miles south of Caliente and six miles east of Leight Station on the Salt Lake Route.

Development: three shafts, 150, 90 and 250′ in depth.

CHERRY CREEK SILVER MINING CO. **NEVADA**

Former office: Hooper Bldg., Salt Lake City, Utah. J. H. Moyle, pres.; O. W. Moyle, treas., at last accounts.

Property: Mary Ann silver mine at Cherry Creek, White Pine county, under lease and bond to the Exploration Syndicate No. 2, which see.

CHICAGO-NEVADA TUNGSTEN CO. **NEVADA**

Address: care H. M. Byllesby & Co., 208 La Salle St., Chicago, Ill.

Property: the Ragged Top and Besson group, 11 miles from Toulon, Pershing county, a station on the S. P. R. R., shows tungsten deposits. Ore will be treated in a mill planned to be put up at Toulon on the shore of Humboldt sink.

Production: 550 tons in May and June, 1916. The mill handled custom ores. No recent information.

CHOLLAR GOLD & SILVER MINING CO. **NEVADA**

Address: 339 Bush St., San Francisco, Calif.

Inc. Nov., 1904 in California. **Cap.,** $1,120,000; $10 par. Stock listed on New York Curb, but inactive.

Property: on the Comstock Lode, Virginia City, Storey county, leased in 1919 to the Comstock Leasing Co., which see.

CHURCHILL MILLING CO. **NEVADA**

Dissolved October, 1917. Plant taken over by Nevada Wonder Mining Co. Suspended operations in December, 1919.

COLORADO-NEVADA MINING & MILLING CO. **NEVADA**

Defunct. Fully described in Vol. XIII.

COMBINED METALS, INC. **NEVADA**

Office: 516 Felt Bldg., Salt Lake City, Utah. **Mine office:** Pioche, Nev.

Officers: Chas. Read, pres.; E. H. Snyder, v. p.-mgr.; J. C. Jensen, sec.-treas., with W. F. Snyder and Frank Nichols, directors. R. T. Godbe, supt.

Inc. in Nevada. **Cap.,** $50,000; 5c par; assessable; 800,000 issued.

Property: the Panaca group of the Amalgamated Pioche Mines & Sm. Corp. (q. v.), 6 claims, 110 acres, at Pioche, Lincoln county, held under lease. **Ore:** occurs in veins and as a bedded deposit in limestone, averaging 27x90x525′.

Development: by about 4,000′ of drifts, crosscuts and raises. Reserves are estimated at 250,000 tons of refractory ore, assaying 0.04 oz. gold, 8.2 oz. silver, 8% lead, 18% zinc, 14.0% iron. This ore cannot be profitably marketed at smelters, and the management plans erecting its own plant in 1920.

Equipment: includes 200-h. p. steam hoist, 700 cu. ft. compressor.

Operations were begun in 1916. Shipments of 7,400 tons up to July, 1919, gave smelter returns of $144,000. Shipping 500 tons per month in 1919.

COMMERCIAL MINES AND MILLING CO. **NEVADA**

M. T. Kane, Manhattan, Nye county, Nev. Operates under lease the Stray Dog, Indian Camp, Crescent and Riley fractions, also the Eagle mill of 20 stamps and a pebble mill.

COMO CONSOLIDATED MINES CO. NEVADA

Address: Como, via Dayton, Nev.

Officers: S. F. Taylor, pres.; Gurney Gordon, v. p.-mgr.; W. R. Grant, Sec.; J. W. Davey, asst. sec.-treas., with H. G. Humphrey, directors. Chas. Le Kamp, gen. supt.

Inc. October, 1916, in Nevada. **Cap.**, $1,500,000; $1 par; issued 1,000,000. Listed on San Francisco Exchange. U. S. Corp. Co., transfer agents and registrar. Annual meeting, October 1.

Property: 260 acres at Como in the Silver City-Palmyra district of Lyon county, 12 miles S. E. of Dayton and 14 miles S. W. of Virginia City.

Geology: ore is mixed oxide and sulphide, carrying gold and silver in a quartz vein in andesite. The quartz is hard, and contains calcite in small amounts.

Development: by incline and vertical shafts to a depth of 350′; also a tunnel 4,000′ long. A rich shoot was opened in Oct., 1919, on 100′ level of the Lucky Sunday claim. A new tunnel to open mine at depth of 600′ is to be driven.

Equipment: complete for mining, and a 100-ton cyanide mill (described in Min. and Sci. Press of Jan. 10, 1920, by F. Borzynski), employing crusher, 10 stamps, ball-mill, agitators, Oliver filter, etc. A good recovery is made at a cost of $2 per ton.

Company is producing, but no reports have been secured.

COMO GROUP MINING CO. NEVADA

Address: 20 Fordonia Bldg., Reno, Nev.

Officers: C. P. Ferrel, pres.; W. S. Schuyler, v. p.; with W. G. Edwards, sec.-treas., and J. H. Rae, and J. H. Rae, Jr., directors.

Inc. 1919, in Nevada. **Cap.**, $150,000; 10c par.

Property: 6 claims, 120 acres, four adjoining Como Cons. on the east, in Washoe county. A strong vein traverses three of the claims for 4,500′ and a large quantity of ore is said to be opened.

COMSTOCK FRACTURE MINES CO. NEVADA

Incorporated December, 1919, in Nevada, by C. A. Garrett, T. B. Gordon, Gurney Gordon, F. M. Kleppe, and O. R. Vaughn. Cap., $75,000; 20c. par.

No information has been received as to property.

COMSTOCK LEASING CO. NEVADA

Address: Virginia City, Nev. H. B. Bulmer, mgr.

Property: 2 patented claims on the Comstock Lode, at Virginia City, Storey county, held under lease from the Potosi Gold & Silver Mng. Co., and the Chollar Gold & Silver Mng. Co., both old and inactive companies.

Ore: occurs in fissure vein with diorite foot and andesite hanging wall; veins run N. E.-S. W. and contain gold-silver ores.

Development: by 2,000′ tunnel to depth of 400′.

Equipment: includes electric hoist, 100-ton cyanide mill.

COMSTOCK-PHOENIX MINING CO. NEVADA

Office: Provo, Utah. Mine at Six Mile Canyon, Virginia, City, Nev.

Officers: Jesse Knight, pres.; Geo. H. Drysdale, v. p.-mgr.; with Knight Starr Jordan, J. Wm. Knight, and F. M. Manson, directors. W. L. Mangum, sec.-treas.

Inc. 1909. **Cap.**, $1,000,000; $1 par; all outstanding.

Property: 3 patented claims in the Silver Star district, 2 miles from railroad, on what is believed to be a cross fissure, about 1 mile from the Comstock lode. The main vein has a N. E.-S. W. course. Several distinct ore-shoots have been encountered that vary from 1 to 8′ in width, and assay up to 50 oz. silver, with some gold.

Development: by 800′ shaft, tunnel and raises. A drift was being extended westward on the 800′ level in 1919, in the direction of the Comstock.

Equipment: electric hoist, compressor, tram and buildings.

Production: shipments from 1909 to 1914 amounted to $400,000, with net returns of $250,000. Old company paid dividends of $102,516. Present com-

pany, which is a reorganization in January, 1917, of the old company, has not issued any reports.

Small shipments being made by the company and by lessees operating in old stopes.

COMSTOCK SUPERIOR MNG. CO. **NEVADA**

Address: 446 Gazette Bldg., Reno, Nev.

Officers and directors: G. S. Clack, pres.-mgr.; LeRoy Keene, v. p.; O. U. Pryce, sec.-treas.

Inc. June 12, 1919. **Cap.,** $200,000; 10c par; assessable; 200,000 issued. Annual meeting, July 1.

Property: 6 claims, 110 acres, 7 miles S. W. of Virginia City, Storey county, said to show a contact deposit between granite and limestone schist, averaging $5 gold, 2% copper, and 50 oz. silver. Four feet of $23 silver has been opened.

Development: by 100′ tunnel and 70′ shaft. A 600′ tunnel is being driven.

Equipment: electric power, 75-h. p. compressor, etc.

Production will start in 1920.

COMSTOCK TUNNEL CO. **NEVADA**

Address: Emanuel Trotta, sec., 25 Broad St., New York, N. Y., and Sutro, Nev.

Cap., $4,000,000; shares $2 par; $2,769,000 bond issue outstanding, on which no interest has been paid since 1892. Stock was traded on N. Y. Exchange in June, 1915, at 8 to 20c. per share. Company is controlled through stock ownership by the Leonard family.

Property: 7½ miles of tunnel, draining the Comstock mines to depth of 2,700′. Income of company has been reduced from time to time owing to inactivity of many mines on the Comstock lode, who pay 4% royalty on all ore extracted to the Comstock Tunnel Co. for drainage and ventilation.

On Sept. 23, 1919, the Protective committee announced that if 80% of the bonds were deposited with the Security Transfer & Registrar Co. of 66 Broadway, New York, as trustee, the mortgage would be extended for 10 years, and bonds stamped accordingly. This avoids selling the property under terms of the mortgage.

CONGRESS COPPER CO. **NEVADA**

Address: Rumble & Co., 50 Congress St., Boston, Mass. Purchased the Electrolytic and Neversweat mines at Luning, Esmeralda county, in 1917. Both properties are developed and have produced shipping ore. Neversweat mines described in Vol. XIII.

CONSOLIDATED CALIFORNIA-NEVADA MINING CO. **NEVADA**

Office: 40 Cedar St., New York; and Pioche, Nev. Company is in receivers' hands.

Inc. 1915, to take over the Day Bristol properties, bought in by bondholders' committee at sheriff's sale in 1915. Company started work at Gypsy mine with 50 men, and shipped 800 tons copper-silver ore in November, 1915, deepening Gypsy shaft ,and installing engine, hoist and compressor at Hillside and Tempest shafts. Company had 8,300′ rope tramway in operation.

In Feb., 1916, owing to inability to ship ore already mined and to secure funds from sale thereof, mines closed down and company went into receivers' hands.

In 1916 the Uvada Copper Co. was organized to take over the Day group, but never started operations. The mine was transferred to the Black Metals Mines, Inc., under a lease and bond agreement in 1918, and daily shipments are reported as being made.

CONSOLIDATED CORTEZ SILVER MINES CO. **NEVADA**

Offices: 2 Rector St., New York City, Russ Bldg., San Francisco, and Cortez, Eureka county, Nev.

Officers: F. M. Manson, pres.-treas.; F. C. Hunter, sec.

Inc. 1919, in Nevada. **Cap.,** $2,000,000; $1 par; 1,500,000 outstanding, March, 1920.

Property: the Cortez group at Cortez, Nevada, in Eureka and Lander counties. The group consists of 49 claims, 38 patented, 790 acres. Company also owns water-rights and millsites all formerly owned by the Tenabo Milling and Mining Co. It includes the old Garrison, Mt. Tenabo, St. Louis, Fitzgerald and Arctic mines, which have yielded over 7,400,000 oz. of silver and $500,000 gold from 125,000 tons of ore, since 1864. Milling was stopped in 1892 and all operations in 1895. Lessees extracted the remaining rich ore during 1901 to 1916.

Geology: the orebodies occur as irregularly sinuous replacements of uptilted limestone, overlaid by massive beds of quartzite, whose outcrop forms cliffs along the mountainside. A porphyry dike deflects one orebody. See description and illustrations by Emmons, U. S. Geol. S. Bull. 408, p. 103.

Development: by 4,000′ Garrison main tunnel, attaining a vertical depth of 800′, with 7 levels and a total of 15 miles of workings.

Reserves: estimated at 68,000 tons of 17 oz. ore on dumps and in a few blocks underground; also 120,000 tons of tailings, carrying 7 to 10 oz. silver.

Equipment: includes an old mining and milling plant, and dwellings, shops, etc.

Management is unusually competent, Mr. Manson being head of the Western Ore Purchasing Co., and chairman of the Rochester Nevada Silver Mines Co. The re-working of old stope-filling and the exploration of 1,400′ of virgin ground below the old workings offer excellent speculative possibilities.

CONSOLIDATED MAYFLOWER MINES CO. NEVADA

A reorganization of the Mayflower Bullfrog Consolidated Mng. Co., effected 1917.

Address: 701 Storey Blk., Los Angeles, Calif. **Mine office:** Pioneer, Nevada.

Officers: Jos. B. Kendall, pres.-mgr.; John H. Miller, v. p.-sec.-treas.; with Frank M. Manson, P. H. O'Neill and Wm. J. Tobin, directors.

Cap., $250,000; shares 10c par; assessable; 1,964,371 shares outstanding. Four assessments, 1c. per share, levied April and October, 1918, and Oct. and Dec., 1919. Listed on New York Curb and San Francisco Exchange. U. S. Corporation Co., New York, registrar.

Property: 11 patented claims, 200 acres, in Bullfrog district, Pioneer, Nye county. Oxidized and free-milling ore occurs in veins with N.-S. strike and dip of about 20° E., carrying mainly gold with a little silver and copper. The vein is 4′ wide, and assays said to average $8 to $12 per ton. Examined by J. B. Kendall and R. C. Cameron.

Development: about 3,000′ of workings, including 1,925′ in 1919. At the 530′ Mayflower shaft work was in progress on the 200, 300, and 500′ levels in 1919, exposing 8′ of commercial ore. Reserves estimated in Nov., 1919, as 80,000 tons of $10 ore.

Equipment: 4,000′ water pipe-line, hoist, compressor, and 100-ton mill consisting of 15 stamps, ball-mill, amalgamating plates, concentrator, and cyanide mill. Test runs gave a recovery of 80%.

Production: in 1918, under previous management, 10,000 tons averaging $14 per ton from the 200 and 300 levels. Shipments are sent to the Mammoth smelter at Kennett, Calif.

CONSOLIDATED NEVADA-UTAH CORPORATION NEVADA

Office: 63 William St., New York. Mine at Pioche, Lincoln county, Nev., and Frisco, Beaver county, Utah.

Officers: Chas. H. Clarkson, pres.; Wm. B. Randall, treas.; Wm. F. Roberts, sec.; Jos. W. Kay, F. A. Dillingham, W. J. Palmer, directors. H. R. Van Wagenen, supt.

Inc. 1913, in Virginia. **Cap.,** $6,000,000, shares $3 par; issued $3,936,396; in treasury, $1,163,604; reserved for bond conversion, $900,000; authorized bond issue $90,000, 1st mtge., 6%; issued, $499,867. Company without funds, and was unable to meet interest on outstanding bonds, May, 1919. Property closed

down since 1918. Shares listed on New York Curb. At public auction in New York, on Dec. 10, 1919, 1,200 shares were sold at $60 the lot, and $1,400 bonds for $55 the lot.

Company is a reorganization of the Nevada-Utah Mines & Smelters Corporation, which went into bankruptcy in 1912, and whose holdings were sold under judgment proceedings for $100,000 to the new company. Stockholders in the old company who subscribed 50 cts. in cash for each share held, and deposited their old stock, received bonds for the cash paid by them and 200 shares of stock in the new company for each $100 subscribed.

Property: 3 groups of mines, owned through control of subsidiary companies; the Pioche group at Pioche, including several productive mines that are largely developed; the Imperial group at Frisco, including the Comet mine and the Last Chance at Bingham, Utah.

The Amalgamated Pioche Mines & Smelters Corp., organized to operate the properties of the Cons. Nevada-Utah has been inactive since 1917. Part of the holdings are leased to Uvada Copper Co. and sub-leased to the Black Metals, Inc., and the Combined Metals, Inc., which see.

Fully described in Vol. XIII.

CONSOLIDATED SILVERS, INC. **NEVADA**

Company has an option on share control of the Arizona Silver and Silver Reef companies, which see; it is the prospective merger of these two. Company in turn will, it is said, be merged with Universal Silvers Co. Properties are near Unionville, Pershing county. Caveat emptor.

CONSOLIDATED SPANISH BELT SILVER MINING CO. NEVADA

Address 308 Nat'l Bank Bldg., Tonopah, Nev.

Officers: Jules V. Barndt, pres.-mgr., Nicholas Bldg., Toledo, Ohio; Henry G. Mohr, v. p.; Jay H. Maish, sec.; John V. Wilson, treas., with John A. Hoover, Frank O'Neill, John Siefert and Albert Rees Davis, directors. Robt. M. Hampton, supt.; Chas Kirchen, cons. engr.

Inc. Oct. 23, 1916, in Nevada. **Cap.,** $1,000,000; $1 par; 600,000 shares outstanding. Annual meeting, first Monday in June. Operating expenses for 1918 amounted to $45,000. A total of $150,000 is reported having been expended to date.

Property: 7 claims, 2 patented, 140 acres, formerly known as the Barcelona mine, in Spanish Belt mining district, Nye county, 7 miles from Manhattan and 50 miles N. of Tonopah.

Geology: country rock is limestone and granite. Ore occurs in fissure veins with N. E.-S. W. strike and dip of 42°. Drifting east and west from the end of the tunnel has opened several veins claimed by the management to be from 1 to 7′ wide showing copper-silver ore assaying between $30 to $35 per ton, with shoots of high-grade silver ore running from $50 to $600 per ton.

Development: 2,000′ of workings by former operators includes 1,280′ tunnel and incline shaft, which is to be extended to depth of 600′ with drifts every 100′. The old workings were cleaned out and retimbered, and the shaft was 250′ deep in October, 1919.

Equipment: gasoline hoist, compressors, drills and a 10-ton concentrating mill, installed in 1919.

Property is credited with past production of $500,000. Examined by Chas. Kirchen, June, 1919, who recommends further development.

In an attempt to raise $50,000 for further work, the president claims "Spanish Belt is undoubtedly the richest silver mine in Nevada today. We will develop and expose some of the greatest bodies of milling ore in the State of Nevada."

CONSOLIDATED VIRGINIA MINING CO. **NEVADA**

Offices: 787 Mills Bldg., San Francisco, Cal., and Virginia City, Nev.

Officers: Whitman Symmes, pres.-supt.; Frederic Vincent, v. p.; with J. H. Goldman, J. J. McDado, and Zeb Kendall, directors. A. P. Swan, sec.

Inc. Nov., 1904, in California. **Cap.,** $216,000; shares $1 par; assessable; all issued. Stock transferred at company's office in San Francisco. Listed on New York Curb and San Francisco Exchange. In July, 1919, the company was reported out of debt for the first time in 30 years.

Property: a considerable part of the California claim and the Con. Virginia claim, covering 1,310′ along the Comstock Lode at Virginia City, under same management and operated in conjunction with the Ophir Silver, Union Cons., and Mexican Gold & Silver companies, which see.

Development: under present management work on the 2,700′ and 2,900′ levels was stopped and exploration pushed on the 2,150′ and above to the 1,600′ level. Ore varies from narrow veins up to quartz 15′ in width and ranges in value from $10 to $50 per ton in gold and silver. A new shoot at 2,150′ has yielded up to $72 ore.

The ore is treated at the Mexican mill, the return amounting to about $35,000 per month. The first week in Oct., 1919, yielded 457 tons of ore worth $12,000.

CONTACT COPPER CO. **NEVADA**

Address: Hutchinson, Minn., and Contact, Elko county. Nev.

Officers: S. G. Anderson, pres.; Wm. Schultz, v. p.; Sam G. Anderson, Jr., sec.-treas., with J. A. Lindenberg and J. A. Jorgenson, directors.

Cap., $1,000,000; shares $1 par.

Property: two groups, the Lucie, 11 patented claims, and the Blue Rock, 8 patented and 5 unpatented claims, at Contact, said to show copper carbonate ore in veins.

Development: the Lucie group has a 145′ shaft, said to show ore all the way to the bottom. The Blue Rock has 2 shafts, 50′ and 30′ deep, both said to show ore. No production to date.

COPPER CANYON MINING CO. **NEVADA**

New York office: 25 Broad Street, N. Y. **Mine office:** Battle Mountain, Nevada.

Officers and directors: R. M. Atwater, Jr., mgr.; C. C. Burger, v. p.; L. E. Whicher, treas.; F. Sommer Schmidt, gen. mgr. H. Pelz, sec.

Inc. November 4, 1916, in Delaware. **Cap.,** 1,000,000 shares at $1 par value. 500,000 issued. **Transfer office:** 25 Broad St., New York; N. Y. Trust Co., 26 Broad Street, registrar. Stock listed on N. Y. Curb. Annual meeting, third Tuesday in November.

Property: (1) Copper Canyon group and (2) Copper Basin group. The first named comprises 16 patented claims of about 300 acres in Copper Canyon, Battle Mountain, Nevada. Formerly owned by the Glasgow & Western Mining Co. Purchase price was paid out of first year's production. First worked 1882.

Claims said to show 3 veins, the Virgin, Superior and Estes, varying from 10′ to 30′ in width; the first two with a N. S. course and dip of 60° to 80°, carry ore shoots of about 150′ in length. The Estes ore body found by present management is 100′ long, and 20′ wide of high grade ore. The ore is a mixed sulphide and oxide of enargite, chalcocite, chrysocolla, malachite and cuprite assaying from 5%-15% copper.

Development: by two old incline shafts, 200′ and 600′ and by a vertical shaft started in 1917. The extent of underground workings is 3,500′ with a greatest depth of 570′. Mine is worked by the fill-stope method.

Equipment: 60 h. p. gasoline hoist; 100 cu. ft. compressor, centrifugal pump, 250-h. p. distillate engine.

The Copper Basin group, 9 miles from Battle mountain, covers a rounded hilly tract of granite porphyry and altered shale, containing veins and disseminated deposits of copper ore. Development at numerous points by shafts and underground work has proven a large amount of commercial ore, whose extent is as yet unknown.

Production: April, 1916 to January 1, 1919, about 3,000,000 lb. copper.

Copper Basin is a very promising property, and the Copper Canyon worthy of further deep development.

COPPER METAL MINES CO. **NEVADA**

Idle. Mail returned from former address at Goodsprings, Nev.

Officers and directors: C. B. Stewart, pres.; Peter Clegg, v. p.; J. B. Jensen, sec.-treas., at last accounts.

Inc. Dec. 20, 1916. **Cap.,** $1,000,000; shares $1 par; 400,000 shares issued.

Property: 11 claims, 220 acres, in Ivanpah district, about 35 miles S. W. of Goodsprings, Clark county, only slightly developed and claimed to show a 3′ contact vein between granite and porphyry, assaying 6% copper and 6 oz. silver with a trace of gold.

COPPER PEAK MINING CO. **NEVADA**

Office: Goodsprings, Nev.

Officers: R. A. Andrus, pres.-treas.; W. E. Allen, v. p.-mgr.; P. H. Springer, sec., with P. S. McClanahan, directors, all of Goodsprings, Nev.

Inc. in 1916, in Nevada. **Cap.**, $1,000,000; $1 par; outstanding 520,000 shares.

Gross earnings for 1916 were $13,000 and operating expenses were about $10,000. About 150 tons of ore were shipped.

Property: 6 claims, about 120 acres, on the south and east slopes of Olcot Peak, Yellow Pine mining district, ten miles north of Goodsprings, Clark county, Nev.

Ore: is a high grade copper carbonate occurring in chambers and kidneys embedded in limestone. The highest assay of the 5 cars sorted ore shipped was 25% and the lowest was 14% copper.

Development: by 6 adits with total of 600′, the longest being 150′. Property has been worked intermittently for a number of years and efforts have been made to finance some consistent plan of development.

COPPER PRINCE MINING CO. **NEVADA**

Office: 53 City and County Bldg., Salt Lake City, Utah. W. W. Barton, sec.

Property: south of Austin, Lander county, developed by 235′ tunnel. Six assessments were levied up to July, 1918, but company gives out no report of recent operations. A prospect.

COPPER SHIELD MINING CO. **NEVADA**

Office: 45 W. Second St., St. Lake City, Utah. **Mine office:** Contact, Elko county, Nev.

Officers: Dr. C. I. Douglas, pres.; U. U. Hiskey, v. p.; C. R. Strock, sec.-treas.; H. M. Shields, mgr., and J. A. De Valley, directors.

Inc. 1907, in Nevada. **Cap.**, $1,000,000; shares $1 par; issued, 610,000. Annual meeting, second Tuesday in April.

Property: 11 claims, 200 acres, in the Salmon River district.

Development: by 4 shallow shafts, deepest 73′, and several tunnels, with a total of 646′ of workings, showing 4 veins in monzonite porphyry dikes in grano-diorite, said to carry up to 40% copper and 2 to 6 oz. silver per ton. Oregon Short Line railroad is 37 miles distant. Presumably idle.

COPPERSIDE MINE **NEVADA**

Address: Schwartz & Renaux, owners, Goodsprings, Nev. Otto F. Schwartz, mgr.

Property: 60 acres in Yellow Pine mining district, Clark county, shows a vein said to be from 1 to 8′ thick, and to average 25 to 30% copper. With only shallow workings and practically no equipment the mine is reported to have produced $17,622 worth of ore in 1917, which netted the owners $3,940 over expenses.

CORNFORTH BELLEHELEN SILVER MINE **NEVADA**

See Pacific States M. & M. Co.

COWDEN & DEEGAN MNG. CO. **NEVADA**

Address: D. C. Pomeroy, owner, Denio, Ore.

Property: 5 claims, 3 miles S. of the Oregon line, in Humboldt county, Nevada, said to show granite cut by a quartz vein 6 to 48″ wide, running $5 to $40 in gold per ton.

Development: by tunnels to depth of 500′. Estimates give 1,500 tons of ore blocked out. Plan sinking shaft 200′ and drifting.

Equipment: includes 24-ton stamp mill. Reported to have produced some high-grade ore.

CRAVEN COPPER CO. NEVADA

P. H. Craven, pres. Property near Winnemuca, Humboldt county, slightly developed, said to carry high-grade copper ore. Idle during the war, but operations to be resumed.

CROWN GOLD & SILVER MINING CO. NEVADA

Address: Room 320, Gazette Bldg., Reno, Nev.

Inc. Dec., 1919, in Nevada, by Rudolph Danmyer, C. M. Cross, E. A. Judd and V. R. Grant. **Cap.**, $150,000; 10c par.

No information available as to property.

CROWN MINES NEVADA

Address: Golconda, Nev. Owned by Jos. H. Playter, mgr., and Walter G. Urige.

Property: 15 claims, about 200 acres, 12 miles S. of Golconda, Humboldt county, said to carry a fissure vein in andesite, from 25-60′ in width. Ore occurs in shoots, 40-300′ long, said to average $8-$12 in gold and silver.

Development: by about 2,000′ of underground work, including a 700′ tunnel, which is being extended to gain further depth. Management reported ore reserves of 150,000 tons, averaging $6-$10 per ton in June, 1919.

CROWN POINT GOLD & SILVER MINING CO. NEVADA

Succeeded by Jacket-Crown Point-Belcher Mines Co., which see.

CUNAPAH MINING CO. NEVADA

Address: Montello, Nev.

Officers: P. O. Perkins pres.; S. C. Sherill, v. p.; G. W. Lynch, sec.-treas.; J. M. Bowker, mgr.

Inc. 1916, in Utah. **Cap.**, $50,000; shares, 10c par; 205,000 issued. Listed on Salt Lake Exchange.

Property: 5 unpatented claims in Lucin district, Elko county, Nev., near Utah border. Is in same hill as Salt Lake Copper & Tecoma Consol. mines and shows limestone intruded by porphyry and granite. Ore occurs in "breaks" in limestone near contact.

Development: by 250′ shaft and several tunnels, said to show a lead-silver vein in limestone. Several carloads of ore shipped to June, 1917, averaging 25% lead and 2 oz. silver per ton.

Company installed compressor, hoist and power plant, and was to sink a shaft in 1918. No recent returns.

CUPRITE COPPER CO. NEVADA

Supposedly dead. No recent returns. Described in Vol. XII.

CUPRITE SULPHUR CORPORATION NEVADA

Office: 50 East 42nd St., New York City. J. E. Bowman, pres., Greenwich, Conn.; F. S. Taggart, v. p.

Inc. 1917, in Delaware. **Cap.**, $2,000,000.

Property: a sulphur deposit near Cuprite, Nevada. Output of 100 tons per day was shipped to Coast. Retorting plant was to be installed in 1918. No recent returns.

DAHL PLACERS NEVADA

Address: Jas. Dahl, owner, Copper Canyon, via Battle Mountain, Nev.

Property: 25 claims, 1,500 acres, 700 patented, at Copper Canyon, Lander county, credited with a production from 1910 to 1919, of $485,000 in placer gold. Gross earnings in 1918 were $74,381.

Gravel occurs in small narrow channels of unknown extent.

Development: by 1,500′ tunnel and 60′ vertical shaft. The giants have a daily capacity of 200 yards.

DARKEY MINE NEVADA

Owned by W. S. Holmquist and M. W. Johnson. W. S. Elliott, mgr.; Walter Geddes, supt., at last accounts.

Property: 9 claims, 180 acres, in Elko county, about 9 miles E. of Decoy, developed by 65′ shaft, shows a blanket deposit of manganese ore, in limestone formation. Owners shipped 562 tons of ore, averaging 45% from Oct., 1916, to March, 1917.

Property leased to W. S. Elliott and W. Geddes, for 2 years from March,

1917. Installed a hoist and planned shipping 15 tons per day from Decoy on the Nevada Northern R. R.

DAVIDSON MINING CO. **NEVADA**

Pioche, Lincoln county, Nev. Holdings taken over by Prince Cons. M. & S. Co., July, 1918.

DAY BRISTOL CONSOLIDATED MINES CO. **NEVADA**

Property sold Jan., 1915, and transferred to Consolidated California-Nevada Mining Co., which, after a brief struggle, went into receivers' hands. The Day-Bristol mine then passed into the possession of the Uvada Copper Co., and in 1919, was being operated under a 2-year lease by the Black Metal Mines, Inc., which see.

DAYTON PLACER RECOVERY CORPORATION **NEVADA**

Office: E. N. Greenleaf, 609 Kearns Bldg., Salt Lake City, Utah.

Officers: G. T. Hansen, pres.; B. Binnard, v. p. and treas.; E. B. Critchlow, sec., with D. C. McIntyre, directors. G. W. Wood, cons, engr., at last accounts.

Inc. June, 1916, in Utah. **Cap.,** $500,000; $1 par; 435,000 issued.

Treated mill tailings at Dayton, Nev., and reported to be making a 90% gold, 80% silver and 50% mercury extraction.

Filed a petition in voluntary bankruptcy in March, 1919. Assets total $34,214, and liabilities, $48,760, including $3,314 for unpaid wages.

Management estimated 500,000 tons of tailings available with average assays of $1.50 gold, 3¼ oz. silver and 3 lb. mercury, or about $7 per ton. Total cost per ton estimated at $1.25.

Equipped with 150-ton all slime cyanide mill. Started operations in August, 1917.

DELAWARE MINING CO. **NEVADA**

Idle. H. H. Hunter, mgr., Lovelocks, Pershing county, Nev.

Property: 200 acres, in Seven Troughs district, near Vernon, Humboldt county, Nev. Ore occurs in veins 5-7′ wide, said to average $18-$20 per ton.

Equipment: includes the Darby mill 4½ miles from the mine. Management was planning to explore the Delaware veins at depth at last accounts.

DEMIJOHN CONSOLIDATED MINING CO. **NEVADA**

Offices: 410 Savings & Trust Co. Bldg., Salt Lake City, Utah. Mine at Pioche, Lincoln county, Nev.

Officers: Fred W. Price, pres.; J. Thomas, v. p.; W. M. McCrea, sec.-treas., with Owen A. Bailey, F. E. Parish, O. P. Soule, directors.

Cap., 1,000,000 shares; 10c par; assessable. Assessment No. 9 levied February, 1918. Listed on Salt Lake City Stock Exchange.

Property: 9 claims, 7 patented, 2 miles W. of Pioche, said to show lead-silver-gold ore. The ore is making into the lime from the hanging wall of a fissure 40′ wide and varies from 1″-2′ in thickness. A selected sample assayed 52% lead, 80 oz. silver and 0.12 oz. gold. The main vein traversing the property has a N.-S. strike and dips to the E. Mineralization, though persistent, is not in commercial quantity, save in narrow streak noted.

Development: 300′ shaft, drifts, crosscuts and winzes to the 500′ level.

Equipment: hoist, air compressor and all necessary machinery. Small shipments made in 1915. Property closed down and resumption of work indefinite.

DEXTERETTA MINES CO. **NEVADA**

Mail returned from former office, room 1007, 20 Broad St., New York, N. Y.

Officers: at last accounts, J. W. Barbrick, pres.; Chas. S. Witwer, v. p.; G. D. Avery, 2nd v. p.; Wm. R. Ruhl, treas.; V. M. Schmitz, sec., with Wm. E. Austin, directors. Prof. J. H. Weber, cons. eng. J. W. Walker, supt.

Inc. in Nevada. **Cap.,** $1,000,000; shares $1 par; U. S. Corporation Co., New York, registrars.

Property: 14 claims, 280 acres, at Cherry Creek, White Pine county, said to show a vein from 5′ to 50′ wide and traceable for about 1 mile. Management estimated average silver contents of the ores at $26.50 per ton.

Development: by 1,200′ tunnel, 100′ shaft, several drifts and open-cuts.

Equipment: includes compressor, drills, engines and several buildings. Planned installing 100-ton mill with proceeds from sale of 300,000 shares of treasury stock. No record of the materialization of these plans obtainable, and property presumably idle.

DEXTER-UNION MINES CO. NEVADA

Address: Manhattan, Nev.

Officers: S. R. Moore, pres.; H. H. Brown, v. p.; C. T. Lawrence, sec.-treas., with C. F. Wittenberg and R. Fred Brown, directors.

Inc. 1912 in South Dakota. **Cap.**, $1,000,000; shares $1 par; 800,000 shares issued.

Property: 16 patented claims, 270 acres, in Manhattan mining district. Ore contains gold and silver and is said to average $15 per ton. Lessees reported to have produced $40,000 worth of ore from the Union No. 4 claim. Idle for several years.

DOYLE MINING CO. NEVADA

Dissolved June 26, 1917. Was controlled by Atkins Kroll Co. See Vol. XIII.

DUNLAP COPPER MINE NEVADA

E. S. Chafey, lessee, Mina, Nev. Property at Mina, Mineral county, owned by Nevada Copper Co., which see.

DUPLEX MINING CO. NEVADA

Idle. **Office:** 501 P. E. Bldg., Los Angeles, Cal. **Mine office:** Searchlight, Clark county, Nev.

Officers: Geo. L. Craig, Long Beach, Cal., pres.; C. W. Ennis, v. p.; Geo. R. Colton, sec., with G. F. Colton, directors at last accounts.

Inc. May 7, 1915, in Nevada. **Cap.**, $500,000; shares $1 par. All stock issued is assessable.

Property: 7 patented claims, 101 acres, is a well-known gold mine, with veins in quartz monzonite, carrying gold-silver ores, changing to copper, lead and zinc at depth. Orebodies from 2.5 to 5′ in width.

Development: by 600′ vertical shaft, a 45° incline shaft 400′ deep, and a 74° incline shaft 300′ deep, with about 2,500′ of underground workings. Assay results from carload lots are 0.9 oz. gold, 4.9 oz. silver, 8.6% lead, 2.3% copper, 1.3% zinc. Company claims that on the lowest levels the amount of lead is diminishing and copper increasing. The first copper ore mined in commercial quantities in the Searchlight district was shipped from this mine.

DUPONT COPPER MINES CO. NEVADA

Office: N. H. Wheeler, gen. mgr., 7 E. 42nd St., New York City. **Mine address:** Dupont, P. O. Searchlight, Nev.

Officers: S. J. Kistler, pres.; Wm. D. Miller, v. p.; Chas. M. W. Keck, sec.-treas., with C. S. Clark, directors. G. B. Hartley, J. V. Priest, and W. W. Wishon, mining and consulting engineers.

Inc. Feb., 1916, in Arizona. **Cap.**, 2,500,000; $1 par; 1,500,000 issued. Security Transfer & Registrar Co., N. Y., transfer office. Metropolitan Trust Co., N. Y., registrar.

Property: the Sazarac group, formerly owned by the Gold Coin Mining Co., defunct 1907, and the Bornite group. These holdings comprise 23 claims, 8 patented, 410 acres, at Camp Dupont, 18 miles from Searchlight, Clark county, Nev.

Company also owns a stock interest in the Queen Calumet Copper Extension Mining Co. of Bisbee, Ariz.; also options on 30 mining claims, about 600 acres near the Dupont mines, a 51% stock interest in the Assets Realizing Mines Corp., California (which see), the entire mill equipment of the Hartley M. M. & Reduction Co. at Mazuma, Nev., a defunct English concern, and "the prospect of obtaining" 44 patented lode claims, developed by 5,000′ of tunnel, crosscutting and carrying more than 100 fissure veins yielding 10 to 7,000 oz. silver per ton, and estimated to contain more than two hundred millions of tons of profitable silver-lead ores.

Geology: the Sazarac or Dupont mines show mineralized dikes or veins cutting a quartz-monzonite porphyry, intrusive in a pre-Cambrian granitoid

complex, overlain by Tertiary volcanics. A basic granite is cut by great tongues of aplite and pegmatite dikes paralleling the N.-S. vein system.

Ore is a silicified quartz-porphyry with specular and spathic iron and carries copper and gold values. In the N.-S. Sazarac vein, 5′ wide, the ore is specular hematite in a silicified quartz-porphyry, the vein being 15′ wide on the 200′ level. The Bornite is an E. W. vein 5′ wide, claimed to average $15 to $20 per ton for a length of 100′ and depth of 60′. Four per cent. Hill is a stockwerk of veinlets, making a possible disseminated or porphyry orebody. Ore said to assay 10.4 oz. silver, 20.23% copper, and $6 to $300 gold per ton.

Development: by a 225′ main shaft on the Sazarac, 92 and 111′ shafts on the Bornite, and 100′ shaft on the Copper Queen claims.

Reported on by Carl Anderson, Walter M. Brown, and by W. W. Wishon in 1916.

In a recent circular, company claims to own, control, or was negotiating for, 4,800 acres in various districts and claimed that ore valued at about $14,000,000 was ready for milling; also that the future mine possibilities have a valuation in excess of $58,000,000, and mine and mill equipment is worth $600,000. This circular claims that when these properties are in full operation the company will produce $500,000 per month for many years, which is interesting if true. Is not favorably regarded.

EASTERN COPPER CO. **NEVADA**

Idle. Mail returned from former office, 805 H. W. Hellman Bldg., Los Angeles, Cal., and 32 Broadway, New York City. **Mine address:** St. Thomas, Nev.

Officers: L. H. Lathrop, pres.; J. K. Turner, v. p.; C. P. Campbell, sec.-treas.; C. R. Topping, supt., with W. F. Vidal, directors. J. K. Turner, cons. eng.

Inc. 1917, in Arizona. **Cap.,** $1,500,000; $1 par; 734,100 shares issued. Stricken from New York Curb, June, 1918. Security Transfer & Registrar Co., New York, and Registration Surety Co., S. F., transfer and registry agents, respectively.

Property: 12 claims, 240 acres, in Gold Butte mining district, Clark county, about 15 miles east of St. Thomas, the nearest railway point.

Ore: occurs in a fracture zone in limestone and carries copper in the form of chalcocite and malachite.

Report by L. J. Lathrop recommends sinking a shaft. Leases have shipped surface ore only in past, some of it reported to have carried 29% copper.

Is a prospect which needs deep development.

EASTERN PRINCE GOLD & SILVER MINING CO. **NEVADA**

Address: H. F. Earle, sec., Newhouse Bldg., Salt Lake City.

Cap., $100,000; shares 10c par. Listed on Salt Lake Exchange, and offered at a cent a share in June, 1919.

Property: 8 claims adjoining Prince Consolidated in Ely mining district, Pioche, Lincoln county, believed to have extensions of the Prince Consolidated low-grade, iron-manganese deposits, carrying a little silver, lead, zinc and gold.

EASTERN STAR MINING CO. **NEVADA**

Office: Winnemucca, Humboldt county, Nev.

Officers: E. Reinhart, pres.; Chas. F. Spilman, v. p.; L. G. Campbell, sec.-treas., with Daniel Craig and R. S. Bolam, directors.

Inc. 1911, in Nevada. **Cap.,** $1,500,000; shares $1 par; outstanding, 1,340,000.

Property: 5 claims, 70 acres, in Gold Circle mining district, Elko county, Nev., with a 4½′ gold quartz vein, in andesite.

Development: 280′ incline shaft with levels at 75′, 160′ and 240′.

Equipment: includes two 25-h. p. engines.

Examination and report by a mining engineer estimated 5,000 tons of ore in sight averaging $20 a ton. Idle.

E. & F. MINING CO. **NEVADA**

Idle. **Address:** care Walker Bros. Bank, Salt Lake City, Utah. **Mine office:** Pioche, Lincoln county, Nev.

Officers: A. C. Ellis, Sr., pres.; A. Levy, sec.; Walker Bros. Bank, treas. Arthur Murphy, mgr.

Inc. March 17, 1902, in Utah. **Cap.,** $100,000; shares 50 cts par; assessable.

Property: 12 claims, 11 patented, 240 acres, in the Bristol and Jackrabbit districts, 1½ miles from a railroad. Mine has a 450′ incline shaft and 2 tunnels, one of 350′, with several hundred feet of lateral workings.

Equipment: includes a 25-h. p. gasoline hoist and necessary mine buildings. Mine produced a little copper ore, with excess of iron, but was shut down 1907. Development work in lower tunnel resumed in 1914. Property operated under lease by Arthur Murphy in 1918, who shipped 7 tons of high-grade ore daily in September, 1919, and opened a new orebody 200′ below the tunnel level.

ELDORADO ENTERPRISE GOLD MINING CO. **NEVADA**

E. P. Jeanes, pres., Las Vegas, Nev. Company reported to have made a discovery of platinum ore on their property, 1916. No recent returns.

ELDORADO-FLAGSTAFF M. & M. CO. **NEVADA**

Address: Nelson, Nev.

Officers: C. R. Welch, pres.; Alex. Mead, v. p.; G. A. Duncan, sec.-mgr.; I. W. Bennett, treas, with Peter Anderson, Clark Moore, Duane Miner, directors.

Inc. Sept., 1917, in Nevada. **Cap.,** $500,000; $1 par; 161,000 outstanding

Property: 11 patented claims, 173 acres in Eldorado mining district, Clark county, carries gold-silver ore in a mineralized dike of monzonite-porphyry said to average 70 oz. silver.

Production: about 16,000 tons reported to have averaged $14 per ton. Idle, owing to diversion of water supply.

EL DORADO GOLD STAR MINING CO. **NEVADA**

Operating claim in Nob Hill section of El Dorado mining district. Company offered 40,672 shares for sale, August, 1917, proceeds to pay off $15,000 due on purchase, and to pay for development. No later returns.

ELKO MINING CO. **NEVADA**

H. L. Hollis, cons. engr., 1025 People's Gas Budg., Chicago, Ill.

Property: Alpha mine at Jarbidge, Elko county, contains veins of gold-silver ore in Tertiary volcanic rocks. See Bull. 497, U. S. Geol. Survey, 1912, by F. C. Schrader, for geology, etc. Property under lease with option to purchase, June, 1919.

Development: crosscut tunnel, several hundred feet long.

Equipment: 5-stamp mill.

ELKO PRINCE LEASING CO. **NEVADA**

Out of business. Operated property of the Elko Prince Mining Co (which see), and when indebtedness to J. N. V. Dorr was paid off, the mine reverted to original owners.

ELKO PRINCE MINING CO. **NEVADA**

Main office: 501 Fifth Ave., New York City. **Mine office:** Midas, Nev.

Officers: L. L. Savage, pres.; R. P. Jackson, v. p.; Henry E. Haws, sec.-treas., with J. V. N. Dorr and F. F. Sharpless, directors. L. D. Dougan, supt.

Cap., $1,150,000; $1 par; 1,108,566 shares issued.

Annual report to Jan. 1, 1919, shows: total assets, $1,376,023, and liabilities, accounts payable, $416,236; reserve for depreciation, $104,570; reserve for depletion, $137,308; surplus, $9,342, after deducting $77,599 for dividends. Income was $427,757, of which $426,206 was from mine bullion; expenditures amounted to $186,646, leaving net profit of $177,911 before deducting $97,850 for depletion reserve.

Dividends: begun October, 1917, total about 30c per share, the last of 3½ cents, being paid in Oct., 1919.

Property: 9 patented claims at Midas, Gold Circle district, Elko county.

50 miles N. E. of Golconda on the S. P. R. R. and 33 miles from Red House on the W. P. R. R. During 1915-18, the Elko Prince was equipped and operated by The Dorr Co., acting as the Elko Prince Leasing Co., and mine is still operated by the Dorrs.

Geology: the prevailing and oldest rock of the Gold Circle district is rhyolite cut by andesite. Deposits occur as fissure or replacement veins and as sheeted zones in rhyolite. The vein filling is mainly quartz and the values are in gold and silver, the gold occurring native or associated with pyrite, and the silver free or as argentite in streaks. The veins run northwesterly with a dip of from about 65° to vertical. The Prince vein developed by drifts and cross-cuts is 14-15″ wide, with a N. W.-S. E. strike, and dip from vertical to 85° N. E. Values occur as native silver and free gold. The June Bell, a parallel vein to the Elko Prince, is 30″ wide and 100′ long.

Development: by tunnels, shafts and winzes to depth of 950′. During 1918 the drifts on the 300, 600 north and south, 750 and 900′ were extended with disappointing results on the lower levels, but opening up promising oreshoots on the 300 and 600′ South, which were followed downward. In Nov., 1919, two new orebodies were opened on the 600 and 750′ levels. The north shoot is 1,500′ from the shaft, so an air locomotive is to be used for hauling cars.

Reserves: (Jan. 1, 1919) known ore, 5,308 tons, averaging $20.12; probable ore (principally blocked), 12,605 tons, averaging $16.25, and June Bell ore, 610 tons, averaging $22.10, valued at $325,098, and estimated to indicate a recovery of $152,596.

Equipment: includes complete mining plant and mill, employing 4′ Marcy mill, 5 by 14′ tube-mill, Dorr classifier and thickener, Oliver filter, 185-h. p. oil engine, 10,000′ water pipe-line, etc., the whole valued at $214,922, with daily capacity of 55 tons. Transportation from rail is by a Best tractor. Forty men are employed.

Production: in 1918, 19,570 tons of ore mined and 18,721 tons milled that averaged 0.576 oz. gold and 10.91 oz. silver. Extraction averaged 91.13% and the average price for silver received was 97.9 cents per ounce. Since Nov., 1915, the total output is $1,500,000 from 70,00 tons of ore.

An excellent description of mine and mill is given in "Trans. Am. Inst. Mng. & Met. Eng.," Vol. 60, p. 78, 1919.

ELKORO MINES CO. **NEVADA**

Subsidiary of Yukon Gold Co., which see.

Office: 120 Broadway, New York. **Mine office:** E. A. Austin, mgr., Jarbidge, Nev.

Officers: William Loeb, Jr., pres.; W E. Bennett, v. p. and sec.; O. B. Perry, gen. mgr.; Charles Earl, R. W. Straus, E. L. Newhouse, Judd Stewart, C. L. Myers and Louis Sloss, directors; Leopold Fredrick, treas.

Inc. Sept., 1916, in Delaware. **Cap.,** $1,000,000; $5 par; all issued. D. A. Crockett, 149 Broadway, New York, transfer agent; Guaranty Trust Co., of N. Y., registrar. Annual meeting, third Tuesday of January.

Property: 75 lode claims, including the Starlight, the Long Hike and O. K. groups in Jarbidge district, Elko county, Nev. In each of these groups strong fault fissures in porphyritic rhyolite show alteration, leaching and replacement in the brecciated vein material and walls. Ore consists of sugary and solid quartz, adularia and silicious rhyolite, carrying free gold, with a little silver.

Development: by 5 adit tunnels, aggregating 5,000′, giving a depth of 800′ in the Long Hike, 4 adit tunnels, aggregate length 4,000′, to depth of 700′ in the Starlight, and 2 adit tunnels, 3,000′, to depth of 400′ in the O. K. mine. Ore blocked out was estimated early in 1917 at 214,000 tons, averaging $15 per ton.

Equipment: electric hoist, 2 compressors, pumps, 2 aerial trams; also 100-ton mill employing counter-current decantation system of cyanidation in continuous operation since March, 1918.

Production: figures are not made public, but according to the U. S. Geological Survey's report for 1919, Elkoro was the largest gold producer in the State.

EMPIRE-NEVADA COPPER MINING & SMELTING CO. NEVADA

Address: Yerington, Nev. Wm. Gelder, pres.; G. B. Garrison, sec.; J. E. Gelder, supt.

Inc. in Arizona. **Cap.**, $5,000,000; shares $5 par. Property taken over by Walker River Copper Co., under a lease which provides that when the royalties paid amount to $500,000, the title will pass to the leasing company. The General Development Co. (Lewisohns) is a small stockholder in the Empire Nevada company.

Property: about 500 acres on Copper Flat in 2 groups; 1 about 1 mile W., the other 2½ miles N. W. of Yerington, Lyon county. Ore occurs in bunches and disseminated throughout a body of monzonite-porphyry, said to be opened for 3,000 in length and 1,000′ wide, carrying copper in the form of silicates, carbonates and oxides, a considerable part of it averaging 2.65% copper.

Development: by 5 shafts from 80 to 160′ in depth, several tunnels and open cuts and also by diamond drilling. Mine is said to have produced about $150,000 from surface workings. Shipped 6,000 tons of 6% ore to Mason Valley smelter, 1912, and 2,900 tons in 1914. Property has small smelting plant, assay office, hoist, boarding house, etc. The leasing company was pushing development work in 1919.

ESMERALDA COPPER & SILVER CO. NEVADA

Successor to Esmeralda Copper Co.

Address: Luning Nev., and 6 Montrose Ave., Verona, N. J.

Officers: Mayor D. H. Slayback, pres.-treas.; Jas. Calvert, v. p.-mgr.; J. W. Parker, sec., with J. W. Van Schoick, directors. L. B. Spencer, cons. engr.

Inc. 1907, in Nevada. **Cap.**, $1,200,000; par $1; non-assessable.

Property: 9 claims, 180 acres, at Luning, Mineral county, developed by shafts and crosscuts, to depth of 300′. Assays reported to average 9% copper and 4 to 5 oz. silver. Stock was offered for sale (1919) below par and on a "liberal payment plan" to furnish funds for further development.

EXCELSION MOUNTAIN COPPER CO. NEVADA

Mail returned from former office: Hawthorne, Mineral county, Nev.

Officers: at last accounts, Frank D. Qualey, pres.-gen. mgr.; J. H. Suits, sec.-treas., Lick Bldg., San Francisco; George Brodigan, W. R. Jackman, W. B. Tait, directors; Wm. Winkelman, supt.

Inc. Aug., 1907, in Arizona. **Cap.**, $1,000,000; shares $1 par. Annual meeting, June 7.

Property: Qualey mine, 13 claims, 260 acres, 16 miles S. E. of Hawthorne, in Whiskey Flat district, Mineral county, Nev., said to have surface showings of copper along a contact between granite and limestone. Has 4 shallow shafts and one 1,500′ tunnel, said to show 4% copper ore. Total workings about 3,000′ to a depth of 600′.

Equipment: includes 50-h. p. gasoline engine and 6-drill compressor. Property closed down since 1914.

EXCHEQUER LEASING & MINING CORPORATION NEVADA

Mine sold in Sept., 1919, to the Exploration Syndicate No. 2, which see.

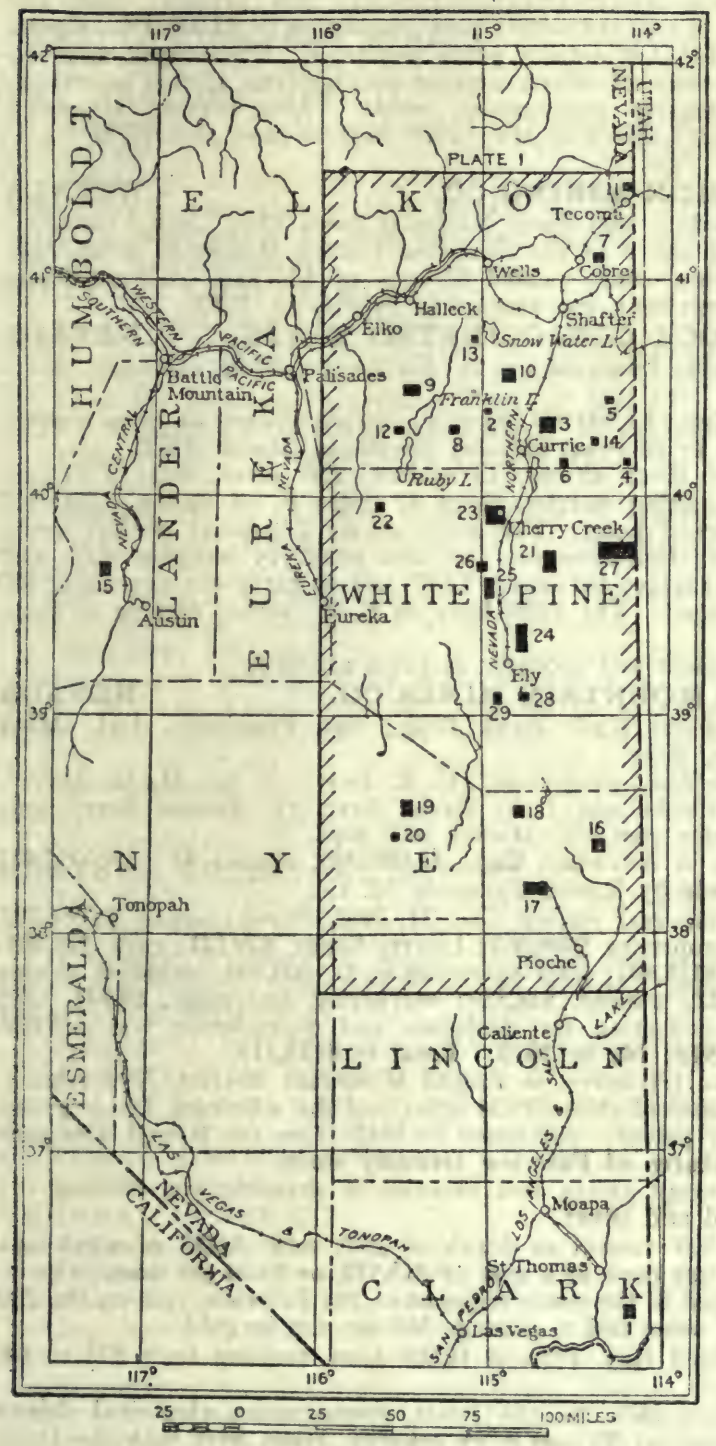
EXPLORATION SYNDICATE No. 2 NEVADA

Office: 42 Broadway, New York City. **Mine office:** Cherry Creek, Nev. J. W. Walker, mgr.

Property: (1) a lease on the Mary Ann mine at Cherry Creek, White Pine county, owned by the Cherry Creek Silver M. Co. The mine contains irregular orebodies in fissure veins in monzonite, with ore reported to assay from 35 to 100 oz. silver per ton. Also (2) the Exchequer and Imperial groups, 1 mile N. of Cherry creek, White Pine county, formerly owned by the Exchequer Leasing & Mining Corp. Ore occurs in fissure veins in quartzite, 2 to 5′ wide, with N. E.-S. W. course, reported to run 45 oz. silver and from 60c. to $3 gold per ton.

Development: at Mary Ann includes 500′ main tunnel, 400′ of stoping along the vein, and 2 winzes, 100 and 160′ deep, being deepened in 1919.

Equipment: includes 35-h. p. gas. engine, compressor, hoist, drills, etc. Reserves are reported as 7,000 tons of 24 oz. milling ore in sight.



MINING DISTRICTS

CLARK COUNTY

1. Gold Butte

ELKO COUNTY

2. Delker
3. Dolly Varden (Mizpah)
4. Ferber
5. Ferguson Spring
6. Kinsley
7. Luray
8. Mud Springs
9. Ruby Valley (Smith Creek)
10. Spruce Mountain
11. Tecoma
12. Valley View (Hankins)
13. Warm Creek
14. White Horse

LANDER COUNTY

15. Ravenswood

LINCOLN COUNTY

16. Atlanta (Silver Park)
17. Bristol (Jack Rabbit)
18. Patterson

NYE COUNTY

19. Troy (Irwin Canyon)
20. Willow Creek

WHITE PINE COUNTY

21. Aurum
    (Schellbourne
    Siegel
    Muncy Creek)
22. Bald Mountain
23. Cherry Creek (Egan Canyon)
24. Duck Creek
25. Granite (Steptoe)
26. Hunter
27. Kern
    (Antelope
    Regan
    Glenco)
28. Taylor
29. Ward

■10
Mining district
(*Number refers to list*)

MINING DISTRICTS OF EASTERN NEVADA

Production: in 1918, about 700 tons of ore shipped to the Garfield, Utah, smelter ran 30-40 oz. silver, and 85c. gold per ton.

Development: at Exchequer-Imperial includes 250′ vertical shaft and 1,200′ tunnel. The mine is credited with a past production of $3,000,000. Operations were resumed in 1913, but did not prove profitable. Encouraged undoubtedly by prevailing high price of silver, present management started operations in 1919, and plans extensive development work. Three carload shipments hauled by wagon to Cherry Creek in May, 1919, said to have assayed 60 oz. in silver.

FAIRVIEW EXTENSION MINING CO. NEVADA

Address: L. D. Gordon, 1011 First National Bank Bldg., San Francisco.

Property: 14 claims south of the Fairview Round Mountain mine, near Fairview P. O. A shallow shaft yielded 50 tons of $30 ore. A head-frame, electric hoist, 6-drill compressor, etc, erected in September, 1919.

FAIRVIEW RED ROCK CONSOLIDATED MINES NEVADA

Office: J. A. Wright, financial agent, Exchange Bldg., Denver, Colo. H. A. Riedel, pres.

Inc. in Arizona. **Cap.,** $2,500,000; $1 par. Stock offered at 5c per share cash, or 5½c. per share in 10 equal monthly payments, March, 1917.

Property: the Red Rock group, 15 claims, 230 acres, near Fairview P. O., in the Fairview mining district, about 42 miles E. of Fallon, Churchill county, the nearest railroad point. The mine shows 2 parallel contact veins, about 400′ apart, between limestone footwall and porphyry hanging wall, said to be from 2-8′ wide at surface for about 1,500′ and to carry ore averaging $30 per ton in gold-silver-copper. The veins have an E.-W. strike, dipping at about 65°.

Mine without equipment and property as yet a prospect.

FAIRVIEW ROUND MOUNTAIN MINES CO. NEVADA

Main office: 1011 First Natl. Bank Bldg., San Francisco, Cal. **Mine** office: Round Mountain, Nev.

Officers: L. D. Gordon, pres.-mgr.; C. J. Berry, v. p.; H. G. Mayer, sec.-treas., with H. R. Cooke and J. R. Davis, directors. Gibson Berry, gen. supt.; R. J. Ledwick, mine supt.; E. Michal, mill supt.

Inc. June 25, 1906, in Nevada. **Cap.,** $1,000,000; shares $1 par; 952,471 shares issued; 200,000 held by Round Mountain M. Co.

Annual report for the year ending Dec. 31, 1918, shows: assets, $1,055,792, which includes mining properties, $946,061; Liberty bonds, $19,121; cash, $75,384; income from ore sales, $178,801; total operating costs, $63,103, including mining and development, $35,822; milling, $18,539; marketing and misc., $8,741. Net operating profit, after deducting for depletion and depreciation was $69,078.

Dividends: 2c in 1918; 14c in 1919. Total is $153,715.

Property: 10 claims, 170 acres, in Round Mountain district, Nye county, includes the Fairview patented claim, 19.54 acres and the adjoining Daisy group, 40.9 acres (surveyed for patent), purchased in 1917 from the Round Mountain Mng. Co., for 200,000 shares of Fairview treasury stock.

Ore: occurs in sheeted zones and fissures in rhyolite, the milling ore averaging $21.79 in gold and silver.

Development: by 500′ tunnel to depth of 250′, with 3,000′ of workings. In 1918, 1,546′ of work was done at a cost of $13,973, or $9.04 per foot. Operations were mainly confined to the south segment of the Fairview vein on the 250′ level, reported to be 15′ wide and to average $10 per ton in gold.

Ore reserves estimated July, 1919, at 10,000 tons, running from $15 to $40 per ton.

Equipment: includes 25-h. p. gas. hoist, compressor, electrical driven 6-stamp amalgamating mill of 30 tons daily capacity, taken over with the Daisy mine.

Production: operations were resumed the latter part of 1917, and the output amounted to 1,214 tons, yielding $20,595 in bullion; in 1918, 8,807 tons, yielded $178,801, representing an extraction of 93.1% and a net recovery of

$20.30 per ton; in 1919 (5 mos.), 3,587 tons, yielded $142,953, with a total production to date of $342,350.

Mine is apparently a fair profit-maker.

FARETTA CINNABAR MINE **NEVADA**

See Quicksilver Mines Co.

FAY EXPLORATION CO. **NEVADA**

Address: F. A. Hazard, or J. C. Charles, Fay, via Pioche, Lincoln county, Nev.

Property: an old mine at Fay, 25 miles N. E. of Pioche, and near the Utah-Nevada line, that yielded $228,000 in gold. Idle for past 8 years. In 1919, the shaft was to be sunk 400′, and the old surface equipment, which cost $182,000, was dismantled.

FIFTY-SIX COPPER MINE **NEVADA**

C. T. Smith, mgr., Humboldt, Nev.

Is the first quartz mine located in Nevada, being staked out in 1856, by L. D. Vary. The mine is in the southern end of the Eugene mountains, not far from the Humboldt river and S. W. of Mill City.

FORT SCHELLBOURNE MINING & MILLING CO. **NEVADA**

Office: 521 Felt Bldg., Salt Lake City, Utah. **Mine address:** Schellbourne, Nev.

Officers: F. W. Snyder, pres.; Hugh H. Tarbet, v. p.; E. H. Snyder, sec.-treas.; with Howard Phelps and J. E. Hepworth, directors, at last accounts.

Inc. Sept. 27, 1916, in Nevada. **Cap.,** $100,000; shares 10c par; $650,000 issued; assessable. No income, save stock sales.

Property: McMahon mines, 7 claims, 140 acres, unpatented, in Schellbourne mining district, White Pine county, 8 miles from Nevada Northern R. R. (Cherry Creek Station). Lands show a fissure vein on a limestone shale contact, with 15-20′ orebody. Ore in streaks carries $1 gold and 12 oz. silver per ton, in quartz calcite gangue.

Development: by 500′ tunnel with 280′ back and 1,000′ of work. Company plans tunnel to cut ore at greater depth.

No production since 1875.

FORTUNA GRUBSTAKE MINING CO. **NEVADA**

Inc. 1917, in Nevada. **Cap.,** $500,000; shares $1 par; 125,000 shares issued; stock offered at 25c, April, 1917.

Property: in Churchill county, Nevada, said to show 12″ vein carrying lead-silver values. Developed by 350′ tunnel. **Presumably idle.**

GEM FIVE MINES CO. **NEVADA**

Address: J. B. Ratliff and G. A. Goldsworthy, lessees, Lovelocks, Nev.

Property: in the Sunshine district, 20 miles S. of Winnemucca, Pershing county, said to carry a vein of high grade gold-silver ore. Hoist, compressor, etc., installed in March, 1919, and shaft being sunk.

GENERAL GRANT MINE **NEVADA**

See Big Chief Cons. Mines Co.

GENERAL MINES CO. **NEVADA**

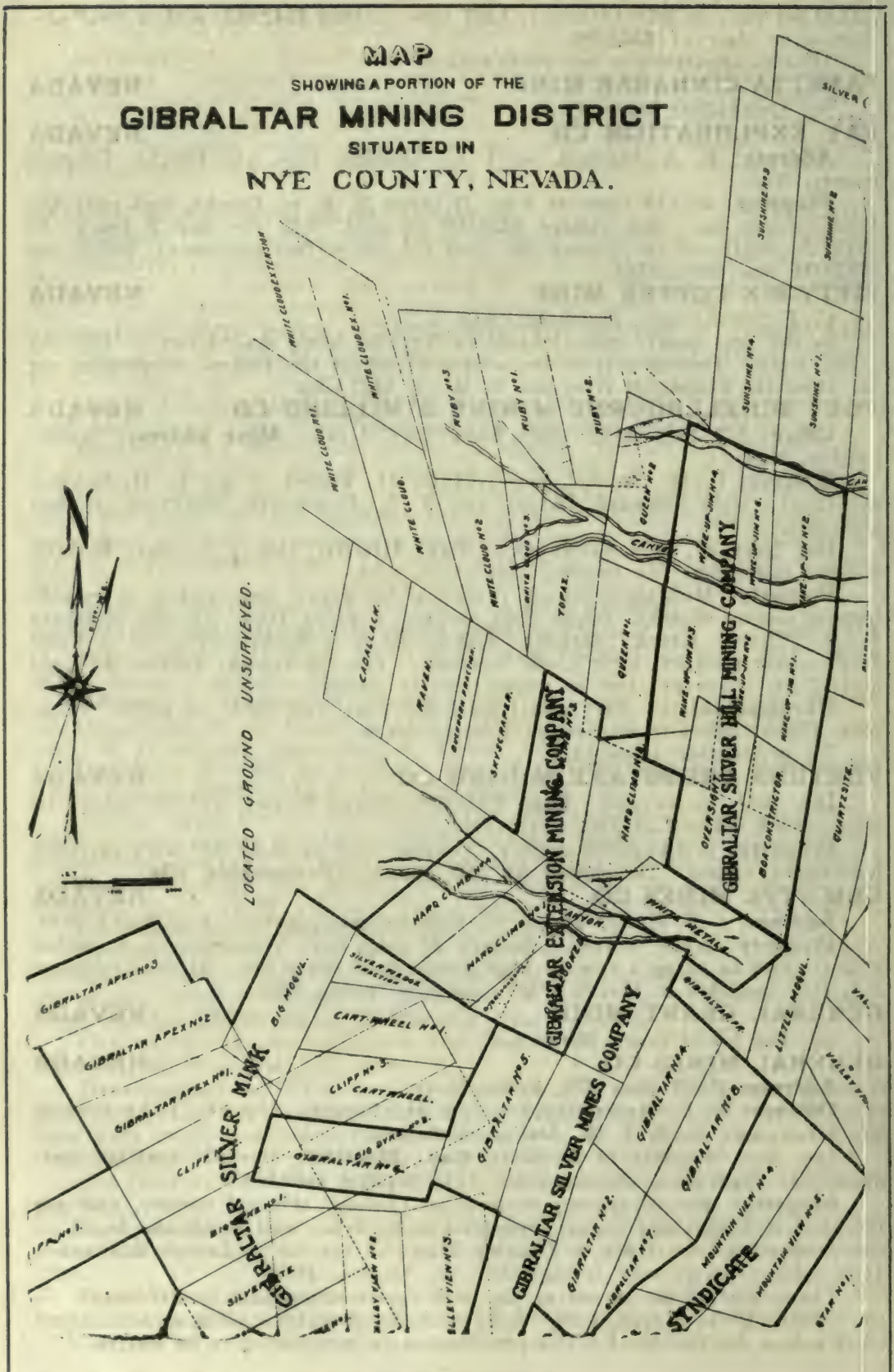
Address: P. O. Box 770, Reno, Nev.

Officers: W. G. Humphrey, pres.; J. H. Clemons, v. p.; C. T. Stevenson, sec.-treas.-mgr., with J. W. Davey, directors.

Inc. Nov. 1, 1916, in Nevada. **Cap.,** $3,000,000; par $1; 1,600,000 outstanding. Operating expenses for 1918 totaled $183,951.

Property: the Silversides mine near Luning, Mineral county, and the Octopus in Humboldt county operated under lease and bond; the bond on the property of the Buck & Charley Mng. Co. (q. v.) in Lower Rochester, Humboldt county, was relinquished in August, 1919.

Three feet of 40 oz. silver ore was reported opened at 100′ depth on the Silversides in March, 1919. A gasoline hoist was installed, and the shaft sunk below the 100′ level. The purchase price is reported to be $50,000.


MAP
SHOWING A PORTION OF THE
GIBRALTAR MINING DISTRICT
SITUATED IN
NYE COUNTY, NEVADA.
LOCATED GROUND UNSURVEYED.
GIBRALTAR SILVER MINK
GIBRALTAR EXTENSION MINING COMPANY
GIBRALTAR SILVER HILL MINING COMPANY
GIBRALTAR SILVER MINES COMPANY
SYNDICATE
WHITE CLOUD EXTENSION
WHITE CLOUD EX. No 1.
WHITE CLOUD No 1.
WHITE CLOUD.
WHITE CLOUD No 2
RUBY No 3
RUBY No 1.
RUBY No 2.
QUEEN No 2
QUEEN No 1.
CANYON
TOPAZ.
CADALLACK.
RAVEN.
BUCKHORN FRACTION.
SKYSCRAPER.
HARD CLIMB No 3
HARD CLIMB No 4
HARD CLIMB No 5
OVERSIGHT
BOA CONSTRICTOR.
QUARTZSITE.
WHITE METALS
SUNSHINE No 3
SUNSHINE No 2
SUNSHINE No 4.
SUNSHINE No 1.
SILVER
GIBRALTAR APEX No 3
GIBRALTAR APEX No 2
GIBRALTAR APEX No 1.
BIG MOGUL.
SILVER WEDGE FRACTION
CART-WHEEL No 1.
CLIFF No 3.
CART WHEEL.
BIG DYKE No 2.
GIBRALTAR No 6.
GIBRALTAR No 5.
GIBRALTAR No 4.
GIBRALTAR No 8.
GIBRALTAR No 2.
GIBRALTAR No 7.
GIBRALTAR FR.
LITTLE MOGUL.
MOUNTAIN VIEW No 4.
MOUNTAIN VIEW No 5.
SILVER SITE
VALLEY VIEW No 2.
VALLEY VIEW No 3.
N

GIBRALTER SILVER HILL MINING CO. **NEVADA**

Address: Room 724, 25 Broad St., New York City.

Officers: Col. T. J. D. Salter, pres.; O. B. Hutchings, sec.-treas.

Inc. February, 1920, in Nevada. **Cap.,** $200,000; par 10c; 900,000 shares in treasury.

Property: the Shea-Putnam group, 8 claims, 140 acres, north of the Gibralter Silver Mines Co. tract and traversed by the same big vein for 4,500′ and by two lesser veins. The ground is undeveloped, but reported by Wilkinson, Frazier and other engineers to have very promising vein outcrops. The tract was located immediately after that of the Gibraltar, Mr. Harry Stimler, the discoverer of Goldfield and present superintendent of the Gibraltar, being one of the locators. The tract immediately north has shipping ore. Is regarded as a very attractive prospect.

GIBRALTAR SILVER MINES CO. **NEVADA**

Address: 80 Maiden Lane, New York City.

Officers: Wm. J. Loring, pres.-mgr., director; R. R. Sherwood, v. p.-treas.; with W. W. Waddell, E. B. Cadwell, E. A. Clark, N. J. Hyman, and H. C. Stimler, directors.

Inc. 1919, in Nevada. **Cap.,** $150,000; 10c par; 500,000 shares in treasury. Corporation Trust Co., New York, transfer agent. Property paid for and company reports a large cash balance in the treasury.

Property: 7 claims in Jett canyon, in the Toyabe mountains, 7 miles due W. of Round Mountain, Nye county, and 45 miles N. of Millers. The outcrop is a precipitous mass of 250′ high. The main ore showing is where a basal fault along the east side of the range cuts an andesite dike or stock. The vein shows a length of about 1,500′ and a width of 60′ or more. It consists of highly silicified andesite carrying silver, lead and zinc. The high-grade ore is reported to assay above 30% lead, with a content of 3 oz. silver to each percent of base metal.

Development: by crosscut tunnels and surface open-cuts.

Equipment: compressor, machine drills and camp buildings.

Reported upon by Wm. J. Loring, E. M. and Chas. D. Wilkinson, E. M., who state that the surface values are very good, the vein of large size, very strong and well defined and the geological conditions favorable for making large orebodies.

The personnel of the company is good, and if the values reported on the surface continue downward, it will be one of the notable mines of Nevada.

GLASGOW & WESTERN EXPLORATION CO., LTD. **NEVADA**

Liquidated. Fully described in Vols. XI, XII, XIII. The Copper Basin and Copper Canyon mines in Nevada were sold to the Copper Canyon Mng. Co., the Adelaide in Humboldt county to Mr. Kierman, Tonopah, and the Montreal property in Beaver county, Utah, to the Milford Copper Company.

GLENDALE MINING, MILLING & POWER CO. **NEVADA**

Glendale, Calif. Had a lease on the Piermont mine near Cherry Creek, Nev.

A jitney auto man, named Hart, of Glendale, Calif., ran property, and the result of inexperience was the usual one. J. H. Leishman, Templeton, Calif., was formerly president, acting merely in an advisory capacity in the early days of the corporation. Company practically out of business, with no assets, but a number of unpaid accounts.

GOLCONDA GOLD LEDGE MINING CO. **NEVADA**

Presumably dead. **Address:** 909 Sharp Bldg., Kansas City, Mo.

Officers: M. A. Fyke, pres.; W. H. Otto, v. p.; A. C. Sweet, sec.; C. V. Fyke, treas., with F. M. Planck, directors at last accounts.

Cap., 1,000,000 shares; $1 par.

Property: 8 claims, 2 miles S. of Golconda, Humboldt county, known as Kramer Hill.

At last report property was under lease.

GOLCONDA NEVADA MINING CO. **NEVADA**

Address: Golconda, Humboldt county, Nev. J. B. Tomlinson, mgr.; had 3-year lease from September, 1915, on the Kramer Hill mine of Golconda Gold Ledge Mining Co.

Equipment: 20-stamp mill for sampling and testing. No recent returns.

GOLD CANYON DREDGING CO. **NEVADA**

Address: G. F. Hitton, Dayton, Lyon county, Nev.

Property: a lease of 1,000 acres of placer ground that had been worked in a small way for years by King and Rae. Estimates of 40,000,000 cu. yd. of gravel ore based on 45 shafts and 30 drill-holes. A 9 cu. ft. dredge was being constructed in September, 1919. Bedrock is at depth of 18 to 90 feet.

GOLD CIRCLE BUICK MNG. CO. **NEVADA**

Address: Louis Reymond, Midas, Nev.

Inc. July, 1919, in Nevada. **Cap.**, $150,000; 10c par.

Property: 3 claims in the Gold Circle district of Elko county. Development work not yet started.

A prominent San Franciscan is reported to have said in August, 1919, that "outside of the Tonopah Divide mine there is more ore in sight in any one of four groups of claims in Gold Circle than all the Divide district. It seems remarkable that there has not been a boom in Gold Circle before this time," which is most interesting if true.

GOLD CIRCLE COALITION CO. **NEVADA**

Address: Midas, Nev.

Officers: M. J. Paisley, pres.; J. W. Cody, v. p.; J. I. Peterson, sec.-treas., with J . A. Langworth, directors.

Inc. 1919, in Nevada. **Cap.**, $150,000; shares 10c par.

Property: Golden Fissure group, at Midas, Elko county. Ore is free milling and occurs in a ledge 10′ wide on 150′ level when it is said to average $12 per ton in gold.

A lower tunnel to cut the vein at a greater depth was driven in 1919.

GOLD CIRCLE QUEEN MINING CO. **NEVADA**

Address: Midas, Elko county, Nev.

Property: a group of claims between the Gold Circle Coalition and Elko Prince mines, shows veins in which high-grade gold-silver ore was found, August, 1919.

GOLD CIRCLE QUEEN MINING CO. **NEVADA**

Address: L. G. Campbell, Winnemucca, Nev.

Officers: J. E. Pelton, pres.; R. S. Bolam, v. p.; L. G. Campbell, sec.-treas.; with G. S. Pelton, directors.

Cap., $1,000,000, increased to $1,500,000 in December, 1919; $1 par; 840,000 outstanding.

Property: 5 unpatented claims in Gold Circle district, Elko county, Nev., held under lease.

Geology: lodes and fractured zone in rhyolite, containing shoots up to 40′ width. Ore carries gold, silver, and some manganese, averaging $16.40 per ton.

Development: by 130′ shaft, and 2 tunnels 180′ and 210′, with total workings of 1,100′.

Ore reserves: estimated at 4,000 tons above 132′, worth $65,000.

Equipment: 15-h. p. gasoline hoist. Propose to erect 30-ton mill and deepen shaft, 1920. **Production:** ore sales in 1916, $8,006; to 1917, $16,970. Recovery by amalgamation alone was 80%.

GOLD DEPOSIT MINING CO. **NEVADA**

Address: Logan, Utah. **Mine office:** Battle Mountain, Nev.

Officers: Robt. Murdock, pres.-treas.-mgr.; John A. Crockett, v. p.; A. S. Cole, sec., with E. S. Larsen, Robt. Murdock, Jr., directors. F. W. Swindlehurst, supt.

Inc. May 27, 1916. **Cap.**, $100,000; shares 10c par; 600,000 shares out-

standing. Annual meeting May 27. Income from ore sales in 1918, $1,500; operating expenses, $1,200.

Property: 9½ claims, 10 miles from Battle Mountain, Lander county, shows rhyolite cut by a quartz vein 3-5′ wide, said to average $10 per ton in gold.

Development: by 250′ tunnel to depth of 150′. Shipments of $60 ore made in 1918. Small force employed.

GOLDEN CHARIOT MINING CO. **NEVADA**

Address: Jamestown, Nye county, Nev. Carl Feutsch, pres.

Property: a group of copper claims, situated about 30 miles from Goldfield. Idle at last report.

GOLDEN PEN CONSOLIDATED MINING CO. **NEVADA**

Holdings sold to Gold Pen Mines Co., which see.

This company was formed in 1915 by Jesse Knight, of Provo, Utah, to purchase the Golden Pen mine at Rand, Mineral county, Nev., for $150,000.

A peculiar feature of the purchase permitted former owners to retain a pay-shoot 38′ long in center of mine. Past record shows rich shipments. See Vol. XII.

GOLD MOUNTAIN MINING & MILLING CO. **NEVADA**

N. P. Theo, pres., Goldfield, Nev. Is a close corporation.

Properties: about 13 miles from Bonnie Claire and 6 miles from Hornsilver, Esmeralda county, operated under lease by J. W. Crane, at last accounts. Veins contain silver-gold ore carrying copper. Developed by two 240′ shafts and connected by a 200′ drift. Estimated reserves, 2,000 tons of milling ore, valued at $20 per ton, blocked out on the 200′ level. An outcropping oreshoot 20″ wide said to have yielded ore assaying from $100 to $500 per ton.

No recent information.

GOLD PEN MINES CO. **NEVADA**

Purchased in June, 1919, holdings of the Golden Pen Consolidated Mining Co., which see.

Address: 45 Nixon Bldg., Reno, Nev.

Officers: W. M. Wantland, pres.-mgr.; J. Carlton Bray, v. p.-supt; Geo. N. Turner, sec.; L. Little, treas., with Harry Amman and Edw. F. Wantland, directors.

Inc. 1919, in Nevada. **Cap.,** $1,500,000; $1 par; 250,000 shares outstanding.

Property: 14 claims, 200 acres in Rand mining district, Mineral county, 17 miles from railroad at Nolan, shows a quartz vein in rhyolite and andesite, with N.-E. course and dip of 70° E. Ore is sulphide, contains gold and silver, shipping grade said to average $366 and milling grade $20 per ton.

Development: by 258′ vertical shaft, with about 2,000′ of workings.

Equipment: 100-ton cyanide plant and electric hoist to be installed. Fifteen men are employed.

The mine is credited with a past production of $211,000, and management reports ore reserves of 40,000 tons, of which 25,000 tons are blocked out.

GOLD PRINCE MINING & LEASING CO. **NEVADA**

Idle or dead. E. L. Luker, sec.-treas., Grand Island, Neb.

Officers: Dr. A. H. Farnsworth, pres.; Jos. Kotik, St. Paul, Neb., v. p.; Chas. O. Orr, gen. mgr.; with E. L. and E. S. Luker, directors, at last accounts.

Inc. in 1914. **Cap.,** $500,000; shares $1 par.

Had lease and bond on the Gold Crater mine, formerly owned by the Gold Crater Cons. Mng. Co., about 30 miles S. E. of Goldfield, Esmeralda county, Nev.

Ore: gold, milling grade, said to run about $15 per ton.

Development: 265′ shaft and crosscuts. **Equipment:** a 12-h. p. hoist and small mill.

GOLD TOP MINING CO. **NEVADA**

Address: 519 H. W. Hellman Bldg., Los Angeles, Calif.

Officers: D. L. Keyes, pres.-treas.; John J. Graf, v. p.-mgr.; Walter F. Kean, sec., with W. H. Sexsmith and M. C. Keyes, directors. W. R. Cozart, supt.

Inc. in Nevada. **Cap.,** $500,000; $1 par; 50,000 shares outstanding.

Property: the Pedro group, 6 claims, 120 acres, in Copper Basin, Lander county, 9 miles from Battle Mountain, developed by 585′ tunnel and 135′ vertical shaft. Ore occurs in a fissure vein, said to contain gold, silver, and copper.

Equipment: includes steam power, hoist, compressor, drills, pump, and Gibson crushing mill. A double-compartment shaft is being sunk to prove extent of orebody.

GOOD SPRINGS ANCHOR CO. **NEVADA**

Office: 1202 Hollingsworth Bldg., Los Angeles, Calif. Mine at Jean,, Clark county, Nev.

Officers: Frank A. Keith, pres.; Philip Wiseman, v. p.; R. I. Rogers, treas.; I. Mattern, sec.; with Seeley W. Mudd, directors. Roy W. Moore, mgr.

Inc. Dec. 20, 1913, in Nevada. **Cap.,** $1,000,000; $1 par; 550,000 issued. Annual meeting, second Monday in May.

Gross earnings in 1916, $111,359; in 1917, $105,589; in 1918, $71,073. Total dividends to January 1, 1919, $180,258.

Property: 7 patented and 1 unpatented claims at Jean, said to show lead-zinc ore occurring as replacement deposits in limestone, strike N.-S., dip 50°. Developed by 212′ winze from a 110′ tunnel; greatest depth of workings 400′; total workings, 2,500′ of drifts.

Equipment: 15-h. p. oil hoist, 3-drill compressor, 2,000′ gravity tram, 50-ton dry mill.

Production: in 1917, 745 tons of 38.28% zinc ore, 368 tons of lead ore carrying 47.14% lead and 5.3 oz. silver, and 592 tons lead concentrate assaying 57.85% lead and 16.5 oz. silver; in 1918, 282 tons of 41.27% zinc ore, 217 tons of lead ore carrying 53.78% lead and 8.4 oz. silver and 576 tons lead concentrate assaying 63.34% lead and 12.8 oz. silver.

GOODSPRINGS MINING CO. **NEVADA**

A Jesse Knight corporation. **Offices:** Provo, Utah, and Goodsprings, Nev.

Officers: at last accounts, Jesse Knight, pres.; J. Wm. Knight, v. p.; R. E. Allen, sec.-treas.; C. L. Hyde, mgr., with W. Lester Mangum, directors. E. J. Delano, supt.

Inc. 1919, in Utah. **Cap.,** $100,000; shares 10c par.

Property: the Milford and Addison groups, on the California-Nevada boundary line, in Yellow Pine district, near Goodsprings, Clark county, reopened and shipping in 1918. A 15′ vein of high-grade lead-zinc ore reported under development.

Equipment: hoist, compressor, etc., installed in 1919.

GOULD & CURRY MINING CO. **NEVADA**

Office: 264 Russ Bldg., San Francisco, Calif.

Officers: Wm. Bannan, pres.; Herman Zadig, v. p.; J. B. Shaw, sec.; Wells Fargo Nev. Natl. Bank, San Francisco, treas., at last accounts.

Inc. Nov., 1904, in California. **Cap.,** $2,160,000; $10 par; assessable; Registration Trust Co., registrar. Listed on New York Curb.

Property: a famous group of claims on the Comstock lode, near Virginia City, Storey county. Is one of the old time Comstock lode properties now controlled by Zadig and associates.

GOWGANDA COPPER CO. **NEVADA**

Probably dead, as letters sent company's officers are returned from Goldfield, Nev.

Officers: C. A. Braconier, pres.; Herman Krieger, sec.; S. H. Thompson, Reese Wampler, W. H. Brock, directors, at last accounts.

Inc. July, 1913, in Nevada. **Cap.**, $100,000; 10c par.

Property: 9 claims, near Round mountain, Nye county, said to show a deposit of low-grade copper ore. Workings are shallow.

GRANITE HILL COPPER MINE **NEVADA**

Property: 14 miles N. W. of Reno, Nev., now owned by Nixon-Nevada Mining Co., which see.

GRAY EAGLE MINING CO. **NEVADA**

See Jersey Valley Mines Co.

GREEN MONSTER MINE **NEVADA**

Office: Phoebe A. Hearst Estate, 410 Hearst Bldg., San Francisco. Operated by lessees at last accounts.

Property: in Yellow Pine district, Clark county, 16 miles N. W. of Goodsprings, Nev. Ore is mainly zinc carbonate with a little lead, copper, and silver. Regular shipments were made 1917-1918, but no production figures are available.

Development: 250′ single-compartment shaft with manway, 2 incline shafts, 100 and 255′ deep and 200′ winze.

GROOM SOUTH END MINING CO. **NEVADA**

Property: 1 claim in Groom district, 100 miles S. W. of Pioche, Lincoln county. In 1916 the output was 1,500,000 lb. of lead and 25,000 oz. of silver ore hauled 60 miles by tractor, to Indian Springs the nearest rail point.

In 1918 shipments were made from workings above the 100′ level. In July, 1919, the mine was reported to show a large body of ore, and development work was under way. The total output is placed at $250,000.

HARTLEY MNG., MLG. & REDUCTION CO. **NEVADA**

Dead. Plant at Mazuma, Nev., purchased by Dupont Copper Mines Company.

HALE & NORCROSS MINING CO. **NEVADA**

Address: Virginia City, Nev.

Officers: H. B. Bulmer, pres.-mgr.; E. L. Lowe, v. p.-sec.; with P. H. Hohnewald, Wm. Turney and R. L. Thurston, directors. Wells Fargo Bank, San Francisco, treas.

Inc. in California. **Cap.**, $112,000; $1 par; 100,000 issued; assessable Annual meeting 3rd Monday in December.

Property: 1 claim, 400′ on the Comstock Lode, at Virginia City, Storey county, from which gold-silver ore has been mined. Idle during 1919.

HAMBURG MINES CO. **NEVADA**

Office: 1118 Newhouse Bldg., Salt Lake City, Utah. Mine at Pioche, Lincoln county, Nev.

Officers: M. C. Godbe, pres.-mgr.; J. R. Cook, v. p.; J. T. Osborne, sec.,John Pingree, treas.; above with A. H. Godbe, W. H. Pitts and Alex Lloyd, directors. M. M. Johnson, cons. engr.

Inc. June, 1916, in Nevada. **Cap.**, 1,000,000 shares; 20c par; 800,000 issued; 200,000 to be sold in February, 1920.

Dividends: first dividend of 1 c paid March 2, 1917; third paid May 21, 1917, making $24,000 to date.

Property: 4 claims, 1 patented, 40 acres, in Pioche mining district, show gold, silver, lead ore, in quartz filled fissures. Veins vary from several inches to 5′ in width, and are cut by several N. S. faults.

Development: by 650′ tunnel with 60′ winze, drifts and crosscuts.

Production: 10 carloads of ore shipped in 1916 netted $8,475; 1,600 tons shipped in 1917, is reported to have averaged 14 oz. silver, $3 gold, and 20% lead. Mine was reopened in February, 1920, after an 18-months shutdown, and another ore-bed is to be followed.

HAMILTON POWER MINING & TRANSP. CO. **NEVADA**

Property: the Grand Prize group, 5 claims and power rights on Illipah creek in Rocco canyon, near Hamilton, White Pine country, Nevada. Probably dead. See Vol. XIII.

HANNAPAH DIVIDE EXTENSION MINES CO. **NEVADA**

Office: M. J. Rankin, Santa Clara College, Santa Clara, Calif.

Officers: W. R. Porter, pres.; Louis O'Neal, v. p.; M. J. Rankin, sec.-treas.; with I. E. Chapin, D. A. Beattie, and W. C. Ralston, cons. eng., directors.

Inc. in Nevada; 300,000 treasury shares offered at $1 each in Dec., 1919.

Property: 9 claims, 176 acres, in the Silverzone district, being reopened and rich silver ore struck late in 1919. Shipments were to be started early in 1920.

HANNAPAH MINE **NEVADA**

Address: Silverzone (Hannapah), Nevada.

Owned by Frederick E. Browne. The mine has an old shaft recently retimbered, which is reported to expose $150,000 worth of ore above the 150′ level.

Hannapah Nevada has been re-christened Silverzone (q. v.) as a result of the renaissance of the old silver camps of Nevada, brought about by the increased price of silver. The mineral deposits of the camp have been known for many years, but after working out the richer oxidized ores, deep exploration was not considered profitable and aside from some leasing work, the camp has long been idle. In 1919, the activity of Divide, led to the reopening of the Old Hannapah mine, and the incorporation of several new companies to develop and operate other properties in the district.

HARNEY GROUP **NEVADA**

Address: Stindl & Donohue, lessees, Pioche, Nev.

The mine is 1 mile east of Pioche, Lincoln county, and in April, 1919, an orebody 9′ wide was cut that consisted of galena averaging $80 to $100 per ton. Shipments were made in 1919, but no record is obtainable.

HAYSTACK MINES CO., INC. **NEVADA**

Address: Winnemucca, Nev.

Officers: Pete Egoscue, pres.; F. L. Reber, v. p.; C. T. Smith, sec.; B. J. Loinaz, treas.; with Y. Arrascada, and Jose Ugariza, directors.

Inc. June, 1914. **Cap.,** $1,000,000; none issued. Annual meeting first Tuesday in January.

Property: 5 unpatented claims, 35 miles W. of Winnemucca and 7 miles S. of Jungo, Humboldt county, on the Western Pacific R. R. Ore carries free-milling gold in fissure veins in granite and quartzite, said to average $22 per ton.

Development: by 3 shafts, deepest 100′. Machinery installed in 1919.

HIDER NEVADA MINING CO. **NEVADA**

Officers: Fred Redmond, pres.; J. J. Morris, sec.-treas., with Mrs. A. F. Pitt, E. O. Lee and T. E. Fitzgerald, directors.

Cap., 1,000,000 shares; 347,980 issued.

Property: about 23 miles south of Battle Mountain, Lander county, said to show several veins carrying copper ore.

Development: includes 125′ incline shaft and a tunnel.

Management shipped some ore from the dumps in 1917. No recent returns.

HILLTOP MILLING & REDUCTION CO. **NEVADA**

Hilltop, Lander county, Nev. **Officers and directors:** Frank LeBar, pres.; Chas. E. Beach, v. p.; E. Ross Carver, sec.-treas. and mgr.

Inc. in Nevada. **Cap.,** $50,000; shares $10 par; all outstanding. Annual meeting in January. Company operated a 75-ton 10-stamp cyanide plant at last accounts.

HOLDEN MINING & MILLING CO. **NEVADA**

Address: 1482 Broadway, New York City, and Tuscarora, Nev. J. E. Harrington, pres. C. C. Griggs, mgr.

Inc. 1916, in Nevada, to take over lease and bond on 2 claims of the

Tuscarora-Nevada M. Co. and the Nevada rights of the Holden patents for concentrating and reducing ores. **Cap.,** $500,000; shares $10 par.

A 50-ton mill was completed in 1919.

HOME RUN COPPER CO. **NEVADA**

Office: 1118 Newhouse Bldg., Salt Lake City, Utah. Mine in Bristol mining district near Pioche, Nev.

Officers: M. C. Godbe, pres.; E. S. Woodward, v. p.; H. F. Earle, sec.-treas., with A. H. Godbe and Henry Sadler, directors. W. H. Pitts, supt.

Inc. 1912. **Cap.,** $100,000; shares 10c par. Listed on Salt Lake Exchange.

Property: 8 claims, 3 fractions, 180 acres, 9 miles from railroad, in Lincoln county, adjoins the Gypsy mine and is said to carry same fissures. Claims show fissures in limestone expanding into replacement deposits and caves carrying rich copper ores with gold and silver.

Company also owns Bristol mine.

Development: by 225′ shaft with levels at 65′, 90′ and 150′ opening up caves, showing 1,500 tons of ore containing 8.25% copper and 40 to 200 oz. silver.

Equipment: includes gasoline engine hoist, compressor and necessary buildings. Idle. Operations will be resumed in 1920 if general conditions improve.

HONEST ENDEAVOR MINING CO. **NEVADA**

Was unfavorably regarded and fully described Vol. XIII. Company succeeded 1917 by Nevada Union Copper Mines Co., which see. Stock exchanged share for share.

HUMBOLDT CONS. MINES CO. **NEVADA**

Offices: 108 So. La Salle St., Chicago, Ill., and Oreana, Nev.

Officers and directors: C. F. Champion, pres. and treas.; C. J. Hayden, v. p.; L. R. Miser, sec. A. E. Taylor, asst. sec.; J. B. Newman, mgr.

Inc. in Arizona. **Cap.,** $1,500,000; shares $1 par. Owns entire capital stock of La Toska Mining Co.

Property: La Toska mine, about 360 acres, at head of Wright Canyon, 5 miles from Ryepatch and the same distance from Oreana, both on the S. P. R'y, Pershing county, Nev. Claims reported to show gold-silver ore occurring in 2 well defined veins. The main vein 6′ wide has limestone hanging wall and rhyolite foot, and carries free gold, as well as silver minerals (bromide).

Development: by 3,000′ tunnel. The main vein was cut in 1917, at depth of 1,345′ as a result of six years' work and mining on it was begun in 1918, when the management reported that there was an ore shoot 130′ long, and was considering erection of a mill. In extending this tunnel, two veins were cut, one at 600′ and the other at 1,000′. Development work on the first vein showed 15′ of gold-silver ore running $8 per ton. The other vein is 4′ thick including an 18″ band carrying $10 gold and 25 oz. silver. $73.626 was spent on mine up to 1918, of which $64,825 was for development work.

HUMBOLDT COUNTY TUNGSTEN MNG. & MLG. CO. **NEVADA**

Address: care H. M. Byllesby, 208 S. La Salle St., Chicago, Ill. L. A. Savage, mgr.

Property: 5 claims in Mill City district, also a lease on the Ragged Top tungsten mine near Lovelocks, which was abandoned. Operated a custom mill of 125 tons daily capacity at Toulon, Pershing county, during 1918. Presumably idle, 1919.

HUMBOLDT TRINITY GOLD MINING & MILLING CO. **NEVADA**

Office: Lovelocks, Pershing county, Nev. E. L. Connell, mgr. Not incorporated.

Property: 10 claims, 200 acres, 12 miles N. of Lovelocks, said to show gold-silver ore in quartz vein 18″ to 24″ wide. The ore above water-level at 100′ depth is said to assay $18 to $25 per ton, with higher value below.

Development: 108′ Humboldt incline shaft with drifts on 90′ and 55′ levels, 80′ and 90′ long, respectively. Claimed $10,000 in ore is blocked out.

Equipment: included an 11-ton mill, and a 15-h. p. gasoline engine. At last report, "Production varies on account of lack of water; if mill runs steady, about $3,000 per month." Nevada is a dry state.

HUNTER MINE NEVADA

Owned by Vulcan M., S. & R. Co., which see.

IDEAL COPPER CO. NEVADA

Office: 634 Bridge St., Grand Rapids, Mich. **Mine office:** Lunning, Nev.

Officers: S. J. Hufford, pres.; H. D. Keefer, v. p.; Henry Riechel, sec.-treas., with Henry Smith, J. I. Keller, directors.

Inc. Jan. 12, 1915, in Nevada. **Cap.,** $600.000; shares $1 par; 4,000 shares issued. Annual meeting, 2nd Tuesday in January.

Property: 16 claims, in 2 groups, unpatented, 360 acres, about 4 miles from Luning, Mineral county, formerly owned by the Wagner Azurite C. Co., and described in Vol. XI. The Atwood group, which is the principal property, shows a contact zone of about 600′ width, traceable 2.000′, between an altered granite footwall and limestone hanging, with N. W.-S. E. strike and dip of 50° N. The outcrop carries silver and gold-copper ores with a quartz gangue.

Development: 2 tunnels, 1,700′ and 350′ long, with a total of 2,185′ of workings.

The Nevada-Wisconsin group shows several dikes of 50 to 100′ width of which one said to show 2 to 11% copper sulphide ore. Developed by shaft.

In 1916, 400′ of shaft work was done (timbered and piped), also 350′ of crosscutting with track and pipe, the work costing $6,000. No recent operations reported.

Equipment: includes 40-h. p. steam plant with 15-h. p. hoist, 3-drill straight-line air compressor, 100-ton leaching plant and 10-stamp mill. Owing to excess of lime in the ore, the leaching plant proved a failure and was closed down.

INDEPENDENT SCHEELITE CO. NEVADA

Property: tungsten claim in the Snake Range district, 26 miles from from Ely, White Pine county. A 30-ton mill was erected in 1916, at a cost of $35,000 and made one run. The product was too low-grade and operations ceased.

INDIAN SPRINGS MINING CO. NEVADA

Address: 223 Mohawk Block, Spokane, Wash. Mine at Lida, Esmeralda county, Nev.

Officers: A. B. Railton, pres.; H. T. DeMerritt, v. p.; Fred N. Davis, sec.; Thos. R. L. Harris, treas.; Ross C. Craddock, supt., at last accounts.

Inc. Feb., 1911, in Washington. **Cap.,** $1,500.000; shares $1 par; assessments, 3 mills to April, 1913. Company is a reorganization of the Indian Springs Copper Mining Co.

Property: 8 claims, 100 acres mineral land in Lida valley, or Tule Canyon district, 30 miles S. W. of Goldfield, Nev. Ground shows veins and replacements in massive gray limestone. Vein runs E.-W., has vertical dip and is said to be 70′ wide, traceable for 1,000′.

Development: by 100′ shaft and 200′ tunnel. Has steam power. Presumably idle.

INGALLS MINE NEVADA

Address: Borcherding, Hill, and McDermitt, Tule Canyon, via Lida, Esmeralda county, Nev.

Property: an old silver producer in Tule Canyon, 37 miles south of Goldfield, operated by lessees and reported to be shipping high-grade silver ore, with $20 gold and 15% lead. A stamp-mill of 20 tons capacity with a cyanide plant was finished in 1919 and is expected to produce $20,000 a month.

This mine was acquired early in 1920 by W. J. Loring and associates, who will transfer it to a new company. The mine is said to have a large amount of ore in sight and is confidently expected to make a big producer.

INGOMAR MINE **NEVADA**

Address: 303 Dooly Bldg., Salt Lake City, Utah, and Goodsprings, Nev. Owned by Samuel A. Arentz and W. A. Perkins.

Property: 3 claims (patents pending), 10 miles S. of Goodsprings, Clark county, has a chamber deposit in limestone, dipping 35° S. E. and pitching N. 20° E., with high-grade zinc carbonate and lead sulphide ore.

Development: by incline shafts to 50′ depth, and tunnels 200 and 300′ long.

Equipment: includes 2-single-span wire tramways, 1,200 and 1,600′ in length, with 2 buckets.

Gross yield for 1918 was $20,000 from shipments of zinc carbonate ore assaying from 42 to 46% zinc, and free from lead and other impurities.

Mine closed down since December, 1918, owing to low price of zinc.

INTERNATIONAL & INTERCONTINENTAL MINING & REFINING CO. **NEVADA**

Dead. Was a paper corporation organized 1916 by Raoul Madero et al of Mexico City to make a market for their holdings. Reported to have had no connection with the companies appearing on the balance sheet of March 24, 1916, as debtors (see Vol. XIII) and was evidently a rank promotion that nobody wants to father.

Stock was stricken from New New York Curb, June, 1918; 200 shares were sold at auction in New York City, July 26, 1919 at $1 for the lot.

INTERNATIONAL PROPERTIES SYNDICATE **NEVADA**

Reported operating manganese claims adjoining the holdings of the Manganese Association, Inc., near Las Vegas, Clark county.

INTERSTATE CONSOLIDATED MINES CO. **NEVADA**

Idle.

Officers: Franklin Harding, pres.-gen. mgr., 105 W. 5th St., Jamestown, N. Y.; J. L. Simmons, v. p.; R. W. Force, sec.-treas., with A. M. Shull and A. C. Frary, directors.

Inc. Sept. 4, 1909, in Arizona (to be changed to Nevada). **Cap.**, $2,500,000; $1 par.

Property: 40 claims at Camp Harding, Esmeralda county, 12 miles from railroad at Goldfield.

Geology: the Harding group shows copper-silver-gold ore in lime-shale for a considerable distance. The copper-content varies greatly, but hand sorting gives about 10% grade. A carload of ore from near the surface, sent to the Mason Valley smelter at Thompson, returned 7.1%. The veins dip 45° N. E. and have a strike of S. 68° W. Other claims said to show copper, lead, and silver ore.

Development: by 127′ shaft and tunnels, two being 327′ long each. Total workings approximate 5,100′. Extensive exploration by core-drilling contemplated.

Owners believe development work will open shipping ore.

IRONDIKE MINING CO. **NEVADA**

Address: care W. R. Smith, Mina, Nev.

Property: 10 claims in Gold Range mining district, Mineral county, about 5 miles W. of Mina, shows fissure veins in limestone porphyry contact. Outcrops said to contain bunches of 1 to 8% copper ore.

A tunnel 1,100′ long in September, 1919, was expected to tap the vein at 417′ vertical depth within 50′. A prospect.

IRONSIDES MINING CO. **NEVADA**

Officers: W. H. Gable, pres.; J. C. McCreary, v. p., both of Scotts Bluff, Neb.; A. J. Shumway, sec.

Property: near Goodsprings, Clark county, developed by 150′ shaft with drifts and stopes from which shipping ore was mined. One shipment to Utah smelters is said to have assayed 15% copper and $9 gold per ton.

Mine has been closed since April, 1918, but is to be reopened 1920.

IROQUOIS COPPER CO. **NEVADA**

Address: Mina, Nev.

Officers: H. B. Lind, pres.; M. A. Lind, v. p.; J. L. Fenwick, sec.-treas.

Inc. in Nevada. **Cap.,** $12,000; par $1; 8,000 shares issued and owned by the Nevada & Boston Copper Co.

Property: the Iroquois Copper Co. hold title to a group of 9 lode mining claims adjacent to the Wall Street mine, and midway between Mina and Luning, Nevada. The property covers a contact-metamorphic zone 3,000′ long and 50′ to 300′ wide, of garnetized limestone with porphyry intrusions, but no definite contact; course of zone, N. E.-S.W. This material carries ore in fractures and cross fissures, the garnet material being reported to carry a large body of 1½ to 2% copper ore.

Development: by 1,300′ of workings, including the 125′ Mary and 325′ Mastadon shafts on a 18 to 48″ strong vein of oxidized ore.

During 1916-1918, property was worked by lessees who shipped ore that averaged 7% copper, 2 oz. silver and gave a return of $50,000.

JACKET-CROWN POINT-BELCHER MINES CO. **NEVADA**

Office: Mills Bldg., San Francisco, Cal. Mine near Virginia City, Storey county, Nev.

Directors: M. B. Forman, C. L. Moore, J. L. Brainard, H. W. Glensor, and L. M. Bliss. Wm. P. Miller, supt., Virginia City, Nev. Company is a merger of 3 of the big Comstock mines.

Inc. Feb. 11, 1915, in California. California Corporation Commission authorized issue of 360,000 shares common and 12,000 shares preferred to the Yellow Jacket G. & S. Mng. Co.; 208,000 common and 10,400 preferred to Belcher Mng. Co., and 150,000 common and 10,000 preferred to the Crown Point G. & S. Mng. Co. Above stock is in payment for all properties of these 3 companies subject to debts of $80,962; 217,600 shares were sold at par, and money used for development.

Property: the bonanza mines that made the fortunes of Flood, Mackay, Lucky Baldwin, and D. O. Mills. The mines are in the southern part of the Comstock lode, a great fissure vein 4 miles long, filling a fault plane in the andesite-diorite rocks of Mt. Davidson, near Virginia City. The ore is quartz carrying silver-gold. Geology described in Monograph 3, U. S. Geological Survey.

The merger made it possible to install modern pumps, to unwater the 1,700′ and 1,800′ levels of the mines where good ore was worked until a great influx of hot water stopped mining.

Equipment: 125-ton mill and cyanide plant erected 1917.

Production: for 1915 and first half of 1916 came from old stopes and and workings on the 1,600′ level and above, the average production from both mines reported at about 1,000 tons per week. No recent report of work received, but property was being operated 1918-19.

JARBIDGE CENTRAL MINES CO. **NEVADA**

Closed down.

Officers: J. P. Duncan, pres.; Angus McDonald, v. p.; W. W. Fisk, sec.; with John MacRae, Ira Brackitt and H. O. Milner, directors.

Inc. Oct. 5, 1911, in Nevada. **Cap.,** $1,500,000; $1 par; 1,250,000 issued.

Property: 9 unpatented claims in Jarbidge district, Elko county, said to show a quartz vein in rhyolite, dipping 85° S. W. and pitching S. 32° E. Average gold assay is $15 to $20 per ton.

Development: by vertical shaft to 65′ and by 2 tunnels 175′ and 225′ long. Work in 1916 cost $5,000, done on an option. A prospect.

JEFFERSON GOLD & SILVER MINING CO. **NEVADA**

Address: S. H. Brady, mgr., Reno, Nev.

Property: the old Kanrohat mine in Jefferson canyon, 8 miles from Round Mountain, Nye county, developed by 4 tunnels to depth of 1,000′. An orebody 14′ wide reported exposed on the bottom level. Ore carries gold and silver.

During 1918, three raises were put up from the 1,000 to the 700′ level, and 10 from the 700′ level to the surface. The mine is said to have a large amount of ore in the workings and 60,000 tons on the dumps.

Equipment: includes 100-ton mill and cyanide plant. Fifteen men employed in 1918.

JERSEY CONS. COPPER & GOLD MINING CO. **NEVADA**

Office: 272 Grant St., Salem, N. J. **Mine office:** East Ely, Nev.

Officers: R. T. Seagrave, pres.; H. M. Loveland, v. p.; F. Eldridge, sec.; W. L. Bassett, treas., at last accounts.

Inc. Jan. 15, 1917, in Delaware. **Cap.,** $100,000: shares $1 par; non-assessable; 4,950 issued. Annual meeting 1st Thursday of March.

Property: 15 claims, unpatented, 300 acres in the Mizpah Mining district, 5 miles east of Mizpah, on Nevada Northern railroad, White Pine county. Claims show several fissure veins in granite and contact deposits between granite and rhyolite, one of which is estimated by the management at 200′ width, carrying mainly bornite and chalcopyrite ore.

Company re-located above property, formerly owned by Mizpah Cons. Copper & Gold Mining Co., when latter failed to do its annual assessment work for 1915.

Development: by 70′ two-compartment shaft, showing a 3′ orebody, said to give maximum assays of about 15% copper, 8 oz. silver and $18 gold per ton, which are not to be considered as average ore values. At last report (1917) company was driving a tunnel, 1,385′ long, expected to cut ore at about 1,450′.

JERSEY VALLEY MINES CO. **NEVADA**

Address: Worcester, Mass. W. Prince Catlin, mgr., Battle Mountain, Lander county, Nev.

Property: in Kimberly or Hill Top district, 23 miles from Battle Mountain, comprises the Jersey Valley group, and the Gray Eagle claims, acquired September, 1913, from the Gray Eagle Mining Co. Four sets of lessees were taking out ore from the last named claims in 1917.

JOHNNIE MINE **NEVADA**

Address: A. P. Johnson, 207 O. T. Johnson Bldg., Los Angeles, Cal.

Property: 20 claims, 12 patented, 400 acres at Johnnie, Nye county, Nev., carries a gold quartz vein with 45° dip, running N.-S. through quartzite and limestone.

Development: by incline shaft 1,100. deep, and 10,000′ of workings.

Equipment: distillate engines, 40-h. p. hoist, 10-drill compressor, and 16-stamp mill, of 80-ton capacity, employing amalgamation.

JOLLY JANE LEASING CO. **NEVADA**

Had 3-year lease on the Jolly Jane claim, of Pioneer Extension Mines Co., now Reorganized Pioneer Mines Co., which see.

JOSE-DAVIS MINING & MILLING CO. **NEVADA**

Address: E. E. Roberts, pres., Lovelocks, Pershing county, Nev. W. Beauchamp, mgr.

Property: the Jose-Davis lease of the Sheepherder's Dream claim which produced rich gold ore in 1915, and 2 claims adjoining. The lease runs until about mid-1921.

Development: by two 40′ shafts, and several drifts, reported to have opened 200 tons of rich ore.

A 30-ton Gibson mill was erected at Kodak, on the Southern Pacific, 6 miles from the mine. In January, 1920, mine was yielding $1,100 gold ore.

JOYCE MINING CO. **NEVADA**

Officers and directors: J. C. Jensen, pres.; A. J. Weber, v. p., Judge Bldg., Salt Lake City, Utah; J. A. Stallings, sec.-treas., with J. H. Stallings and D. Bianco.

Inc. 1917, in Utah. **Cap.,** $100,000; shares 10c par.

Property: 4 claims, in Galena camp, 12 miles S. W. of Battle Mountain, Lander county, developed by 1,000′ of tunnels and drifts, said to show lead-silver ore of shipping grade.

JULIA CONS. MINING CO. **NEVADA**

Address: 315 Bush St., San Francisco, Calif.

Cap., $550,000; shares $5 par. Listed on New York Curb, but lifeless.

Property: on the Comstock Lode, Storey county, is practically unworked. Assessments made at intervals. Idle.

JUMBO COPPER MOUNTAIN MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: Chas. Sprague, pres.; J. K. Turner, v. p.-cons. engr.; Ben Gill, sec.-treas. L. L. Dellinger, supt.

Inc. Nov., 1917, in Nevada. **Cap.,** $2,500,000; shares $1 par; assessable. Assessment of 2c per share levied April, 1918. Company is a subsidiary of the Jumbo Extension Mng. Co. (which see), whose shareholders received one share in this company for each Jumbo Extension share held, free of charge. Vendors of the Copper Mountain mine took $25,000 worth of shares in the new company at 25c. each as part payment for mine.

Property: 5 patented, 12 unpatented claims, 340 acres, 18 miles from rail at Nolan, Mineral county.

Development: by 3 shafts, with over 6,000′ of workings. A crosscut from No. 1 shaft opened 3′ of 7% and 5′ of 4% ore, and from No. 2, 3′ of 8% and 4′ of 4% ore in 1917. No. 3 shaft at 385′ depth passed through the contact zone (porphyry and limestone) exposing 8′ of sulphide ore assaying 5% copper. Recent work has been devoted to development on the 275′ level of No. 3 shaft. By September, 1919, the drift was out 635′, it having been in ore for 150′.

Production: shipments to September, 1919, by company and lessees amounted to over $100,000.

Reported in November, 1919, that company was about to abandon mine as the owners, Ed. La Patt, Ed. Schultz and Mrs. J. L. Woodward, demanded $50,000 due on purchase price. Company spent $130,000 to date.

JUNE BUG DEVELOPMENT CO., INC. **NEVADA**

Office: Ogden, Utah. **Mine office:** Las Vegas, Clark county, Nev.

Directors: Lester S. Scoville, pres.; Milton J. West, v. p.-mgr.; Frank L. Scoville, sec.-treas., with John Hochett and Walter B. Scoville.

Inc. Jan., 1916. **Cap.,** $100,000; shares 10c par; 825,000 issued. Annual meeting, January 4.

Property: 9 claims, surveyed for patent, 18 miles N. W. of Las Vegas, in the Goodsprings district, Nev., said to show gold, silver and zinc ore. Pay ore occurs in shoots 30′ long, and 6-10′ wide and from 14″ to 5′ thick, reported to assay 40% zinc, $1.50 gold and $4 silver per ton. The ore is a zinc silicate. Veins are in limestone formation.

Development: by shallow shafts and about 1,200′ of workings. Shipments of 650 tons for 4 months ending June, 1916, to the Utah Ore Sampling Co., returned $35,000. Three cars of ore shipped in March and April, 1917, returned $2,811. No shipments since. Driving a new tunnel in 1919, which was expected to cut the ore at a greater depth.

JUSTICE GOLD & SILVER MINING CO. **NEVADA**

Address: 264 Russ Bldg., San Francisco, Calif.

Officers: Franklin Leonard, Jr., pres., 25 Broad St., New York City; Wm. Bannan, v. p.; J. B. Shaw, sec.

Inc. 1904, in California. **Cap.,** $105,000; $1 par, reduced from $5; assessable; last assessment levied March, 1917.

Property: a group in the Gold Hill mining district, Storey county, at south end of the Comstock lode. The company is sinking a new shaft, now down over 200′, and said to be in ore.

JUSTICE GOLD MINING CO. **NEVADA**

Address: Goldfield, Nev.

Officers: O. M. Justice, pres.; John La Foe, v. p.; Mrs. A. B. Hays, sec.-treas.; C. W. Hays, gen. mgr., with J. R. West, directors, at last accounts.

Inc. 1914, in Nevada. **Cap.,** $1,000,000; shares, $1 par. Stock listed on San Francisco Stock Exchange.

Property: the Gold Coin Extension claim in the Diamondfield section

of the Goldfield district. Company also had a lease on the adjoining property of the Diamondfield Daisy Gold Mining Co., which carried a 2½′ vein of gold-copper ore running from $18-$39 per ton.

Development: by 265′ Daisy shaft, crosscuts, drifts and stopes. Several carload shipments in 1915 from stope above the 265′ level reported to have yielded $70 per ton. No recent returns.

KANSAS CITY-NEVADA CONS. MINES CO. **NEVADA**

Office: 510 Commerce Bldg., Kansas City, Mo. **Mine office:** Bruner, Nevada.

Officers: Walter P. Neff, pres.; Geo. A. Metcalf, v. p.; B. H. McGarvey, treas.; R. E. Bruner, sec.; H. W. Bruner, gen. mgr., with R. W. Waddell, E. C. Sooy, Henry Crawford, E. E. Nordquist and Jas. W. Orr, directors. A. E. Swain, engr.

Inc. 1915, in Nevada. **Cap.,** $6,000,000; shares $1 par; all issued. Company gave 100,000 shares for the property of the Big Henry Gold Mng. Co.; 2,000,000 shares to redeem the outstanding stock of the Phonolite Paymaster Mng. Co.; 800,000 shares to redeem the outstanding stock of the Phonolite Silent Friend Mng. Co., and 1,600,000 shares for the Duluth Gold Mng. Co. holdings.

Property: 25 patented claims, 487 acres, in the Bruner district, Nye county. Ore occurs in fissure vein in andesite and rhyolite, said to carry gold and silver averaging $20 per ton. A. E. Swain reports that one ore-shoot on the 125′ level is over 340′ long.

Development: the Paymaster property has about ½ mile of workings. The 2-compartment shaft is 300′ deep.

Equipment: a 50-ton mill was constructed in June, 1919. Water will come across Ione valley, a distance of 8 miles.

Over $300,000 has been expended on the property to date. Literature used for stock-selling purposes considered very optimistic.

KANSAS NEVADA MINING CO. **NEVADA**

Address: Goodsprings, Clark county, Nev.

Officers: Frank Williams, pres.; Jonah Jones, v. p.; A. M. Horter, sec.-treas., with John Williams and Jos. Walter, directors.

Inc. July 16, 1917, in Nevada. **Cap.,** $1,000,000; shares $1 par; 706,895 outstanding.

Property: 3 unpatented claims, about 53 acres, 9 miles W. of Goodsprings, show zinc, lead and silver ore in a 4′ vein in limestone formation. The vein runs E. W. and dips N. Developed by 500′ tunnel to depth of 130′. A 3′ vein containing ore running 3½% vanadium oxide reported under development in 1919. Small shipments of lead-zinc ore netted $941 in 1916; $1,832 in 1917; $64 in 1918.

KATTENHORN MINE **NEVADA**

Operated by Kattenhorn Bros.

Property: at Hilltop, S. E. of Battle Mountain, Lander county. Ore occurs in fissure vein in quartzite, and is highly silicious.

Shipments during part of 1918 to the Mammoth smelter at Kennett, Calif., amounted to 100 tons per month, running up to 35 oz. in silver.

The smelter is not operating (1919) and the mine was idle until July, when lessees were reported making small shipments.

KENNEDY CONSOLIDATED MINING CO. **NEVADA**

Office: Yerington, Nev. Mine at Buckskin, Douglas county, Nev.

Utah people, headed by J. F. Cowan, took over this property in June, 1917, from the previous owners, the Kennedy Cons. Gold M. & M. Co., of which W. C. Pitt was president.

Property: 7 claims, 110 acres, patented, in Buckskin district, Douglas county, developed by 3 shafts, 90′, 147′ and 250′ deep and by one 240′ tunnel, said to expose some large bodies of ore, mostly sulphides with gold, silver and copper. Water forced a suspension of work below the 250′ level, where drifting was under way at last accounts. Mine is 4 miles from Nevada Copper Belt railroad and has power line within 1 mile.

Equipment: includes air-compressor, electric hoist and necessary buildings.

KENTUCK MINING CO. OF NEVADA NEVADA

Office: 264 Russ Bldg., San Francisco, Calif.

Officers: Wm. Bannan, pres.; E. G. Fisher, v. p.; J. B. Shaw, sec., Wells Fargo Nev. Natl. Bank., treas.

Inc. Jan. 6, 1912, in California. **Cap.,** $1,050,000; shares $10 par. Listed on New York Curb.

Property: at Gold Hill, Storey county, has been idle many years.

KEYSTONE CHROME MNG. CO. NEVADA

Address: Mina, Nev.

Inc. June 24, 1919, in Nevada, by J. M. O'Brien, B. E. Bonner, C. H. Goodnight, and Zeb Bonner. **Cap.,** $100,000; 10c par.

KIMBERLY CONSOLIDATED MINES CO. NEVADA

Office: 1200 Liberty Bldg., Philadelphia, Pa. **Mine office:** Hilltop, Nevada.

Officers; Frank LeBar, pres.; Geo. A. Ford, v. p.; B. A. Miller, sec.-treas.-mgr., with Chas. A. Beach, S. P. Curtis and John L. Cox, directors. J. E. Fenstermaker, supt.

Inc. 1910, in South Dakota. **Cap.,** $5,000,000; shares $1 par; 4,297,916 shares issued. Stock listed on the San Francisco Exchange. Annual meeting in May.

Property: 18 claims, all patented, 360 acres, at Hilltop, Lander county, shows gold, silver, copper and lead ore in quartz veins. The vein runs N.-S., dips W., and is said to have been proven for 5,000′ in length. A crosscut driven on the 350′ level reported to have cut a 12′ vein assaying $9.48 per ton. Developed by 5,000′ tunnel and several shafts.

Equipment: included compressor, ½ mile tram and 25-h. p. gasoline engine, 50-ton mill and cyanide plant.

No recent returns received.

KIMBERLY SHIPPER MINING CO. NEVADA

Office: 1337 Roosevelt Ave., Salt Lake City, Utah.

Officers: W. S. Gilsey, pres.; F. L. Sumpter, v. p.; C. W. Fleck, sec.; Salt Lake City, Utah; C. L. Shelley, treas., with G. H. Gould, directors.

Inc. in Utah. **Cap.,** $50,000; shares 5c par.

Property: 60 acres at Hilltop, Lander county, 20 miles E. of Battle Mountain, shows gold-silver ore. Developed by 800′ tunnel and drifts. A shipment to the U. S. smelter in December, 1915, yielded $75 per ton. No recent returns.

KINSLEY DEVELOPMENT CO. NEVADA

Idle, and probably dead.

Officers: at last accounts, John D. Kendall, pres., Felt Bldg., Salt Lake City, Utah; W. M. Bradley, v. p.; Newton A. Dunyon, sec.-treas. and mgr.; R. J. Deighton, asst. sec.; preceding with B. F. Beaur and Wm. Pischell, directors.

Cap., $1,000,000; shares $1 par.

Property: 28 miles from Currie, Elko county, on Nevada Northern railroad, shows limestone cut by parallel N.-S. fissures, which carry copper ore at the south end of the property and lead ore 1½ miles north. Worked intermittently by lessees. Had steam plant, 3 hoists, compressor and a concentrating mill erected 1909.

KIRCHEN MINES CORPORATION NEVADA

Property: St. Patrick group at Luning, Mineral county, sold at sheriff's auction, September, 1918, to satisfy a judgment for $2,168.

KIRK MINE NEVADA

Address: Chas. J. Wilson, owner, Hilltop, Nev.

Property: 2 claims, 40 acres, in Hilltop mining district, Lander county, developed by 140′ tunnel to depth of 70′. Ore is a sulphide, occurring as contact deposit in porphyry and gneiss, with shoots of ore reported to assay 38% antimony.

Gross returns from shipments in 1918 were $1,400, and expenditure $900.

KLAMATH MINING & MILLING CO. **NEVADA**

O. W. Robertson, pres., Klamath Falls, Ore. Holdings in Jumbo district, near Virginia City, said to show 12′-20′ ledge developed by crosscut tunnel.

LADY WASHINGTON CONSOLIDATED CO. **NEVADA**

Idle. **Office:** 255 California St., San Francisco, Calif.

Inc. 1878, in California. **Cap.,** $108,000; shares $1 par. Listed on New York Curb.

Property: on Comstock Lode, at Goldhill, Storey county, is practcally unworked. Assessments made at intervals.

LAHONTAN MINES CO. **NEVADA**

Address: Parker Liddell, Ramsey, via Virginia City, Storey county, Nevada.

Officers: B. P. Howell, pres.; M. Eddy, v. p.; Parker Liddell, sec.-treas.

Property: discovered in 1906, formerly that of the Ramsey Comstock Mining Co., 15 miles N. W. of Virginia City. In August, 1919, the old workings were being cleaned out and the shaft sunk from 330 to 440′. Three levels show from 3 to 8′ of gold-silver ore, which averaged $35 per ton in milling. A 30-ton mill produced $35,000 worth of bullion which, with shipping ore, gave a total of $80,000 gross receipts from operations.

LA TOSKA MINING CO. **NEVADA**

See Humboldt Cons. Mines Co.

LAS VEGAS GOLD-SILVER MINING CO. **NEVADA**

Inc. June, 1919, in Nevada. **Cap.,** $100,000; shares 10c par.

Property: 23 miles S. E. of Las Vegas, Clark county.

LEAD KING MINING & MILLING CO. **NEVADA**

Idle. **Office:** Continental Nat'l Bank Bldg., Salt Lake City, Utah.

Officers: A. P. Spitko, pres.-mgr.; J. J. Kellogg, sec.

Inc. 1899. **Cap.,** 300,000 shares; 10c par; assessable; 254,000 shares issued. Stock listed on Salt Lake Exchange.

Property: 15 claims, 8 patented, 250 acres, in Duck Creek mining district, White Pine county, said to carry high-grade galena ore with small value in silver occurring in gray and blue limestone formation. Developed by 700′ tunnel.

Shipments: to date total 20 carloads, netting $23,000.

LEADVILLE MINES CO. **NEVADA**

Office: Box 5021, Reno; and Gerlach, Nev.

Officers: A. A. Codd, pres.; F. M. Manson, v. p.; W. H. G. Buck, sec.-treas., with T. J. Dunn and R. H. Bates, directors.

Inc. Jan. 3, 1920, in Nevada. **Cap.,** $150,000; 10c par; non-assessable, 750,000 shares in treasury. Initial offering of 50,000 shares at 25c each made early in 1920.

Property: 3 claims, 61 acres, including the John Harnan property in the Leadville district of Washoe county, 40 miles by good road N. of Gerlach on the W. P. R. R. Previous owners mined ore worth $200,000. Claims show diorite-porphyry, traversed by a quartz vein carrying silver-lead ore containing zinc, and a little gold.

Development: by the 1,700′ Floyd or main tunnel, with 300′ winze on vein at point where tunnel cuts it. Over 1,000 tons of ore is ready for the mill.

Equipment: hoist, 2-drill compressor, 30-h. p. gasoline engine, pump, and 50-ton mill employing crusher, rolls, screens, jigs, classifier, concentrators, and two 80-h. p. F.-M. oil engines.

LIBERTY GOLD MINES CO. **NEVADA**

Address: Frank H. Bird, pres.-mgr., Tuscarora, Nev.

Property: 7 claims, 140 acres, in Deep Creek district, Elko county, developed by tunnels to depth of 625′. **Ore:** occurs in a porphyry intrusion. Values are in gold-copper-silver.

Management reported having 5,000 tons of $50 ore ready for shipment in February, 1919. A 100-ton flotation mill is planned for 1920.

LIBERTY GROUP **NEVADA**

Address: Jas. G. Lindsay, owner, Commercial Trust Bldg., Philadelphia, Pa. W. H. Aubrey, mgr.

Property: a mine at Liberty, 20 miles from Tonopah, Nye county, which was worked in the 70's, the old workings reaching a depth of 700'. Recent work said to have opened an orebody 10' wide at depth of 60', assaying 60 oz. silver and 6½% lead. Operated intermittently.

LINCOLN HILL MINING & MILLING CO. **NEVADA**

Office: Lower Rochester, Nev.

Officers: C. D. DeLorme, pres.-mgr.; F. L. Reber, v. p.; F. B. DeLorme, sec.-treas., with John M. Adams and Adam Patterson, directors.

Inc. April 8, 1913, in Nevada. **Cap.,** $1,750,000; $1 par, increased 1917 from $1,000,000.

Property: Lincoln Hill mine, 2 claims and a fraction, 45 acres, on Lincoln Hill, Rochester mining district, Pershing county.

Ore: occurs in well-defined fissure veins. Samples from a 40' vein under development in the east end of the tunnel assayed $62 in gold and silver.

Development: by 1,600' of tunnels, raises and winzes.

Equipment: includes electric power, compressor, power drills, hoist, 2-stamp mill of 12 tons daily capacity. Management plans enlarging mill and installing electric power. Over 500 tons of ore have been milled to date, averaging better than $100 per ton.

LONE MOUNTAIN MINING CO. **NEVADA**

Operated under bond the Rip Van Winkle mine of the Alaska Improvement Co., which see.

LONGFELLOW GOLD M. & M. CO. **NEVADA**

Address: Carman Heights, Gardnerville, Nev.

Officers: W. I. Boardman, pres.; H. H. Fisher, v. p.; E. W. Carman, sec.-treas.-mgr., with Dr. M. A. Albe, J. M. Albe, C. L. Hale and J. R. Miller, directors.

Inc. 1903, in Nevada. **Cap.,** $1,500,000; $1 par; 1,325,000 issued.

Property: 8 claims, 150 acres, in Red Canyon district, Douglas county, said to show quartz veins in monzonite averaging $10 in copper, gold, silver and lead.

Development: by 265' shaft and 845' tunnel to depth of 415'.

Equipment: includes gasoline hoist, compressor, pump, 30-ton mill.

Management plans further development work and enlarging equipment.

LORING NEVADA MINES CO. **NEVADA**

Address: Lovelocks, Pershing county, Nev.

Inc. Sept., 1919, by W. A. Huston, A. Bermedetti, and J. C. Foster. **Cap.,** $150,000; 10c par.

Property: a group of claims in the Loring district.

No other information available.

LORING TREASURE HILL MINES CO. **NEVADA**

Address: Weir Bros. & Co., 25 Broad St., New York City.

Property: a group of claims southeast of the Honeybee mine at Loring, Pershing county. Surficial indications said to be good. Ore carries free gold. A carload sent to smelters yielded $68 per ton. Dumps contain several hundred tons of $10 ore.

LOUISIANA CONSOLIDATED MINING CO. **NEVADA**

Offices: 25 Broad St., New York City; and 305 Nat'l Bank Bldg., Tonopah, Nev.

Officers: Julius Siegbert, pres.; Herman Rawitser, v. p.; L. A. Dessar, sec.; R. S. Nichols, treas., with Jas. E. Osborn, Wm. V. Creighton and Fred Housman, directors. Fred W. Draper, gen. mgr.

Inc. May 17, 1912, in Nevada. **Cap.,** $100,000; 10c par; increased to $2,500,000; $1 par; 1,590,325 issued. Bonds authorized $250,000; outstanding, $95,000. Listed on New York Curb and San Francisco Exchange. Quoted at 50c, October, 1919. Registrar & Transfer Co., New York, registrar.

Property: 43 claims and a fraction, 808 acres, including the Tip-Top

mine at Mt. Montgomery. Oneota district, 5 miles from the S. P. narrow gauge railroad, running from Mina, Mineral county, Nev., to Keeler, Calif. Company also owns approximately 75% of capital stock of Nevada Sm. & Mines Corp., which in turn owns about 90% of capital stock of Tybo Cons. Mng. Co., and entire issued capital stock of Southwestern Nevada Mines Co., and controls through these companies the Tybo mine at Tybo, the Southwestern mine at Reveille. Company has a 20-year operating agreement from 1917 on the Tybo mine, paying 30% of the profits to the owners, and a 10-year lease from 1917 on the adjoining Diminick mine.

Stockholders in the Nevada Sm. Corp. were permitted to exchange their holdings on a basis of 10 shares of Nevada Sm. for 3 shares of Louisiana Cons.

Geology: the Tybo mine is said to show a fissure vein on a limestone-rhyolite contact with N. E.-S. W. course, and nearly vertical dip, the ore averaging 19 oz. Ag., 0.15 oz. Au., 11% Pb.

Development: by 400′ shaft with winze being sunk to 600′ and 2,700′ of lateral workings.

Reserves are estimated by company's engineer to amount to $2,000,000 worth of silver-lead ore blocked out, with a minimum annual profit of $200,000 assured for at least 10 years.

Equipment: includes 125-ton concentrator with 3 flotation units, pump, electric hoist, etc., with electric power supplied by power company.

Up to September, 1918, company had expended about $100,000 on the Tybo mine, and despite glowing press reports, had run into debt, in an unsuccessful attempt to put the property on a profitable basis. Operations were suspended until October, 1919, when new management started sinking to the 600′ level. The mill, and a smelter were expected to be in operation during January, 1920. It is estimated that the Tybo can produce 125 tons of ore daily, yielding a net profit of $15 per ton.

LOVELOCK WILLARD MINES CO. **NEVADA**

Address: Lovelocks, Nev.

Officers: W. H. Goodin, pres.; O. H. Oleson, 1st v. p.; L. S. Young, 2nd v. p.-treas.; J. J. Garner, 3rd v. p.; J. L. Thaw, sec.

Inc. May, 1919, in Nevada.

Property: the Treasure Hill group adjoining the Honey Bee mine, 6 claims, 10 miles from Lovelocks, Pershing county, reported to carry 3 well-defined veins, the main orebody, 18′ wide, giving assays of from $20 to $70 in silver per ton. Development is by tunnel. It is a prospect examined by Oscar A. Hershey.

LOWNEY MANGANESE ASSOCIATION **NEVADA**

Address: J. M. Carter, supt., Las Vegas, Nev.

Property: adioins the holdings of the Manganese Association, Inc., near Las Vegas, Clark county, developed by 60′ shaft and 50′ drift said to show a lens of ore from 4 to 8′ wide, averaging 38-48% Mn. No shipments reported.

LUCKY BOY CONSOLIDATED MINING CO. **NEVADA**

Address: care J. H. Miller, Hawthorne, Nev.

Officers: Jesse Knight, pres.; John H. Miller, v. p. and gen. mgr.; W. Lester Mangum, sec. Company controlled by the Knight Investment Co., of Utah. Total dividends paid, $125,000.

Inc. in Utah; 2,681,763 shares issued; assessable.

Property: the Lucky Boy mine, under the town of Lucky Boy, about 5 miles from Hawthorne, Mineral county, shows silver-gold-lead-copper ore in a vein in limestone near granite. Ore contains galena and tetrahedrite with quartz and some calcite, in lenses and shoots, in a vein which runs N. 80°-85° E. and dips 65°-75° S. Geology fully described in U. S. G. S. Bull. 594, p. 153.

Development: by 1,000′ Hubbard shaft with drifts E. and W. at 100′ intervals and by a deeper drainage tunnel, 6,200′ long.

The big ore-shoot, which produced $800,000 in 8 months and half as much more in the next year, has been mined out except where narrow. No stoping ore was cut in the lower tunnel, but there is much unworked ground in the mine and much virgin territory in the property.

Equipment: includes air compressor, electric motors, machine drills and useless 10-stamp mill.

Lessees are reported to have mined ore worth $100,000 during the 12 months ended October, 1919. Their work has not revealed any new orebodies. In November, the Haller lease shipped 15 tons of 350 oz. silver and 18% lead ore. In October, the company decided to resume operations, and levied an assessment of 1c per share. The Mills property adjoining, and the townsite and water supply of Hawthorne was acquired, a total of 2,000 acres.

LUCKY DEPOSIT MINING CO. **NEVADA**

Officers: L. G. Hardy, pres.-gen. mgr.; J. P. Cahoon, v. p.; C. W. Knudsen, sec.-treas., with A. N. Olsen, directors, at last accounts.

Inc. March 1, 1914, in Utah.

Property: 9 unpatented claims at Aurum, White Pine county, said to show copper ore with some silver-gold values, running $45-$50 per ton.

Development: by 175′ crosscut tunnel cut along a porphyry dike said to measure 200′ across. The tunnel being driven to reach depth of 300′.

A little ore was shipped in 1917. No recent returns.

LUNING CONS. SILVER MINES CO. **NEVADA**

A merger, early in 1920, of the Luning Gold Mines Co. and R. B. Todd Mining Co. and controlled by L. A. Browne and associates of San Francisco and New York.

Address: Gazette Bldg., Reno, Nev., and 1482 Broadway, New York. A. E. Lowe, supt., Luning, Nev.

Officers: L. E. Browne, pres.; A. E. Lowe, v. p.-treas.; with E. P. Baker, R. B. Todd and Frank Dunn, directors. C. D. Olney, sec.

Property: 23 claims, 460 acres, in the Luning district of Mineral county. Country rock is quartz diorite. Ore is partly sulphide, carrying gold and silver. Mr. Lowe's report says veins average 3′ of $25 ore, two-thirds of it silver; one-third gold.

Development: by 300, 100 and 120′ shafts, also by several tunnels, two being 700′ long. Workings amount to over 5,000′, blocking out ore valued at $250,000.

Equipment: steam power, hoists, aerial tram, orebins, dwellings; mill to be built in 1920.

Production: $30,000 during past 15 years, under management of R. B. Todd.

LUNING GOLD MINES CO. **NEVADA**

Merged early in 1920 into the Luning Consolidated Silver Mines Co. of Nevada, which see.

LUNING-IDAHO MINING CO. **NEVADA**

Office: Reno, Nev. **Mine office:** Luning, Mineral county, Nev. **New York office:** 1482 Broadway.

Officers: Robt. B. Todd, pres and gen. mgr.; R. G. Withers, v. p.; G. M. Todd, sec.-treas., with A. D. Cox and W. T. Erickson, directors.

Inc. April 29, 1910, in Nevada. **Cap.,** $1,500,000; $1 par; 1,116,533 issued. Operating expenses for 1916, $20,000; 1917, $24,505; 1918, $5,282.

Property: 13 claims, 260 acres, in the Pilot range in the Santa Fe mining district, shows several fissure veins in granite and quartzite, said to carry 2½% copper, 2 oz. silver and about 60c gold per ton.

Development: by shafts, open cuts and tunnels, with about 3,000′ of workings to depth of 200′. Longest tunnel driven about 682′ across the mineralized zone is near the hanging wall granite.

Equipment: includes hoists, compressor and drills.

Last shipments made in 1917. A flotation mill is planned. Property reported on by M. H. Jacobs, J. C. Skuse, S. B. Parish and Wm. G. Oliver. Operations during 1918-'19 were limited, owing to lack of working capital.

LYNN BIG SIX MINING CO. **NEVADA**

Office: 701 McIntyre Bldg., Salt Lake City, Utah. **Mine office:** Carlin, Nevada.

Officers: Henry Harker, pres.; R. M. Holt, v. p.-sec.-treas.-mgr.; with L. A. Marks, Swen Nelson and Wm. Brown, directors. Geo. Z. Edwards, supt.

Inc. 1912, in Nevada. **Cap.,** $250,000; shares 25c par; assessable; 850,000 shares outstanding. Assessment No. 4 of 2½c levied December 7, 1917.

Property: 12 claims, 1 patented, 220 acres, at Goldville, via Carlin, Elko county. Ore occurs in fissure veins in porphyry and rhyolite. The main orebody has a N.-S. course with dip of 45°, ore occurring in shoots 2 to 8′ long, and reported to assay from $2 to $300 per ton.

Equipment: includes gasoline hoist and 10-ton amal. mill.

Production: milled 1,000 tons, and 10 carload shipments to smelters in 1918 said to have averaged $80 per ton.

MAJUBA SILVER, TIN & COPPER CO. NEVADA

Address: 315 Nixon Bldg., Reno, Nev. G. S. Brown, pres.; Jack Welch, mgr.

Inc. 1919, in Nevada. **Cap.,** $200,000; shares 10c par.

Property: 79 claims, 1,580 acres, 20 miles E. of Imlay, Humboldt county. Operated under option by Mason Valley Mines Co., which see. Reserves are estimated as 50,000 tons of sulphide ore, assaying 3% copper and 1.95 oz. silver per ton and 1,000 tons of 12% and 1.4 oz. About 2,000 tons smelted yielded 12% and 1.4 oz. Some tin ore has been found, and is to be developed.

MAMMOTH GOLD MINING CO. NEVADA

Office: 127 Montgomery St., San Francisco, Cal.

Officers: J. W. Lowe, pres.; Wm. P. Wrixon, v. p.; Leon C. Osteejee, sec.; E. H. Norman, treas., with E. M. Robitscher, J. C. Romaine and J. H. Wyruck, directors.

Cap., $100,000; par $1; assessable; 17,500 shares outstanding. Assessment No. 4 of 2c levied November 1, 1917.

Property: 2 patented claims, 40 acres, in southern part of Manhattan mining district, Nye county, said to show gold-silver-copper ore. Development is by 250′ vertical shaft. Idle several years.

MANGANESE ASSOCIATION, INC. NEVADA

Control purchased for $100,000 in 1918, by Thos. Thorkildson, Trust & Sav. Bk. Bldg., Los Angeles, Calif.

Property: the Three Kids claim, 16 miles S. E. of Las Vegas, Clark county, said to carry the largest known sedimentary deposit of high-grade manganese ore, assays averaging 40% Mn. and 12% SiO_2.

Ore is composed mainly of psilomelane and pyrolusite, occurring in a lenticular mass outcropping near the base of the foothills. It is very soft and light and occurs in a stratified deposit, the beds striking N. 50° W., with dip of 15° N. E. The ore exposed in the face of an open-cut 200′ long averages 25′ in thickness, and the lateral extent of the deposit unknown.

During four months operations by lessees in 1917, shipments amounted to 6,500 tons. In the first part of 1918 daily production was reported as 150 tons shipped East under contract. The slump in price and lack of demand resulted in the mine being shut-down in March, 1919.

MANHATTAN BIG FOUR MINING CO. NEVADA

Idle. Harry B. Ruhl, sec., Goldfield, Nev. L. K. Koontz, pres.; J. H. Thatcher, v. p.; C. Wilson, treas., with W. G. Saunders, directors.

Inc. 1906, in Nevada. **Cap.,** $1,000,000; outstanding, $784,000; shares $1 par. Listed on San Francisco Stock Exchange.

Property: 60 patented claims at Manhattan, Nye county, Nev.

Development: to 500′ level by shafts. High-grade ore was extracted by early lessees and the ore remaining is exceedingly low-grade. About the only way to treat it profitably would be to mine the Big Four hill by steam shovels and even this method is uncertain. At last accounts, Mushett and Wittenberg were trying to find the extension of the high-grade orebody.

Owns 100-ton mill, closed down, 1913. No news for several years.

MANHATTAN CONS. MINES DEVELOPMENT CO. NEVADA

Address: P. O. Box 921, Tonopah, Nev. **Mine office:** Manhattan, Nev.

Officers: J. H. Miller, pres.; W. J. Douglass, v. p.; E. J. Erickson, 2nd v. p.; C. C. Boak, sec.-treas., with C. F. Wittenberg, F. M. Manson and W. J. Webster, directors. M. N. Page, supt.

Inc. 1913, in Nevada. **Cap.,** $1,500,000; $1 par; assessable; 1,350,000 issued. Assessment No. 10 of 1c levied January, 1919. Listed on San Francisco Exchange.

Property: 5 patented claims, 82 acres, in Manhattan district, Nye county, Nev. Litigation with White Caps company was settled in 1917, after 5 years.

Geology: ore occurs as shoots up to 42′ wide in contact and chamber deposits in lime-shale. Assays from $18 to $30 per ton.

Development: by 565′ shaft and 3,500′ of workings, said to have blocked out 40,000 tons of $16 ore. On the 3rd level an 8′ orebody was reported to have been opened up for a distance of 25′, in May, 1919.

Equipment: 50-h. p. electric hoist, 6-drill compressor, and triplex pump.

MANHATTAN COPPER MINING & MILLING CO. NEVADA

Idle. Pioche, Lincoln county, Nev. Company succeeded the Manhattan Gold & Copper Mining Co. and is owned by the Cons. Nevada-Utah Corporation, successor of the Nevada-Utah Mines & Smelters Corporation.

Property: 7 claims, one in the Ely mining district, developed by 120′ shaft, showing manganese, iron, silver, lead ore. The other 6 claims are at Stampede Gap in the Highland district of Pioche and show small veins of silver-lead and copper ore. Developed by 130′ shaft.

MANHATTAN DEXTER MINING CO. NEVADA

Address: Manhattan, Nev.

Officers: S. R. Moore, pres.; C. F. Wittenberg, v. p.; C. T. Lawrence, sec.-treas.

Inc. in South Dakota. **Cap.,** $1,500,000; shares $1 par. Stock listed on San Francisco Exchange.

Property: 1 patented claim, at Manhattan, Nye county, Nev., operated intermittently by lessees in 1915-'17. Union No. 9 claim has 2 sets of lessees, who are mining gold ore.

MANHATTAN MORNING GLORY MINING CO. NEVADA

Property: adjoins holdings of the White Caps Mining Co., near Manhattan, Nye county. Apex suit brought against the latter company decided adversely for the claimants, March, 1918.

Stock listed on San Francisco Exchange.

MANHATTAN MUSTANG MINING CO. NEVADA

Manhattan, Nye county, Nev. Property mostly held by Tram-Chase lessees, who reported mining rich ore, at last accounts.

Stock listed on San Francisco Exchange.

MANHATTAN RED TOP MINING CO., REORGANIZED NEVADA

Office: 126 Russ Bldg., San Francisco, Cal.

Officers: H. Zadig, pres.; W. E. Colburn, v. p.; C. E. Hudson, sec.-treas.; also directors. N. K. Franklin, supt.

Inc. Oct., 1912, in Nevada, as successor to the Manhattan Red Top. **Cap.,** $1,500,000; shares, $1 par; 1,000,000 issued; assessable. Two assessments of ½c each levied December, 1917, and June, 1918.

Property: 60 acres in Manhattan district, Nye county, Nev.

Development: by 200′ shaft with crosscuts and drifts on the 110′ level.

Equipment: 40-h. p. hoist, compressor, drills, etc., electric power.

A prospect whose shares have been extensively traded in on the San Francisco Stock Exchange.

Work was discontinued March, 1918, owing to a heavy flow of water and inadequate equipment.

MANHATTAN SUNRISE MINING CO. NEVADA

Address: Manhattan, Nev.

Inc. 1917. E. H. Mead, pres.; Wm. Forman, v. p.; John M. Gregory, treas.-sec., with E. C. Smith and Zeb Kendall, directors.

Property: lies east and northeast of the White Caps Extension holdings, near Manhattan, Nye county. No record of operations securable.

MANHATTAN UNION AMALGAMATED MINES SYN. NEVADA

Is a reorganization of the Union Amalgamated Mining Co., fully described Volume XIII. **Office:** Tonopah, Nev.

Officers: C. F. Wittenberg, pres.-mgr.; L. L. Mushett, v. p.; Chas. D. Olney, sec., 265 Russ Bldg., San Francisco, Calif., with O. A. Newcomer and M. W. Burdick, directors.

Inc. Nov., 1917. **Cap.,** $200,000; 10c par; assessable; 1,814,209 outstanding. Three assessments levied to July, 1919. Stockholders in the Union Amalgamated were given the privilege of exchanging their stock, share for share, upon payment of a 2c per share assessment.

Property: 6 patented claims, 120 acres, on Litigation hill, Manhattan, Nye county, said to show gold-silver ore in fissure veins. Development is by 600′ shaft.

Equipment: includes 20-ton cyanide mill.

Production: under former management was about 10,000 tons of ore. Mine has been closed down since 1918.

MARICOPA MINES CO. NEVADA

Austin, Lander county, Nevada. See same under Arizona.

MARINETTE MINING & MILLING CO. NEVADA

Address: P. O. Box 1258, Goldfield, Nev.

Officers: R. H. Tune, v. p.-mgr.; W. L. Boak, sec.-treas., with D. H. Dunn, A. H. Elftman and R. S. Cook, directors.

Inc. Nov. 12, 1918, in Nevada, as a reorganization of the Marinette Nevada Mining Co. **Cap.,** $1,000,000; 10c par; assessable; 511,326 shares outstanding. Annual meeting, first Tuesday in January.

Property: 9 claims, 8 patented, 180 acres, in Klondyke district, 14 miles N. of Goldfield, Esmeralda county.

Ore: contains silver chloride in quartz fissure vein, 1 to 4′ wide, with N. E.-S. W. course and dip of 30°. Assays said to average $12 to $18 in silver-lead.

Development: by 600′ incline and 150′ vertical shaft to depth of 200′, with a total of 1,000′ of workings. Management plans development at depth. Shipments by former company were made to the Kennett smelter, California.

MARINETTE NEVADA MINING CO. NEVADA

Succeeded, 1918, by Marinette Mining & Milling Co., which see.

MASCOT SILVER MINING CO. NEVADA

Address: Pioche, Nev. Organized 1918 by John R. Cook, Judge Chas. Lee Horsey, H. W. Rand, and J. B. Thompson.

Cap., $1,000,000; $1 par; 400,000 shares held in treasury.

Property: Boston-Pioche group of 12 claims, formerly known as the Yuba East group at Pioche, Lincoln county, developed to depth of 800′. Returns from ore shipments said to have paid for development work during 1918.

MASON VALLEY-BLUESTONE EXTENSION MINES NEVADA

Address: 1014 Boston Bldg., Salt Lake City, Utah.

Officers: C. W. Reese, pres.; A. G. Gutheil, v. p.; G. M. Sullivan, sec.; H. C. Jex, treas., with O. P. Soule, W. E. Evans, and Henry Barney, directors.

Inc. in Utah. **Cap.,** $100,000; shares, 10c par; 500,000 shares held by Trustee. Listed on Salt Lake Exchange. Is a reorganization of the Mason Valley Extension Mining Co.

Property: 48 acres, 20 patented, in Mason district, near Yerington, Lyon county, Nev.

Geology: claims cover contact metamorphic deposits of copper near porphyry, and grano-diorite, the ore occurring in crushed limestone.

Development: by 350′ shaft. Management hoped to find the same ore zone as in the Mason Valley and Bluestone mines, at last accounts.

MASON VALLEY EXTENSION MINING CO. **NEVADA**

Re-organized under name of Mason Valley-Bluestone Extension Mines, which see.

MASON VALLEY MINES CO. **NEVADA**

Office: 14 Wall St., New York. **Mine office:** Thompson, Lyon county, Nevada.

Officers: Wilber Judson, N. Peter Rathvon, David E. Thomas, Frank W. Holmes and E. O. Holter, v. p's.; Henry E. Dodge, sec.-treas.; preceding with John F. Alvord, C. A. Corliss and C. F. Ayer, directors. A. J. McNab, gen. mgr.

Inc. Jan. 14, 1907, in Maine. **Cap.,** $2,500,000; $5 par; increased March 14, 1910, from $1,000,000, shares $1 par; all issued. Bonded debt is $612,500 in authorized $1,000,000 first mortgage 10-year 6% gold bonds, convertible into stock on the basis of $10 per share and redeemable on 31 days' notice at 102½ and accrued interest.

The mortgage contains a sinking fund provision, by which the company is required to pay to the trustee within 60 days after January 1, each year, beginning 1912, 20c for each net dry ton of ore treated during the year preceding, with a provision whereby the sinking fund payments may be reduced proportionately, as outstanding bonds are retired.

Guaranty Trust Co., New York, and United States Trust Co., Boston, registrars. Bankers Trust Co., New York, and Boston Safe Deposit & Trust Co., transfer agents. Shares listed on Boston Stock Exchange and New York Curb.

Annual report for year ending December 31, 1918, shows: Current assets, $1,723,767, and current liabilities, $205,558, compared with $1,639,347 and $214,065 in 1917. Net profit for 1918 amounted to $178,202, compared with $358,277 in 1917, and a deficit of $71,762 in 1916.

Property: 9 claims, patented, 170 acres, and a fractional claim of 10 acres, known as the Spragg mine, lying south of the Bluestone and about 1½ miles west of Mason. Company also owns a smelter and 1,320-acre smelter site near the railway.

The Gray Eagle property, 14 patented claims, 256 acres, near Happy Camp, Siskiyou county, Cal., was acquired in September, 1916, for 144,250 fully- paid Mason Valley shares, said to be worth $721,250. The title to the property is in the name of the Gray Eagle Copper Co., all of which shares are held by Mason Valley. In 1912, Henry Krumb estimated ore reserves as 450,000 tons, averaging 4.64% copper and $1 gold per ton. In 1916, O. R. Whitaker estimated as follows:

	Tons	Copper, %	Gold, Oz.	Silver, Oz.
Semi-oxide	50,000	5.00	0.06	0.20
Mineralized walls	600,000	1.13	0.025	Trace
Chalcopyrite	440,000	4.68	0.50	0.12

Up to June, 1918, about 8,000′ of underground work and 7,500′ of diamond-drilling was reported to have proved 930,000 tons of ore averaging .025 oz. gold and 3.04% copper, and 500,000 tons averaging 0.01 oz. gold and 1% copper.

The Majuba Hill group, 20 miles E. of Imlay, Humboldt county, has been developed under option since 1916. During 1917, 1,752′ of work was done, and in 1918, 2,650′; said to have opened promising ground in the No. 3 tunnel. A total of $142,509 had been expended on the Majuba group to December 31, 1918. Shipments amounted to 788 tons of 11.51% copper ore in 1918, and in 1917, 300 tons averaging 10% copper. The total to September, 1919, was 2,000 tons, yielding 12% copper and 1.4 oz. silver.

In April, 1919, the company was reported to have taken an option on the Northern Light mine, near Schurz, and to have started sinking a shaft.

Geology: Nevada property, an oxidized garnet deposit between limestone and andesite, partly covered by rhyolitic tuffs. The latter rocks are comparatively soft and have been eroded into steep escarpments and sharp gulches. Ore is of contact metamorphic character, being an altered limestone of 30′ average width. Surface ore shows malachite with a little cuprite, succeeded, at about

100′ depth, by cupriferous pyrite, largely massive, with copper in the form of chalcopyrite. The mine is said to have some ore averaging 10% copper, but the average is about 3.5% copper. An average analysis shows 16 to 17% iron, 16 to 18% lime, 12% sulphur and 38% silica.

Development: has been done by means of crosscut tunnels driven from the surface to the ore-bearing zone. Drifts have been run N. and S. following the general course of the orebodies. Crosscuts have been extended E. and W. from the main drifts. The workings reach a depth of about 550′. The mine has been worked by the shrinkage stope system and good results have been obtained by this method. A very considerable tonnage of low-grade carbonate and sulphide ores, with a small quantity of high-grade ores have been developed. Actual development work was begun March, 1907, and workings aggregated 29,358 on December 31, 1918.

Equipment: a 6,250′ tramway, with drop of 600′, of 100 tons hourly capacity, connects the mine with the Nevada Copper Belt railway, which line connects with the company's smelter, 16 miles distant.

The smelter, built at a cost of approximately $600,000, is about 2½ miles from Wabuska, on the Southern Pacific railway, and about 16 miles from the mine. The plant consists of a sampling mill for custom ores, extensive storage bins, a blast-furnace building, with two furnaces of 1,800 tons daily capacity, a sintering plant, power house, machine shop, plate shop, smithy and carpenter shop. Two stands of 12′ converters of the Great Falls type, were installed, 1913.

The smelter was blown in January 16, 1912, and one furnace was in continuous operation to October 20, 1914. Custom smelting was almost entirely discontinued in August and September, 1914, and economic conditions making it inadvisable to operate upon Mason Valley ore alone, the plant was closed down in October, 1914. Smelting operations were resumed February 13, 1917; and the second furnace put in operation in March. During 1917 the smelter treated 294,958 tons of ore and 13,390 tons of low-grade fluxes, of which 114,273 tons represented Mason Valley ore, amounted to 7,038 tons of blister copper containing 1,037 oz. gold, 46,257 oz. silver, and 13,914,764 lb. copper.

In 1918 the smelter treated 336,694 tons of ore and 11,689 tons of fluxes, 117,251 tons of which was company ore and 788 tons from properties under option, yielding 809 oz. gold; 91,824 oz. silver and 15,475,851 lb. copper.

Average price received for copper sold was 25.01c, compared with 28.09c in 1917. Income from ore sales in 1918 totaled $1,507,507 and operating costs $1,246,017.

Only one furnace was operated during the greater part of 1918 and the uncertain copper market caused a temporary closing down of mine and smelter, February 28, 1919. Production for January amounted to 947,336 lb. copper and in February, 947,336 lb.

If properly managed company should become a steady dividend payer as it has a good plant, strategic location and owns a good mine. In December, 1919, company was arranging for better rates so that ore and concentrate could be sent to its smelter from Plumas county, Calif. If this is done, the smelter will be enlarged by a reverberatory and custom work done. This request was refused in January, 1920. It now costs $10.50 per ton to ship concentrate from Paxton, Plumas county, California, to the smelter at Wabuska, a distance of 182 miles; but to Utah smelters, a distance of 600 miles, only $8.80 per ton.

MASON-YERINGTON MINES CO. **NEVADA**

Reorganization of the Utah-Yerington Mines Co.

Office: 1014 Boston Bldg., Salt Lake City, Utah. **Mine office:** Mason, Nevada.

Officers: at last accounts, C. W. Reese, pres.; A. G. Gutheil, v. p.; G. M. Sullivan, sec.; H. C. Jex, treas., with S. McCroskey, C. J. Guild and Ross Thompson, directors.

Inc. in Utah. **Cap.,** $1,000,000; 500,000 held by trustee.

Property: E. of the Mason Valley Mines Co., in Mason district, Lyon county, Nev., said to show 42″ of silver, gold, lead, copper ore, in limestone.

No recent information.

McCONNELL MINES CO. **NEVADA**

Office: care O. H. Sonne, pres, Yerington, Lyon county, Nev. **Mine office:** Mason, Lyon county, Nev.; S. B. Elbert, sec. and mng. engr.; with Mrs. O. H. Sonne and Mrs. S. B. Elbert, directors.

Inc. Sept. 14, 1912. **Cap.,** $500,000; shares $5 par; issued, 40,002 shares.

Property: 10 claims, 160 acres, patented, adjoining the Yerington Malachite mine on the west. Claims show limestone, shale and granite with argentiferous contact deposits in the contact zone near the grano-diorite. Property has 4 orebodies, 2 developed, averaging 25′ in width and carrying about 3.5% copper.

Development: by 400′ shaft and 3 tunnels. **Equipment:** includes a 25-h. p. hoist, 7-drill air compressor and 8 buildings.

Production: in 1918, shipments to Mason Valley smelter totaled 3,964 tons ore averaging 3.88% copper, producing 304,332 lb. copper.

Property regarded as good.

M. & D. MINING CO. **NEVADA**

Office: 903 Boston Blk., Salt Lake City, Utah.

Officers: U. Terasawa, v. p.-mgr.; P. A. Clark, sec.; S. Samota, treas., with H. A. Smith, A. T. Clark and H. A. Smith, Jr., directors.

Inc. Aug. 6, 1916, in Utah. **Cap.,** $10,000; shares 10c par; assessable. Annual meeting, August 6th.

Property: 17 unpatented claims in Eldorado canyon, Clark county, said to carry gold-silver-copper ore. A prospect.

MENDHA-NEVADA MINING CO. **NEVADA**

Idle and probably dead. **Mine office:** Pioche, Lincoln county, Nev. T. J. Osborne, pres.; M. C. Godbe, sec., Newhouse Bldg., Salt Lake City, Utah.

Cap., $1,000,000; shares $1 par.

Property: is said to have produced $500,000 under its former ownership. The mine is reported to have a vein 3 to 15′ thick, averaging 6′, practically vertical and showing silver and gold-bearing lead and copper ores on 700′ level. Development is by a 900′ incline shaft.

MERCURY MINING CO. **NEVADA**

Adddress: G. D. Abbott, sec., 1022 Crocker Bldg., San Francisco, Cal.

Mine office: Ione, via Austin, Nye county, Nev.

Officers: C. A. Norris, pres.; F. W. Bradley, v. p.; G. D. Abbott, sec.-treas.; Clifford G. Dennis, mgr.

Inc. May 7, 1910, in Nevada. **Cap.,** $1,000,000, all outstanding; shares $1 par. Annual meeting second Wednesday in January.

Balance sheet for 1918 shows assets: $1,079,364, which include property and plant, $1,042,541; supplies, $4,135; stock, $5,100; cash, $25,304; surplus, $2,284. Liabilities include operating accounts, $51,781; reserve account, $27,584.

Comparative Operating Statement:

	Gross Earnings	Operating Expenses	Operating Profits
1918	$51,363	$51,363	$26,702
1917	9,704	11,949	2,245*
1916	31,099	33,042	1,943*
1915	44,127	26,299	17,828
1914	16,110	17,868	1,758*

* Deficit.

Property: 10 patented claims near Ione, said to show cinnabar ore, Company has one 25-ton Scott furnace.

Production: in 1911-'12, 9,467 tons ore, 2,480 flasks mercury; in 1913, 7,715 tons ore, 1,013 flasks; in 1914, 2,100 tons ore, 384 flasks; in 1915, 5,375 tons ore, 417 flasks; in 1916, 73.14 tons ore, 399 flasks; in 1917, 94 flasks, and in 1918, 10,147 tons ore, 775 flasks. Flasks contain 75 lbs.

MERRILL SILVER-LEAD CO. **NEVADA**

Address: J. K. Turner, cons. eng., Goldfield, Nev. A. H. Merrill of New York is president, and G. H. Duell of Goldfield, is largely interested.

Property: 10 claims, 10 miles S. of Goldfield. A 6′ vein crosses the

ground for 1,800′, and samples have yielded up to 7.44 oz. silver per ton, as well as lead and a little gold. Formation is crystalline limestone. By December, 1919, $50,000 had been raised for development.

MEXICAN GOLD & SILVER MINING CO. **NEVADA**

Offices: 787 Mills Bldg., San Francisco, Calif, and Virginia City, Nev.

Officers: Whitman Symmes, pres.; J. H. Goldman, v. p.; A. P. Swain, sec., with J. P. Fraser, Geo. E. Bennett and C. W. Conliss, directors.

Inc. 1874, in California. Operations under former managements described in Vol. XIII. **Cap.**, $201,600; $1 par; assessable; all issued. Assessments during 1918 amounted to $56,848. Stock listed on New York Curb and San Francisco Exchange.

Property: 600′ along the Comstock Lode, bounded on the N. by the Union Consolidated and on the S. by the Ophir Silver, which, with the Cons. Virginia mine are under the same management. For geology see Vol. XIII, and U. S. Geological Survey Monograph No. 3.

Exploration work on the 2,700 and 2,900′ levels has been abandoned, and work confined to the 2,000′ level and above. This new work has not yet progressed far enough to develop ore.

Production: in recent years amounted to about $1,500,000 from the 2,200 to the 2,500′ levels, the ore averaging $33 per ton.

Equipment: includes 100-ton all-slime cyanide plant, operated under the name of the Mexican Milling Co., which is used by the Cons. Virginia, Ophir Silver, Sierra Nevada, and Mexican G. & S. companies.

MEXICAN MILLING CO. **NEVADA**

Offices: 787 Mills Bldg., San Francisco, Cal., and Virginia City, Nev. Whitman Symmes, gen. mgr.

Is an association of the companies using the mill of the Mexican G. & S. Mining Co.

MILL CITY TUNGSTEN CO. **NEVADA**

Address: W. J. Loring, Crocker Bldg., Can Francisco, Cal. Thos. Sutton, mgr., Mill City, Nev.

Inc. 1918, in Nevada. **Cap.**, $500,000; shares $1 par.

Property: a tungsten-bearing group near Mill City, Pershing county, developed by 400′ of tunnels and drifts. Ore occurs in a vein said to average 4′ in width with good value. Twenty-three men employed, and 30 tons of scheelite ore shipped daily to Toulon during part of 1918, prior to completion of the Pacific Tungsten Company's 125-ton mill in October.

Operations ceased in February, 1919, due to the tungsten market collapsing. Company spent a large sum on this property for war demands, and now asks for a refund from the Minerals Relief Commission of the Federal Government.

MINA COPPER SILVER MNG. CO. **NEVADA**

Address: Mina, Nev.

Officers: A. E. Bettles, pres.; Wm. Bouchard, v. p., and Geo. W. Myers, sec.-treas.; also directors.

Inc. July 24, 1919, in Nevada. **Cap.**, $150,000; 10c par.

MINA REWARD GOLD & SILVER MNG. CO. **NEVADA**

Address: 223 N. Virginia St., Reno, Nev.

Inc. June 5, 1919, in Nevada, by T. R. Hofer, L. T. Booth, J. J. Rossiter, V. S. Andrus, and A. B. Gudmendsen.

Cap., $150,000; 10c par.

MINERAL HILL CONSOLIDATED MINES CO. **NEVADA**

Address: Mineral Hill, Nev.

Officers: Frank Stollenwerck, pres.; S. F. Stollenwerck, v. p.; Daniel Pratt, sec.; J. S. Wilcox, treas, at last accounts.

Inc. 1906, in Arizona. **Cap.**, $1,000,000; $1 par; 713,000 issued; $100,000 6% bonds authorized; issued, $2,500.

Property: 11 claims, 3 patented, 135 acres, in Mineral Hill district, Eureka county, Nev. Mine discovered 1869 was worked from 1871 to 1878, when it was closed because of the drop in silver; re-opened in 1906.

Geology: ore occurs in fracture zones, along strike faults in blue dolo-

mitic limestone and carbonaceous shale. Ore carries silver, which occurs as argentite, with some gray copper, galena and gold. There is about 2,000′ of underground development.

Samples of over 4,000 tons varied from 3.8 to 177 oz. silver and 0.5% to 0.7% lead, averaging 53.5 oz. silver and 0.04 oz. gold. Presumably idle.

MINERVA TUNGSTEN CORPORATION NEVADA

Office: 330 Investment Bldg., Los Angeles, Cal., and Pioche, Nev.

Officers: Bryant Mathews, pres.; J. B. Van Winkle, v. p.; O. Werner, sec.-treas., with K. G. Gillette, A. M. Chase, and O. A. Knox, mgr., directors.

Inc. 1918, in Nevada. **Cap.,** $350,000; par $1; 250,000 issued. Operating expenses for past year totaled $35,000.

Property: 17 claims, 340 acres, in Minerva district, White Pine county, 55 miles N. E. of Ely and 77 miles N. W. of Pioche.

Examined by F. L. Hess, F. B. Weeks, E. R. Pembroke, J. B. Winwood, J. Nelson Nevius, S. R. Porter, O. A. Knox and M. van Sicklen.

Geology: scheelite ore occurs in a quartz vein in limestone dipping 55° with E. W. course and 9 to 50′ wide. Shoots are up to 750′ long. Ore carries 1 to 4% tungstic acid as scheelite.

Development: by 100′ vertical shaft and tunnels 200 to 350′ long. Greatest depth is 150′. Workings amount to 3,000′.

Ore blocked out is estimated at 25,000 tons, with 100,000 tons probable.

Equipment: gas engines, compresor, drills, 3½-mile pipe-line for water, 150-ton gravity concentrating mill, camp for 50 men, auto-trucks, etc.

Production: 10 tons of 70% concentrate from test runs.

Pending an improvement in the tungsten market, work is confined to development and experimental work in the mill.

MINES DEVELOPMENT CO. OF NEVADA NEVADA

Address: Lovelocks, Humboldt county, Nev.

Officers: John T. Reid, pres., treas. and gen. mgr.; Paul G. Reid, v. p., sec. and supt., with R. C. Moore, J. Theis, Peter Anker and W. H. Rawlis, directors, at last accounts.

Inc. Sept. 1, 1904, in Arizona. **Cap.,** $750,000; shares $1 par; issued, $454,000.

Property: 5 claims, 100 acres, in the Juniper Mountain district, said to show various fissure veins, alongside of quartz porphyry dikes, intrusive in monzonite. Veins run N. 20° W. and are nearly vertical. The vein developed averages 5′ wide, is traceable for 2,000′ and proven to 170′ depth. Small seams of ore found at or near surface show chalcocite, bornite and tetrahedrite, giving average assays of 2% copper, 5 oz. silver and $1 gold per ton.

Development: by a 500′ tunnel. An 800′ shaft to explore surface deposits at depth is proposed. Property has been idle for several years, owing to lack of funds and speculative character of claims.

Company also has some claims under option in the Table Mountain district, Churchill county, Nev. Two cars of sorted ore shipped are said to have returned 22 and 26% copper. Mine is remote from rail and only assessment work was done.

Company owns 60,000 shares of the Buffalo Valley Mines Co., which see.

MINNESOTA-NEVADA COPPER MINES CO. NEVADA

Formerly the Wabuska Copper Mines Co.

Address: Otto Taubert, Yerington, Nev.

Inc. in Nevada. **Cap.,** $3,000,000; $1 par.

Property: 600 acres in Douglas county and 160 acres in Lyon county, near Wabuska. The Minnesota group is said to show a contact deposit between limestone and granite of about 20′ average width, carrying sulphide ore.

Development: by 2 shafts, 1 of about 500′ depth, showing ore said to average better than 3% in copper tenor.

Reported that company is developing a large iron-ore deposit. In July, 1919, surveys had been completed for driving a half-mile drainange and transportation tunnel.

MINNESOTA NEVADA INVESTMENT CO. **NEVADA**

Office: 436 Endicott Bldg., St. Paul, Minn. Mine near Fairview, Churchill county, Nev.

Officers: Alf. Patterson, pres.; O. S. Deringer, sec.; M. P. Ryan, treas.; A. A. Day, gen. mgr.; Chas. A. Peet, mg. engr.

Inc. Aug. 6, 1906, in Oklahoma. **Cap.,** $1,000,000; $1 par; issued 690,000. Annual meeting, Aug. 6.

Property: 28 claims, 160 acres placer ground, total about 750 acres, on Chalk mountain, 3½ miles north of Fairview. Claims said to show several orebodies, of which 3 are 6′ average width and proven to depth of 126′, showing 2% copper, 32% lead, 26 oz. silver and $8 to $20 gold per ton.

Development: by 3 shafts, deepest 126′. Company succeeded to the property of the Corinthian Mining Co. and Chalk Mountain Copper Co. Idle several years.

MIZPAH CONS. COPPER & GOLD MINING CO. **NEVADA**

Out of business: property operated by Jersey Cons. C. & G. M'ng. Co.

MOGUL MINING CO. **NEVADA**

Dead. **Inc.** Oct. 11, 1916, in Delaware. **Cap.,** $1,000,000; $1 par; 932,500 shares issued. Was listed on New York Curb as a prospect in 1917, and the shares skyrocketed by rank manipulation.

Property: in the Rawhide camp, was sold by the sheriff for debt in 1918, and bid in by former president, Alexander S. Proskey, who organized the Seminole-Regent Mining Co., which see.

MONITOR-BELMONT MINING CO. **NEVADA**

Address: Belmont, Nye county, Nev.

Officers: G. A. Nelson, pres.; Hugh W. Nelson, sec.-treas

Property: 33 claims in Belmont district, 51 miles from Tonopah, Nev. District first opened in 1864 and yielded over $15,000,000 of silver to 1885. Mines were then closed until 1906, but it took 8 years to secure title to the present holdings. A mill was erected in 1915 and started treating old dumps in 1916, but closed down in 1917.

Geology: quartz veins and lenses occur in slate and limestone, near their contact with intrusive silicious granite. Intruded rocks have been altered to mica schists and jasperoid, the minerals occurring in the quartz as bunches. Ore is chiefly an argentiferous, antimonial copper ore, with lead and silver chloride, etc.

Development: by three 500′ shafts, drifts and crosscuts.

Equipment: hoist, compressor and 120-ton mill, including ten 1,600-lb. stamps with flotation plant.

The mine was under one year lease from August 1, 1918, to the Nevada Wonder Mng. Co. To March 1, 1919, $85,644 had been expended and further work was done until September, when the lease was relinquished. From reliable information received, we understand that this old mine is not worth further investigation.

MONTANA YERINGTON COPPER CO. **NEVADA**

Yerington, Lyon county, Nev.

Property: a group of claims said to show orebodies in porphyry with 4-7% copper, unlike other Yerington deposits.

Development: 420′ shaft showing chalcopyrite ore at bottom. The 160′ level east was run 500′ to daylight, making a main working tunnel. Crosscut on 400′ level said to encounter ledge 6-7′ thick, showing shipping ore in face. Under option to Geo. Wingfield, Goldfield, Nev., 1913, and Mason Valley Mines Co., in 1914, but was relinquished. Messrs. Archer, Ehrman and Kremmel controlled the company at last accounts.

Output in 1916 was 2,050 tons of 6% ore. Operated by lessees in 1917-18.

MONTE CRISTO MINES CO. **NEVADA**

Inc. 1919, to take over holdings of Chas. Butters Co., Ltd., London.

Property: 700 acres and a millsite in Storey county, near Virginia City.

MONTEZUMA SILVER MINES CORPORATION **NEVADA**

Office: Goldfield, Nevada.

Inc. Oct. 5, 1917, in Nevada. **Cap.,** $1,000,000; par $1; about 150,000 in treasury

Officers: H. B. Nedham, pres.; J. G. Thompson, v. p.-res. agt.; Joseph Hover, sec.; Robert Dixon, treas.; Duncan Cameron, asst. treas.; A. H. Cooper, mine supt.

Property; 9 patented claims, 178 acres, in the Montezuma district, Esmeralda county, Nevada, about 16 miles S. W. of Goldfield (nearest rail point), and 30 miles S. W. of Tonopah. Properties were operated as individual mines and produced heavily 40 years ago, the ore being hauled by mule teams 200 miles to Austin, Nevada, for smelter treatment. Operation of properties was resumed by present company, 1917, the new development giving a noteworthy improvement in the physical condition of the properties. Prior to resumption of operations in 1917, about 9,000′ of development had been performed in the various properties, the deepest working being a 300′ shaft on the Bullion mine, and many thousands of tons of valuable mill ore placed on the dumps. Properties are traversed by 10 different veins varying in width from 1 to 10′. Ore assays upwards from $10 a ton in silver, lead, copper, gold, and a small amount of zinc. Three feet of rich jamesonite ore (sulphantimonite of lead) was cut at 260′, in new shaft, this ore carries high silver values.

MONTGOMERY-SHOSHONE MINES CO. **NEVADA**

Address: W. G. Benham, asst. sec., 30 Church St., New York City.

Property: in Rhyolite mining district, Nye county, is an old mine, operated intermittently.

MORRIS SYNDICATE MINES **NEVADA**

Address: W. C. Losey, Paulsen Bldg., Spokane, Wash.

Property: 6 unpatented claims, 23 miles N. E. of Mina, Mineral county, Nev., and near the Olympic Mines Co.'s property, a producer.

Geology: shoots 2 to 20′ wide reported to occur in contact vein in rhyolite and andesite. Ore said to assay $30 gold per ton. Developed by 60′ shaft in 1917; no later data.

MT. VERNON M. & M. CO. **NEVADA**

Address: G. A. Bice, pres., Box 166, Sparks, Nev. T. K. Byers, v. p.; S. O. Trescott, sec.-treas., Box 1004, Tonopah, Nev. Joseph Vernon, supt.

Property: 23 claims at Tokop, 30 miles S. of Goldfield and 8 miles E. of Hornsilver, Esmeralda county, 9 miles from the T. & T. railroad. Three claims were owned by Le Champ D'Or, a French company.

Production: is variously reported to be as high as $70,000, from a depth of 75′. There has been no systematic development. Dumps contain over 10,000 tons of gold-silver ore. Some rich ore was reported found in December, 1919, and a small mill was to be erected.

MUNCY CREEK MINING CO. **NEVADA**

Offices: Judge Bldg., Salt Lake City, Utah, and Aurum, Nev.

Officers: C. D. Ray, pres.; S. A. Greenwood, sec., with Jos. Crosby, directors. H. L. Parker, gen. mgr.

Property: 23 claims, a millsite and the Muncy Creek ranch at Aurum, White Pine county.

Ore: in the Grand Deposit mine the main vein shows carbonate zinc ore on the footwall and lead-silver ore on the hanging, with an intervening lens of copper sulphide. Ten known oreshoots are claimed to have sampled 6% copper, 8 oz. silver, and 10-60% lead.

Development: by 240′ Grand Deposit incline shaft. **Equipment:** includes 25-ton mill, calcining plant, hoist, office and other buildings. Ten men employed.

NATIONAL LEASING CO. **NEVADA**

A George Graham Rice promotion which went the way of all things human.

Inc. 1917, in Delaware. **Cap.,** $2,000,000; $1 par.

Company had a 5-year lease on property of the Charleston Hill Gold Mining Co., at National, Nev. It was claimed that the gold-bearing vein of the National

Mines Co. continued through the National Leasing claims for at least 700′, and that a 3,000′ tunnel already driven was near the vein. George Graham Rice underwrote 1,000,000 treasury shares and guaranteed to provide $5,000 per month for development, accepting stock therefore at 15c. per share, less 5%. This money was considered sufficient to do 10,000′ of work in 2 years. Only about $40,000 was actually expended on the property by Rice.

The National Mines Co. has produced over $6,000,000 in gold, but there has been little output by lessees in recent years.

In February, 1918, the Leasing company was unable to meet payments and the lease was forfeited. An attempt was made to reorganize and an option obtained on Las Palmas silver-lead mine at Sonora, Mexico, near the Lampazos Silver property, another promotion under the same management that is now defunct.

NATIONAL MINES CO. **NEVADA**

Office: 39 Board of Trade Bldg., Chicago, Ill. **Mine office:** National, Humboldt county, Nev.

Officers: J. G. Snydaker, pres.; L. G. Campbell, v. p.; C. V. Buckley, sec.; S. C. Scotten, treas.; R. S. Bolam, supt.; H. L. Hollis, cons. engr.

Inc. in Wyoming. **Cap.**, $1,000,000; shares $1 par; non-assessable; 817,427 shares outstanding.

Property: 6 patented claims and a fraction at National, Humboldt county, shows gold-silver ore in quartz fissure veins, traversing a rhyolite-andesite formation. Orebody runs N.-S. and dips 45-70° W. Geology and vein system fully described in U. S. G. S. Bull. 601.

Development: by 10 adits from 150′ to 2,500′ in length and 3 shafts, 450′, 350′ and 800′ deep. Underground workings total about 7 miles.

Equipment: includes 2 electric hoists, aerial tram, 100-ton mill for amalgamation and concentration of ore. Mill treated 4,463 tons of ore in 1912; 47 tons in 1913; 2,763 tons in 1914; 18,622 tons in 1915; a total production of 36,000 tons, or $6,000,000, mainly from the National gold shoot, intercepted at depth of 40′ below the surface and which averaged $20-$30 to the pound.

In June, 1917, a lease on company's plant was given the National Leasing Co. to enable it to explore the ground through the National Mines. Payments were not met, and the company recovered its holdings with the aid of a sheriff in February, 1918. Since then operations have been continued by several sets of lessees in a small way, and small shipments of rich ore reported being made.

NATIONAL NEVADA MINING CO. **NEVADA**

Address: W. S. Bretz, supt., National, Nev.

Property: lies north of the National mines, Humboldt county, developed by tunnel in 565′, July, 1919, with about 35′ more to go to reach the vein.

NATIONAL TREASURE MINES CO. **NEVADA**

Office: Boston Bldg., Salt Lake City, Utah. **Mine office:** National, Nev.

Officers: J. G. McAllister, pres.; Judge H. H. Henderson, v. p.; Dr. L. G. Wheeler, sec.; Robt. Noyes, treas., with John Pingree and Daniel Alexander, directors.

Property: 4 claims to the south of the National mine at National, Humboldt county, developed by 800′ tunnel, said to show gold and silver ore in andesite.

NENZEL CROWN POINT MINING CO. **NEVADA**

Fully described in Volume XIII. Merged, 1919, into Rochester-Nevada Silver Mines Co., which see.

NEVADA AUSTIN MINES CO. **NEVADA**

Defunct. **Address:** W. C. Pitt, Lovelocks, Nev.

Property: a 100-ton cyanide plant at New Pass, 27 miles W. of Austin, Lander county, sold February, 1919, to satisfy a $30,000 mortgage held by the president, W. C. Pitt.

NEVADA BIRCH CREEK MINING CO. **NEVADA**

Address: J. H. Ingram, pres., or H. W. Dyer, sec.-treas., Birch Creek, via Austin, Lander county, Nevada.

Inc. Oct., 1919, in Nevada.

Property: 8 claims, 12 miles south of Austin. The surface shows a

wide contact vein between granite and limestone, the material giving good pan tests. A 135′ tunnel shows 60′ of ore, assaying from $9 per ton up in gold. A second tunnel, 375′ long in December, will be continued until the ore is reached.

NEVADA BLACK HAWK SILVER MINING CO. NEVADA

Office: 232 North Virginia St., Reno, Nevada.

Officers: C. C. Flagg, pres.; Chas. G. Sadlier, v. p.; A. D. Bird, sec.-treas.; O. W. Whiting, E. M. and H. M. Hamlin, directors.

Inc. July, 1919, in Nevada. **Cap.**, $75,000; par 5c; 750,000 shares of promotion stock outstanding.

Property: consists of 6 claims, viz: Black Hawk, Gray Hound, Glance, Glance No. 1, Hamlin No. 1 and 2 with all claims joining. The Black Hawk claim was worked in the 70's and early 80's, and has produced over $250,000 in silver, lead, and gold. All of these claims have large outcrops, and samples run as high as $250 to $300 per ton. The property is in Black Hawk mining district, at Marietta, 17 miles S. W. of Mina, Mineral county, adjoining the Indolment mine on the south, and the Silver Gulch Mining Co. on the southeast, 2 miles north of Marietta.

Development: by 200′ of shaft and tunnel work; 500′ of tunnel will crosscut the Black Hawk vein, and Hamlin vein at a depth of 300′.

No equipment, but contracting for engine and compressor for tunnel work in October, 1919.

NEVADA BONANZA COPPER CO. NEVADA

Main office: 159 S. Main St., Salt Lake City, Utah. Mine at Morningstar City, Lyon county, Nev.

Officers: Freeman Morningstar, pres. and gen. mgr.; Sereno B. Tuttle, v. p.; Fred C. Dern, sec.-treas.; Walter C. Tuttle, asst. sec.-treas., with Robt. J. Deighton, H. P. Clark, W. D. Mathis, Thos. J. N. Nippur, M. S. Woolley and P. L. Williams, directors.

Inc. 1906. **Cap.**, $2,100,000; $1 par; 1,448,000 issued.

Property: 12 claims, 7 patented, 250 acres, adjoining the Nevada Douglas ground, about a third of a mile from Ludwig, on Nevada Copper Belt railroad, in the Yerington district. J. C. Dick, E. M., of Salt Lake City, reports 3 fissure veins crossing property; the Green Dutchman vein being about 5′ wide and assaying well in gold and copper. The vein on the Copper King claim has been developed by a 3-compartment, 115′ shaft, said to show copper ore its entire depth.

No record of recent operations obtainable.

NEVADA & BOSTON COPPER CO. NEVADA

Address: care H. B. Lind, Mina, Nev.

Owns all the outstanding stock of the Iroquois Copper Co. (q. v.), which has title to a copper property near Mina, Mineral county.

Inc. in Wyoming, **Cap.**, $2,500,000; par $1: 1,000,000 shares issued and held intact by three stockholders; 10,000 sold; 1,490,000 in treasury.

NEVADA-BULLION MINES CO. NEVADA

Mine near Bullion, Elko county, Nev. Company often called the Bullion-Nevada Mines Co., owns a group of claims adjoining the Nevada-Bunker Hill Mining Co. holdings and a half interest in the Kerr & Peterson lease on that company's ground.

Development: by a 1,980′ tunnel, which will be extended 200′ further to cut the vein opened in old mine workings. Lessees were shipping ore, 1916, but property is now tied up in litigation.

NEVADA BUNKER HILL MINING CO. NEVADA

Address: Box 477, Elko, Nev.

Officers: J. A. McBride, pres.; W. W. Booher, v. p.; Frederick Davis, sec.-mgr.; John Henderson, treas., with O. T. Williams, S. E. Davis, and G. S. Brown, directors. S. E. Davis, supt., Bullion, Nev.

Inc. April 28, 1905, in Nevada. **Cap.**, $2,000,000; $1 par; 800,000 shares in treasury October, 1919. Annual meeting, first Wednesday in May.

Gross income in 1918 was $10,637, of which $2,112 was from royalties paid

by lessees, and $6,600 from sale of treasury stock. Expenses amounted to $11,263. Total liabilities $18,020.

Financial statement for year ending May 1, 1918, shows: receipts, $14,935, including $6,000 loan, $3,779 royalty, $3,150 from stock sales. Disbursements amounted to $16,293, including $5,308 for development work.

Property: 16 unpatented claims and 9 patented claims, 360 acres, in Railroad district, Elko county, Nev., 28 miles S. W. of Elko. Claims said to show copper-silver ore in porphyry contacts, silicious copper ore in porphyry intrusions, and silver-lead ore in limestone. Property has been reported on by Chas. E. Van Barneveld, H. L. Huston, and by Chas. H. White of Harvard University.

Development: numerous tunnels and shafts and a deep tunnel 3,410′ long, to tap veins at a depth of 500 to 800′ below deepest workings, 150′ further work expected to bring it to the Tripoli and 600 to 800′ further to the Standing Elk fissure. Workings total about 3 miles.

Production: in four years—1912-'15—lessees shipped 4,570 tons yielding $114,102; in 1916, 3,166 tons, netting $100,540; in 1917, 3,767 tons, netting $110,750; and in 1918, 503 tons, which netted $23,055.

Five sets of lessees are working above 800 level. Royalty derived is put into company's development work.

In order to provide funds for further development work, stockholders were asked to return a portion of their holdings into the company treasury or pay 10c. a share assessment before October 1, 1919.

NEVADA-BUTTE MINING CO. **NEVADA**

Probably dead. Martin Benson, pres., at last accounts.

Inc. 1913. **Cap.**, $1,000,000; shares 25c par.

Property: 15 claims in Dolly Varden and Mizpah districts, Elko county, Nev., 75 miles from Ely, said to be on the northern end of a great belt of mineralized porphyry and to carry fissure and contact deposits.

Development: by several shallow shafts, shows mineralization, but property still in prospect stage. Drilling on neighboring areas reported to have shown commercially mineralized porphyry.

NEVADA-CALUMET COPPER CO. **NEVADA**

W. H. Bray, mgr.; F. D. Nowell, pres.; J. A. Beck, v. p.-sec., at last accounts.

Inc. 1913.

Property: the Boyd-Martin group, 30 claims, in heart of the monzonite-porphyry belt of Battle mountain, Lander county, shows copper-stained patches thought to represent the outcrop of a big disseminated glance deposit.

NEVADA-CALUMET COPPER MINING CO. **NEVADA**

Out of business. See Nevada Calumet mine.

NEVADA-CALUMET MINE **NEVADA**

Address: John L. Washing, 868 Park Ave., Bridgeport, Conn.

Property: 17 claims, patented, 340 acres, 4 miles N. E. of Buckskin and 8 miles N. W. of Yerington, formerly owned by Nevada-Calumet Copper Mng. Co. Property shows diorite porphyry and silicious limestone, and has 3 contact deposits, 3-4′ wide, showing cuprite, malachite, azurite, chalcocite and chalcopyrite, giving assays of 2-4% copper. Reported on by T. M. Hammond and Arthur Prell.

Development: by 2 main shafts, 1,200′ apart, No. 2 on the Yellow Metal claims, 60′ deep, shows 9′ of 2.75% ore. About 300′ of work on 400′ level, and 225′ of laterals on the 500′ level, show small bunches and stringers of ore, in a leached zone, with fair indications of workable values at greater depth.

Equipment: includes two 25-h. p. gasoline hoists, and a 20-room boarding house. Old workings were re-timbered, 1919.

NEVADA CENTRAL COPPER CO. **NEVADA**

Went out of business, January, 1916. Property near Cedar, Eureka county, Nev., deeded to Mrs. G. W. Leighton, who has leased it to local people. For description see Vol. XII.

NEVADA CHAMPION COPPER CO. NEVADA

Inc. 1907, in Arizona. **Cap.**, $1,500,000; $5 par. Succeeded 1917 by the Pilot Copper Co., which see.

NEVADA CONSOLIDATED MINES & SELLING CO. NEVADA

Idle and probably dead.

Officers: Alex. Brown, pres.; Chas. L. Newton, v. p.; C. C. Matthews, sec.; F. G. Carey, treas, at last accounts.

Property: about 1,000 acres, including a gold property formerly owned by the Huntoon Valley Mining Co., 45 miles south of Hawthorne, Mineral county, and copper claims 10 to 20 miles S. W. of Hawthorne, formerly owned by the Walker Lake Expl. Co. The copper property, developed by 3 crosscut tunnels to 440′ below the outcrop, was claimed by the company to have a vein carrying disseminated pyrite and chalcopyrite, averaging 2½% copper and $4 gold. This vein has apparently been lost in the lowest tunnel. Country rock is granodiorite. The mine had 1,500′ of workings.

NEVADA CO-OPERATIVE MINING CO. NEVADA

Address: Goldfield, Nev.

Officers: Chas. S. Sprague, pres.; J. K. Turner, v. p. and cons. engr.; P. J. Somers, sec.

Inc. 1913. **Cap.**, $2,000,000; shares $1 par; assessable; 1,500,000 shares in treasury. Company is a reorganization of Goldfield Mines Operating Co.

Property: 11 claims, 150 acres, including the Empress, in Gold Mountain mining district, Esmeralda county, 37 miles S. E. of Goldfield, shows 3 well-defined quartz veins, from 1-6′ wide with numerous quartz stringers, running N. E. The formation is Cambrian sedimentary rocks, quartz-monzonite porphyry, granite, rhyolite, and basalt.

Development: total work to June, 1915, was about 3,000′, of which 2,000 is on the Central or Liberty vein. A crosscut tunnel, driven 800′, exposed ore averaging $8.17 across a width of 1½′. Drifts run from a raise on the hanging-wall from the 800′ level, encountered a quartz vein, assaying $26.40 gold and 54c. silver per ton.

Equipment: includes several buildings and an old 10-stamp mill, which is to be remodeled. Mine was inactive pending favorable opportunity for refinancing, but resumption reported in September, 1919.

NEVADA COPPER CO. NEVADA

Company inactive since 1910. **Office:** 572 Bullitt Bldg., Philadelphia, Pa. **Mine office:** Mina, Mineral county, Nev.

Officers: Jas. S. Austin, pres.; J. H. Whiteman, v. p.; C. A. Higbee, sec.-treas. Company is controlled by the owners of the Tonopah Mining Co.

Property: Dunlap copper mine, 10 claims, 200 acres and millsite in Silver Star mining district, 10 miles E. of Mina, operated under lease in 1919 by E. S. Chaffey.

Claims show quartzite and quartzite-breccia with mineralized zone 700′ wide and 2,000′ long, carrying ore-bearing reefs with oxides, carbonates and native copper. Shipments made in 1919 reported to have assayed 6% copper.

Development: by several thousand feet of tunnel, open-cuts and winzes, mostly in ore, but none showing sulphide, as water-level is not reached.

Equipment: includes compressor, blacksmith shop, etc.

NEVADA COPPER HILLS MINING CO. NEVADA

Idle, and possibly dead.

Office: 18 South Mulberry St., Mansfield, Ohio. **Mine office:** Luning, Mineral county, Nev.

Officers: at last accounts, A. H. McCullough, pres.; F. W. Lenhart, v. p.; T. J. Foster, sec.; Chas. Ritter, treas.; Rowland Lea, gen. mgr.

Inc. Oct. 24, 1907, in Nevada. **Cap.**, $1.500,000; $1 par; issued 745,000. Farmers Savings & Trust Co., Mansfield, Ohio, registrars. Annual meeting, first Monday in December.

Lands: 10 claims, 200 acres, in the Fitting district, 9 miles north of Luning. The property is reported, by Mr. Lea, to have replacement ore-bodies in limestone over a width about 600′, with a N.-S. strike, and a dip of 6°.

Ore: oxidized, with occasional native copper and some bornite with chalcopyrite in the bottom workings. Orebodies average 2′ thick and 28 of them are opened up for a length of 400′ and a depth of 100′ according to the company's secretary. Ore is stated to assay 1 to 70% copper, from a trace to 8 oz. silver and from a trace to $3 gold per ton.

Development: by 225′ shaft and a 330′ tunnel.

Equipment: includes a 25-h. p. hoist, and 6 buildings. Presumably pursuing a "watchful waiting" course and ignores all requests for information.

NEVADA COPPER MINING, MILLING & POWER CO. NEVADA

Office: Tacoma, Wash. Mine at Contact, Elko county, Nev. **Officers:** E. F. Messinger, pres., Tacoma, Wash.; Henry Smith, v. p. and gen. mgr., Contact, Nev.; E. S. Price, sec.-treas.; M. K. Price and C. Smith, all of Tacoma, directors.

Inc. May 5, 1905, in Arizona. **Cap.,** $1,500,000; shares $1 par; non-assessable; issued, $1,500,000.

Property: 52 claims, patented, in Salmon River district, better known as Contact district, shows Paleozoic sediments cut by granite with ore-bodies along the contact. In 1915 a 100-ton flotation plant was erected, following extensive diamond-drill explorations. Property and geology fully described Bull. 497, U. S. Geol. Survey.

NEVADA CROESUS SILVER MINES CO. NEVADA

Address: Richardson & Foster, Tonopah, Nev.

First offering of 200,000 shares at 10 cents, November, 1919 to February, 1920.

Property: 7 claims in the West Divide district, 15 miles from Klondyke station on the T. & G. railroad. Examined by Ross Woodward, who said that encouraging values had been found, particularly on the Mammoth silver lode. From 250′ of development, 11 samples ranged from $8 to $546 per ton in silver.

NEVADA-DOUGLAS CONSOLIDATED COPPER CO. NEVADA

Office: A. J. Orem & Co., 79 Milk St., Boston, Mass. **General office:** 222 S. W. Temple St., Salt Lake City, Utah. **Mine office:** Ludwig, Lyon county, Nevada.

Officers: A. J. Orem, pres.; James G. Berryhill, v. p.; L. H. Curtis, v. p.; F. M. Orem, sec.-treas.; W. C. Orem, gen. mgr.; with J. J. Corum, H. I. Moore, F. J. Curtis and J. G. Berryhill, Jr., directors.

Officials: Henry I. Moore, asst. mgr.; G. E. Mainhart, gen. supt.; —— Cox, supt. of Copper Belt Railroad; C. A. Chapman, auditor.

Inc. March 4, 1915, in Utah. **Cap.,** $5,000,000; $5 par; assessable; 979,643 issued. Bonds, $2,000,000; 300,600 outstanding. Federal Trust Co., Boston, registrar; State Street Trust Co., Boston, transfer agent. Stock listed on Boston Curb.

The company is a reorganization of the Nevada Douglas Copper Co. at the time of its consolidation with the Moore Mng. Co. The new company assumed liabilities of the old companies, $525,000 of Nevada Douglas and $57,000 of Moore Co. Nevada Douglas stockholders received share for share in stock of new company and the Moore Co. received 10,000 shares of stock. To date, 8 assessments of 10c. a share have been levied, the last one in January, 1919. The old Nevada Douglas Copper Co. paid a dividend of $125,000 in 1913.

From the many financial statements issued by A. J. Orem of Boston, it would appear that during 1918, the operating revenue was $362,466 and expenditures, $432,070, making a loss of $60,604. The balance sheet of January 31, 1919, showed current assets, $478,987, of which $387,108 was copper in transit; liabilities totaled $551,910, of which $151,554 was A. S. & R. Co.'s advances on metal, $182,818 for Mason Valley company's smelting charges, and $124,923 for accounts and wages unpaid.

The company also owns 88% of the capital of the Nevada Copper Belt R. R. Co., which made a net profit of $87,417 during 1918, and $11,102 in the first four months of 1919. The line is 41 miles long.

Another analysis said to be by a stockholder, gives a net indebtedness of $343,669.

During the first four months of 1919, the total loss on shipping ore worth $47,560 was $78,378.

Property: about 950 acres, with 2 millsites, 80 acres, and miscellaneous lands, including water-rights, giving total holdings of about 1,070 acres on the western slope of the Mason mountains. Lands include former holdings of the Ludwig Copper Mng. Co., the Douglas C. Mng. Co., which succeeded the Douglas M. & S. Co., the Nevada Douglas Co. and the Moore Mng. Co. Holdings of the Nevada Douglas C. Co. consisted of 4 separate and distinct mines, the old Douglas mine, the Amalgamated group and the Casting Copper mine, being the original holdings of the company, and the Ludwig mine. Country rock consists of limestone intruded by grano-diorite with large contact orebodies and fissure veins. There is also one claim at Buckskin, 7 miles distant, which carries fluxing ore.

The Moore Mng. Co. owned the Moore group of claims, a prospect with about 450′ of development work and "considerable oxidized ore blocked out in a way that it cannot be measured." Property of the old Western Nevada Copper Co., described in Vol. X, has been fully paid for by Nevada Douglas.

Ludwig mine: is about a mile N. W. of the Douglas. The property comprises 2 mining claims and a 40-acre tract in Smith Valley, on which there is a well and pumping station. The Ludwig was opened 1865, and was a shipper for some years of small quantities of high-grade ore, production including some very handsome malachite and azurite, a portion of which was sold to lapidaries, and considerable bluestone was mined for the old mills of the Comstock that used the Washoe process.

Geology: the ore occurs in a fissure vein with a white limestone footwall and a silicious limestone hanging wall, which changes to a garnetiferous limestone, heavily impregnated with sulphides in places. Where crushing has permitted surface waters to work downward, large bodies of carbonates and copper glance ores are found as replacements in the footwall limestone. The vein proper has an average width of about 30′ and has been developed along its course for 1,300′ and to a depth of 800′ by levels, along hanging wall, every 100′. The orebody on the 700 level is 50′ wide and 300′ long and runs 6% copper. The shoots, or pipes, of high-grade secondary ore, running from 16 to 30% in copper, form chamber deposits in the limestone near the porphyry contact, proven down to 800 level. Ore reserves were estimated at 200,000 tons of 2% copper ore.

In addition to copper ore, the Ludwig has a very large deposit estimated to contain 15,000,000 tons of gypsum, on the footwall, said to be 3,000′ long, 500′ wide and 400′ deep, which figures seem high. This deposit of gypsum is of commercial value, and some has been mined and shipped.

Douglas mine: this has a typical contact metamorphic deposit in which garnetized limestone carrying copper sulphides and their resultant oxidized ores occur in very irregular orebodies in limestone, which have a tendency towards a horizontal rather than a vertical extension. The mineralized area is about 700′ wide and 2,000′ long with numerous parallel fissures which seem to control the mineralization. This mine has been developed by a main working tunnel and a deeper haulage tunnel with numerous crosscuts and drifts netting the property. The working tunnel, 4,290′, has an average depth of 120′ beneath the surface and the ore is in places continuous to the surface. Four 50′ winzes show the downward extension of the ore. Claimed to have 75,000 tons of ore blocked out.

The **Casting Copper mine** shows a large area of garnet-epidote limestone constituting low-grade carbonate ore, which will be extensively mined. This mine has a vertical 350′ shaft and a 500′ tunnel. Claimed to have 100,000 tons blocked out. When shipments were being made to the smelter the ore averaged 5% copper as compared with 3% in the Douglas mine.

At the Amalgamated mine little development work has been done, but the surface exposures indicate the existence of similar large contact metamorphic deposits.

Ore reserves: in all properties are estimated at 550,000 tons blocked out, and 2,000,000 tons partly blocked. A report says that "Engineers estimated probable ore several times the latter amount." In May or June, 1919, A. O.

Orem said: "I estimate the real values in sight in these properties are worth $2,000,000, over and above all indebtedness ——." In December, he gave the net value as $1,908,590, less $125,000 for the flotation plant contemplated. Present ore carries 3% copper, with a fair quantity of high-grade material.

Property as a whole has about 8 miles of workings.

Equipment: includes four 100-h. p. hoists, good for 1,000′ depth each, with a 52-drill air-compressor. Electric current is taken from the Truckee River General Electric Co. Water is secured from artesian wells in Smith valley, brought to the mine by a 17,000′ pipe-line.

Production: it is stated that since the present management took charge over 31,000,000 lb. of copper has been produced, realizing about $5,285,000. Of this the Ludwig yielded 18,587,924 lb. in 7 years. During 1916, ore sent to Utah smelters amounted to 11,135 tons, carrying 7.5% copper. Freight charges were $8 per ton.

General: in Vol. XIII of "The Mines Handbook," we gave the following opinion: "A 250-ton leaching plant, begun in 1914, was in full operation by September, 1917. . . . This plant cost $475,000 and is expected to treat ore at a cost of $1.25 to $1.50 per ton. . . . If the leaching plant is a success it will prove the salvation of the company. The policy of handling the property has not met with favor in the East, as a result, financing and development have been slow. Management is believed to be competent, and making every effort to put property on a dividend basis. Estimated that $1,000,000 has been spent on the property since 1912, of which $475,000 went to the leaching plant, $193,000 to offices, shops, buildings, etc., the remainder in development, new property, etc. The year 1918 should show the property's merits."

Since then, the plant has proved to be a complete failure, although in May, 1918, a letter of explanation said: "As before stated, there has never been any doubt about the chemical correctness of our process, for it has given consistently high extractions from the very beginning. Our difficulties have all been mechanical." On June 1, 1918, there was a complete change of management. The mines, save the Western Nevada, were running low on shipping ore, so a development campaign was started at the Ludwig, Casting Copper, and Western Nevada. This resulted in sufficient 3½ to 4% ore being added to yield 250 tons daily for 18 months or more. Some of the largest orebodies ever opened in these mines were uncovered at 800′ in the Ludwig and at 400 and 500′ in the Western Nevada. Results in the Casting Copper are stated by the assistant general manager, H. I. Moore, to be promising. Late in January, 1919, operating costs were 19c. a pound. On December 1, 1918, metal on hand and in transit totaled 1,200,000 lb., and in that month and January, the yield was between 300,000 and 400,000 lb. There were 160 men employed then. It was estimated in January, 1919, that current assets, etc., were almost sufficient to pay off the floating debt. An assessment of 10c. was urged, also that development and operation be continued. As a neighboring company, the Bluestone, has erected and operated a 400-ton oil-flotation plant, it is now suggested that Nevada-Douglas do likewise.

In October, 1919, a new scheme for financing Nevada-Douglas was approved. It includes extending the railroad bonds for 3 years and have holders of the bonds release N.-D. from its guarantee. This would reduce obligations of N.-D. to $300,000. To take care of this indebtedness and furnish money with which to build a flotation plant and for working capital, it is proposed to authorize 5-year, 6% bonds amounting to $1,000,000, secured by N.-D. properties, and increase capital by 300,000 shares. All shareholders will be asked to subscribe.

The general feeling towards this property has been one of doubt.

NEVADA GOLD MINES CO. **NEVADA**

No recent returns. J. S. Madden, Austin, Lander county, Nev., mgr., at last accounts. **Inc.** 1915, in Nevada.

Property: 16 claims, including the Gold Park, La Crux, San Pedro, May-Do-So and Cottonwood groups, at Austin said to show gold-silver-copper ores in well-defined veins. Development was begun in 1915.

NEVADA GOLD MINES CO., LTD. **NEVADA**

Offices: 527 Eagle Block, Spokane, Wash., and Luning, Nev.

Officers: W. C. Losey, pres.; S. S. Endslow, sec.-treas.

Property: 4 groups of claims, comprising 24 claims near Luning, Mineral county. The Carbonate group is developed by 1,800′ of workings to depth of 350′, and the Montreal group of 4,000′ of workings, said to have disclosed several orebodies containing gold, silver and copper values.

NEVADA HILLS MINING CO. **NEVADA**

Address: Reno, Nev.

Officers: Geo. Wingfield, pres.; H. M. Hoyt, v. p.; E. A. Julian, gen. mgr.; C. F. Burton, sec.-treas., with Chas. E. Knox and L. A. Gibbons, directors. A. H. Westall, supt.

Inc. April 19, 1906, in South Dakota. **Cap.,** $6,250,000: $5 par; 1,065,687 shares issued. Reno National Bank registrar. Stock is listed on San Francisco Exchange and New York Curb.

Property: the Fairview Eagle mine, about 107 acres, at Fairview, Churchill county, Nev. After a profitable career as a gold-silver producer the mine was closed early in 1917 and company is looking for a new property.

Company's operations in former years were quite successful, the surplus at end of 1916 being $351,140 or about 33c. a share. In 1918, company gave leases on various sections of the mine, resulting in shipments of high grade ore to the Hazen Sampler in 1918 and 1919.

NEVADA HUMBOLDT TUNGSTEN MINES CO. **NEVADA**

Controlled by Humboldt Tungsten Mng. Co. (q. v.).

Address: Lovelocks, Nev., or Mill City, Nev. C. J. Jones, H. E. Loufek and P. J. Murrish, incorporators.

Cap., $1,000,000; $1 par.

Property: claims near Mill City, Pershing county, said to show a deposit 5′ wide of ore carrying 4% tungstic oxide, for length of 120′.

Equipment: a 100-ton mill was reported completed in Dec., 1918, and the first shipment of three carloads of concentrates was made February, 1919. Power and water supplied by the Mill City Development Co., a subsidiary, over a 34-mile power line; the water supply of 250 gallons per min. supplied through a 22,000′ pipe line of 6″ wire wound redwood pipe carrying water in 2 stages from a 24′ well. Two storage reservoirs of 100,000 and 50,000 gal. have been built. Mine worked 7 months in 1919.

In September, 1919, the company was taken over by the Humboldt Tungsten Mining Co. interests.

NEVADA LEAD MINING CO. **NEVADA**

Address: H. L. Brooks, mgr., Cobre, Nev.

Officers: B. F. Woodward, pres.; H. C. Eldridge, sec.; with Jasper Hall, Mathew Mesler, E. E. Fisher, directors.

Property: 11 miles from Cobre, Nev., and 7 miles from Loray, on Southern Pacific R. R. said to show ore in limestone-quartzite contact. At depth of 80′ is said to be 18″ of ore assaying 40% lead, 20 oz. silver, and $3 gold per ton. Several carloads had been shipped up to 1917, but no recent returns have been secured.

NEVADA LINCOLN MINING CO. **NEVADA**

See Vol. XIII for details. About mid-1918, Frank Wilson, then president, sued company for services rendered, and secured judgment by default, and the mine was sold to satisfy the judgment. Wilson bought it, and organized the Wilson-Nevada Mining Co., to which the property was transferred. In September, 1919, the Lincoln company started suit against Wilson and his company to set aside the judgment and sale.

NEVADA LORING MINES CO. **NEVADA**

Address: T. J. D. Salter, Tom Ward, or J. C. Foster, Loring, via Lovelocks, Nev.

Property: the Mayday claims in the Loring (formerly Willard) district, Pershing county. In September, 1919, several veins had been uncovered, assaying high in gold and silver.

NEVADA NEW MINES CO. **NEVADA**

Office: 146 No. Virginia St., Reno. **Mine office:** Rawhide, Mineral county, Nev.

Officers: E. W. King, pres.-gen. mgr., Mina, Nev. Alex. Boyle, gen. supt.

Inc. 1912, in Nevada. **Cap.,** $1.200,000; par $1; 500,000 issued. Transfers made at company's office.

Company took over the property of George Graham Rice's old promotions, the Rawhide Coalition M. Co., Rawhide Queen M. Co. and the Black Eagle M. & M. Co.

Property: 260 acres in Rawhide, Regent listrict, said to carry free gold and ruby silver, in a 4″ vein, opened on the 500′ and 600′ levels. Developed by 3 shafts and crosscuts to depth of 600′.

Equipment: includes 10-stamp amalgamation and concentration mill, 35-ton cyanide plant, compressor, and gasoline power.

After the wild boom of 1908 the mines were practically idle until 1912. Worked by lessees from 1912-1916, the production is reported to have been $800,000 worth of ore averaging $25 per ton. Company resumed operations in 1916, but operated at a loss and in September, 1917, leased the entire holdings to Salmon, Ross and Flynn, who are reported sinking the main shaft to depth of 1,500′ and developing the veins known to exist. Lessees have also granted sub-leases, the company receiving royalty on all ores shipped.

NEVADA OPHIR MINING CO. **NEVADA**

Office: 25 Broad St., New York City.

Officers: Walter E. Trent, pres.; Leonard A. Dessar, v. p.; Dwight V. Jones, sec., with E. E. Rich and Frank V. Sullivan, directors.

Inc. 1917, in Utah. **Cap.,** $100,000; shares 10c par; 500,000 issued. Registrar & Transfer Co., N. Y., registrar and transfer agent.

Property: 8 claims in Ophir canyon, Nye county, formerly known as the Murphy mine and originally owned by the Twin River M. Co., which was succeeded 1869 by the Cambridge Silver M. Co.

Geology described by Clarence King in a volume of the U. S. G. S. published in 1870. Rich silver ore occurs in a well-defined fissure vein in andesite.

Development: by 500′ shaft with levels every 100′. Orebody ends against a fault.

The mine is credited with a production of $700,000 up to 1868, when the old company went into bankruptcy and the property was sold. Several companies then operated the mine but apparently without success. The Nevada Ophir started work in 1918 and reports opening up a 4′ vein of $15 ore. A new 300′ shaft was being sunk (June, 1919), in the hanging wall to reach the vein about 100′ below the old workings. Shipments to be made to Manhattan.

Is regarded as a very promising property.

NEVADA ORE & COPPER CO. **NEVADA**

Address: Hawthorne, Mineral county, Nev.

Officers: T. L. Kimmel, pres.; E. M. Freerks, v. p.; J. A. Wright, sec.-treas., with D. D. Ellerbrock and A. W. Beach, directors. H. J. Fick, supt.

Inc. 1907, in Nevada. **Cap.,** $600,000; 30c par; 20,000 outstanding.

Property: 34 claims, 40 acres, near Mina, carrying copper-gold ore in fissure veins. Developed by 560′ shaft and 6,000′ of workings.

Equipment: includes gasoline hoist and 50-ton cyanide mill Company has expended about $120,000 on property. Plan sinking new 500′ shaft.

NEVADA PACIFIC MINES CO. **NEVADA**

Probably dead. **Address:** L. P. Patrick, pres., Goldfield, Nev., at last accounts. **Mine office:** Mina, Mineral county, Nev.

Property: the Mayflower group in New York canyon, N. E. of Mina, shows copper ore 150′ wide, exposed by surface work, from which 15 tons daily were shipped to the Wabuska smelter in 1913. No recent information received.

NEVADA PROGRESSIVE GOLD MINING CO., INC. **NEVADA**

Main office: 1201 Monadnock Bldg., Chicago, Ill. **Mine office:** Sweetwater, Nev.

Officers: A. G. Anderson, pres.; Geo. T. Rosengren, v. p.; I. Cameron, treas.; L. Mundorff, sec.

Inc. Sept., 1914, in Nevada. **Cap.,** $2,000,000; $1 par.

Property: 400 acres mineral land and 600 acres miscellaneous land at Wellington, 8 miles from Masonic, Lyon county, said to show gold-silver-lead ore. **Development:** by 2 shafts, 100 and 300′ deep.

Company also owns and is operating the Silverado mine in Mono county, California, near Sweetwater, Mineral county, Nev. Shipments of silver ore made to Hazen sampler amounted to $33,281 in 1917 and $35,125 in 1918. Cyanide plant and new equipment installed in 1919.

NEVADA QUEEN COPPER CO. NEVADA

Office: 404 Mining Exchange Bldg., Colorado Springs, Colo. Mine near Yerington, Lyon county, Nev.

Officers: Duncan Chisholm, pres.; John A. Chisholm, v. p.; R. G. Riddett, sec.-treas., with Geo. M. Irwin and D. P. Randall, directors.

Inc. Oct. 5, 1906, in Colorado. **Cap.,** $1,500,000; $1 par; issued 1,107,350. Is operated as a close corporation. Annual meeting second Monday in October.

Property: 28 claims, patented, 467 acres, lying immediately north of the Nevada Douglas and Yerington Central Copper companies. Developed by shafts of 186′ and 210′, showing copper ore said to assay 1.5 to 28%. Idle for several years.

NEVADA QUINCY MINING CO. NEVADA

Address: 303 Judge Bldg., Salt Lake City, Utah.

Property: in Cherry Creek mining district, White Pine county. Company in process of dissolution.

NEVADA RAND MINES CO. NEVADA

Address: Box 152, or 10 Fordonia Bldg., Reno, Nev.

Officers: C. G. McBride, pres.; Dr. C. F. Watkins, 1st v. p.; S. R. Satterthwaite, 2nd v. p.; Wm. V. Rudderow, sec.-treas.-mgr.; C. E. Hymer, supt.

Inc. July 8, 1916. **Cap.,** $100,000; par 10c; 822,600 issued, June, 1919. Annual meeting second Monday in July.

Property: 7 unpatented claims, 110 acres, in Rand district, Mineral county, 17 miles from Nolan on the T. & G. railroad. Group carries a fissure vein in hornblende-andesite, with an ore-shoot opened for 240′ in length in a fractured mineralized zone approximately 100′ wide, from which high-grade silver-gold ore has been shipped. This zone is said to extend into claims of the Extension Company to the N. W. Ores are highly silicious and oxidized, with free gold and hornsilver. Examined, 1919, by S. E. Montgomery, J. C. Jones and Charles Kirchen.

Development: by 450′ shaft, with total workings of 2,500′. Recent work on the 150 and 200′ levels, south of the old workings, disclosed a new orebody from which considerable high-grade and milling ore has been mined. Management plans to continue work on the 250′ level in 3 directions. Reserves are estimated at 35,000 tons of $15 milling ore, and 1,400 tons of $17 ore on dumps.

Equipment: includes 18-h. p. gas. hoisting engine and assay plant. In June, 1919, a 40-50-ton mill was installed, which is driven by a 32-h. p. F.-M. oil engine. A cyanide plant will be added, as tests show a 90% extraction can be obtained.

Company appears to have a promising mine in a district that has produced very rich ore, and is following a conservative policy. The output totals $40,000; 300 tons in 1919 averaging $57.92 per ton.

NEVADA REGENT MINES CO. NEVADA

Inc. June, 1915, in Utah. **Cap.,** $1,000,000: shares 10c par.

Property: in Regent district, Mineral county, Nevada. No recent returns secured.

NEVADA SCHEELITE CO. NEVADA

Mine address: Ely, Nev.

Property: S. E. of Ely, White Pine county, equipped with mill and reported producing tungsten ore during 1918. No production figures obtainable.

NEVADA SILVER CONSOLIDATED CO., INC. **NEVADA**

Former office: Wonder, Nev., successor to Vulture-Wonder Mines Co.

Officers: at last accounts, G. H. Manning, pres.; R. V. Ellis, v. p.; N. H. Manning, sec.-treas.; E. S. Cox, asst. sec.; S. H. Brady, mgr., also directors.

Inc. in Delaware. **Cap.**, $2,500,000; $1 par; 1,700,000 issued. The New York brokerage firm of Howard A. Riley & Co. was to make a "market" for the stock, but appears to have lost interest in the promotion.

Property: 9 quartz claims, 166 acres, 4 miles N. W. of Wonder, Churchill county, Nev. Nearest railroad point is Fallon.

Geology: ore deposition has followed a dike of dense and hard intrusive rhyolite, showing intense silicification. This dike is intruded along the dacite-rhyolite contact, except where quartz-porphyry intervenes between it and the dacite. The dike is itself classed as a vein, as it is silicified, and somewhat mineralized. The quartz of the hanging and foot walls carries the best values. Forty-six samples taken from various exposures on the property returned from 0.3 to 13.6 oz. silver per ton.

Development: in 1917 extensive openings were made by lessees, who shipped ore, one lot of 500 tons averaging $125 per ton. A shaft was down 216′ in July, 1917.

NEVADA SILVER CONSOLIDATED MINING CO **NEVADA**

Address: F. E. Young, Tonopah, Nev.

Property: in the Ione district, Nye county, N. E. of Tonopah. Formation is said to be almost similar to that at Tonopah and Divide. Veins are fault-fissures, filled with mineralized breccia from which good surface assays are reported. Work was to be commenced late in 1919.

NEVADA SILVER MINING & DEVELOPMENT CO. **NEVADA**

This is a new company operating the Dog group of claims 3,000′ S. of the V 7 company in the Reservation district near Schurz, Mineral county.

NEVADA SILVERFIELDS CO. **NEVADA**

Office: 11 Pine St., New York, N. Y. **Mine address:** Battle Mountain, Nev. Is a Breitung promotion.

Officers: Ralph S. Child, pres.; H. B. Barling, v. p.-mgr.; Wm. A. Hamilton, sec.-treas., with H. H. Seaman and Edward B. Boies, directors. H. B. Menardi, supt.

Inc. June 27, 1918, in Nevada. **Cap.**, $2,000,000; $5 par; 700,000 in treasury. Empire Trust Co., N. Y., transfer agent and registrar. Annual meeting, second Monday in March.

Company has option to purchase holdings of the Silverfields Mining Co., Ltd (q. v.), (an English company), at Battle Mountain, Lander county, and controls the adjoining Nicklas Mng. Co., separately described. Stockholders of the Nicklas Co. were given a 90-day exchange privilege from June 1, 1919, on a basis of 5 shares of Nicklas for 1 share of Nevada Silverfields.

Property: 26½ claims, 400 acres, 12 miles S. W. of Battle Mountain. Ore is reported to average 2.5% lead; 0.091 oz. gold; 6.50 oz. silver.

Developed to depth of 450′ with about 5,000′ of workings. Management estimates ore reserves of 142,870 tons, June, 1919. A 100-ton concentrator is to be erected.

NEVADA SILVER SHIELD MINING CO. **NEVADA**

Address: Horse Canyon, via Round Mountain, Nye county, Nev. Organized late in 1919.

Property: 8 claims, including the Silver Shield mine in Horse Canyon, opened by two 400′ tunnels, one of which to a depth of 160′ is said to have revealed 200,000 tons of $15 to $18 silver ore.

NEVADA SMELTING & MINES CORP. **NEVADA**

Controlled by and practically merged with the Louisiana Cons. M. Co. q. v.

Office: Room 515 E., 30 Church St., New York. Mines near Tybo, Nye county, Nev.

Officers: Max E. Bernheimer, pres.; L. A. Dessar, v. p.; Werner Mueller, sec.; A. W. Joseph, treas., with M. Eisenberg, Chas. Lee, L. E. Marsden, N. P. Payne, H. Rawitzer, C. J. Roberts, directors.

Inc. May, 1906, in South Dakota. **Cap.**, $5,000,000; shares $5 par. Stock stricken from the New York Curb August, 1918. Empire Trust Co., New York, registrar. Balance on hand, March 31, 1918, was $121.

Company realized $4,090 on 80,000 shares of Greenwater Copper Mines & Smelter Co. stock in 1914, retaining 272,000 out of the 3,058,775 issued shares of the Greenwater Co.; also owns a controlling interest in the Tybo Cons. Mining Co., owning silver-lead-zinc properties at Tybo, Hot Creek district, Nev., operated by the Louisiana Cons. M. Co., which see.

Stockholders of the Nevada S. & M. were given the privilege of exchanging their stock on a basis of 10 shares of Nevada for 3 shares of Louisiana Con. This offer was withdrawn February 10, 1918, after more than 70% of the outstanding stock had been exchanged.

NEVADA STANDARD COPPER CO. NEVADA

Officers: Wilbert E. Marsh, pres., P. O. Box 24, Mina, Nev.; C. E. Korthe, v. p.; L. H. Marsh, sec.-treas., with B. H. Wyant and Matthew W. King, directors. Marsh sold his majority holdings in the company to G. A. Raessler of Luning in 1919.

Inc. 1912, in Nevada. **Cap.**, $100,000; shares $1 par; non-assessable; 6,850 issued.

Property: the Green Mystery group of 11½ claims, the Tray Dollar group of 10 claims and a mill-site, near Luning in Santa Fe district, Mineral county, 8 miles N. E. of Mina, on the Goldfield branch of the S. P. R. R. The Green Mystery claims cover low rounded hills at about 6,000′ elevation. The rocks are leached porphyries underlain at 20′ depth by low-grade oxidized copper ores. Ore contains bornite, chalcocite and chalcopyrite. Assays reported from 1.1 to 25% copper, with small gold and silver values.

Development: by 192′ shaft on the Green Mystery claim, which at 45′ cut a fault plane fissure that widened to 20′ on the 104′ level. Crosscutting in 1915 on the 192′ level to the North opened up 11′ of low-grade copper ore. A level at 104′ cut a 24′ shear zone carrying low-grade ore. Management considers it a typical porphyry, or disseminated copper deposit. There is a bed of copper-bearing conglomerate between porphyry and lime, extending for 4,000′ along the contact. An incline sunk to explore this conglomerate is 60′ deep with drifts N. & S. for 160′. The Tray Dollar covers several lead-silver veins containing ore assaying from $16-$40; a copper-silver contact vein between lime and monzonite is said to assay $50-$134 per ton. Developed by 5 tunnels, 50-175′ on fissure veins and 335′ crosscut to contact vein with 175′ further to go to reach the ore-shoots. Property examined by W. R. Brown, W. H. Wiley and C. W. Clark.

Equipment: includes gasoline hoist, pump, blacksmith shop and buildings for men. There are 3 springs, 2½ to 5 miles distant. Report $25,078 expended on property to March 1, 1919. No salaries paid.

NEVADA SUPERIOR MINES CO. NEVADA

Probably dead, as mail is returned from former office at 625 Dooly Bldg., Salt Lake City. **Mine office:** Jungo, Nev.

Officers: Otto Grantz, pres.; E. R. Reitsch, v. p.; John Geiger, sec., and gen. mgr.; Dr. Allen C. Eakin, treas., with D. R. Peterson, directors, at last accounts.

Inc. 1905, in Utah. **Cap.**, $300,000; shares $1 par; assessable; 155,000 shares outstanding. Income for 1915 was $164 from royalties.

Property: 21 claims, 420 acres in Humboldt county, 23 miles from Jungo on the W. P. R. R., shows gold-silver-lead-zinc ore in fissure veins traversing schist and slate. The main orebody, from 2-20′ wide, strikes N. W. and is said to give average assays of 8.6 oz. silver, 11.2% lead, 1% copper, 8% zinc. Shipments of crude ore made by lessees in 1915 ran $15-$24 per ton. Developed by 2 tunnels, 1,000′ and 2,500′ long, and 330′ vertical shaft.

Equipment: includes 75-ton concentrating mill, steam power, compressor, pump and hoist. Company has been inactive since 1913 owing to lack of funds.

NEVADA UNION COPPER MINES CO. (THE) **NEVADA**

Office: 407 Central Sav. Bank Bldg., Denver, Colo.

Officers: F. D. Goodale, pres.-treas.gen. mgr.; M. H. Muller, sec.; Paul Esch, v. p., with Byron Tifft, Robt. Kettner, A. M. Goodale, and Henry Truelson, directors.

Inc. June 29, 1917, in Colorado. **Cap.**, $600,000; 10c par; 2,000,000 shares in treasury, July, 1919. Company acquired holdings of the Honest Endeavor Mng. Co., fully described in Volume XIII. The stock of the latter company was exchanged on a share for share basis. In January, 1919, stockholders authorized an issue of $25,000 five-year 1st mortgage bonds, of which $5,000 have been placed among the stockholders with a stock bonus of an equal amount and $4,000 additional had been subscribed at last report.

Property: 12 claims, 200 acres, in Yerington district, 1½ miles from Ludwig, Lyon county.

Development: by several shafts, one 120′ deep, and some lateral work. The Union Blue is the principal vein, being described as a porphyry intrusion between diorite walls. On surface between a streak of high-grade ore and one of white talc there is said to be 32′ of mineralized diorite-porphyry. In 1919, drifts were run E. and W. on the 120′ level with expectation of opening an orebody of commercial size. Is a likely prospect.

NEVADA UNITED MINING CO. **NEVADA**

Oliver G. Jennings, pres. and treas., 49 Wall St., New York. An inactive corporation. Fully described in Vol. XI, Copper Handbook.

NEVADA-UTAH MINES & SMELTERS CORP. **NEVADA**

See Consolidated Nevada-Utah Corporation.

NEVADA VOLCANO MINES CO. **NEVADA**

Address: Thomas Harney, Pioche, Nev.

Property: Harney group, 1 mile east of Pioche, Lincoln county, said to show a 9′ vein of silver-lead-gold ore, running $80 to $100 per ton. Production by company and lessees from 1915 to June, 1919, reported to be $75,000.

Suit was filed in June, 1919, by Lloyd Brothers of Pioche, who claim ownership of the mine by right of prior location.

NEVADA WILSON MINING CO. **NEVADA**

Fred Wightman, pres.; A. L. Haight, sec., both of Fallon, Nev. Company organized 1919 to operate the Wilson mine at Eastgate, Churchill county, 20 miles E. of Fairview. Ore contains gold and silver.

NEVADA WONDER MINING CO. **NEVADA**

Office: 572 Bullitt Bldg., Philadelphia, Pa. **Mine office:** Wonder, Nev.

Officers: C. A. Higbee, pres.; J. S. Austin, v. p.-treas.; J. H. Whiteman, v. p.-gen. counsel, with Samuel Bell, Jr., Barton Hoopes, Jr., Chas. R. Miller and Wm. M. Potts, directors. P. S. Bickmore, sec.; H. C. Carlisle, gen. supt.; E. E. Carpenter, supt.; E. S. Cunningham, asst. supt.

Inc. Sept. 19, 1906, in Delaware. **Cap.**, $1,500,000; shares $1 par; all issued.

Dividends: paid at the rate of 20% annually. Last dividend paid May, 1919. Total is $1,549,002. Transfer at company's office. Registrar, Fourth Street Bank, Philadelphia.

Balance sheet for year ended December 31, 1918, showed assets totaling $1,710,695, including $1,269,158 for property and plant; $212,760 stocks and bonds owned, and $228,069 accounts receivable. Current liabilities total $63,340. Surplus was $147,355. Revenue for the period was $1,218,611; $693,299 from mill product and $181,238 from silver on hand but not sold.

Company owns the Wonder Extension, Hidden Treasure and Reorganized North Star Mining companies.

In October, 1917, the Churchill Milling Co. was dissolved, as all its assets had been taken over and its liabilities assumed by the Nevada Wonder.

Property: several mines owned or leased from subsidiaries, embracing 328 patented and 73 unpatented acres at Wonder, Churchill county, Nev. They show gold-silver ore in fissure veins 5-6′ wide in rhyolite with occasional dacite. The gangue consists of quartz, feldspar and kaolin. The rock is mined by the

waste-filling system as the walls in the lower levels are insecure, caving in large masses, thus making the shrinkage system of stoping used above the 400′ level, inadvisable in the lower workings.

Development: by shaft and winze, to depth of 2,000′, with a total of 66,438′ of workings. Exploration in 1916 indicated favorable conditions at depth and during the following year the sub-shaft was sunk from 1,600′ to 1,900′. Work done during 1918 totaled 8,872′, mainly on the 1,900′ and 2,000′. Cross-cuts were driven on the 700 cutting the formation for 1,555′ at right angles to the strike of the vein. Results at depth were not encouraging and management planned prospecting ground between upper levels in 1919.

A one-year lease from August, 1918, was procured on the holdings of the Monitor Belmont Mng. Co., at Belmont, which see. This was relinquished as no ore was found.

The 100-ton Churchill mill, now operated as a department of the Nevada Wonder, ran in 1918 on ore that averaged $2.06 in gold and 13.20 oz. silver.

Production:

	Tons	Ag. oz.	Au. oz.	Total Value	Av. Rec. %	Cost per ton	Oper. Profit Net per ton
1918.....	49,710	657,815	5,108	$742,306	91.82	$10.09	$3.62
1917.....	55,800	929,284	7,882	822,940	89.10	10.78	3.97
1916.....	72,241	1,352,615	11,466	1,112,835	92.67	8.90	5.37

At the end of November, 1919, company ceased operations. Cash assets total about $400,000.

NEVADA ZINC CO. NEVADA

G. L. Bemis, Tobar, Elko county, Nev., gen. mgr., at last accounts.

Property: the Pola Star group near Tobar, has a zinc-lead deposit, 40′ wide and opened for 600′ on surface. Ore said to average from 30-35% zinc and from 4-5% lead. Developed by tunnel and 500′ shaft. Reported producing at the rate of 200 tons per month in 1917. No recent returns.

NEW BONANZA COMSTOCK MINES CO. NEVADA

Incorporated December, 1919, in Nevada, by C. A. Garret, T. B. Gordon, Gurney Gordon, F. M. Kleppe, and O. R. Vaughn. Cap., $75,000; 20c par. No information as to property obtainable.

NEW JERSEY MINES CO. NEVADA

Officers: 628 Hudson St., Hoboken, N. J., and Goldfield, Nev.

Officers: Henry V. Broeser, pres.; L. A. Opdyke, v. p.; J. H. Stegman, treas.; Geo. H. Snyder, sec., Jersey City; above, with 14 others form the directorate; Harry Ernest, mgr.

Inc. Jan. 15, 1912, in Nev. **Cap.,** $1,250,000; shares $1 par; outstanding, 1,010,850 shares; assessable 1c per share per year. Registrar & Transfer Co., New York, registrar.

Treasurer's report for year ending March 31, 1917, shows receipts of $18,017, which includes assessments, $6,912, sale of shares, $1,000, renewal of note, etc., $4,997. Disbursements amounted to $17,672, leaving balance on hand, $346. There were only $1,500 owing on the note. No later returns given out.

Property: 5 claims, 3 patented, 53 acres, several miles N. E. of Goldfield, said to show gold-silver ore.

Development: 507′ shaft, with work done in 1916 on the 330′ and 400′ levels. Conditions remain as in 1916, showing ore, but not in commercial quantities. Idle.

NEW TUSCARORA MINING CO. NEVADA

Address: Tuscarora, via Elko, Nev. **Officers:** W. J. Craig, pres.-mgr.; J. R. Austin, v. p.; W. J. Wolstenholme, sec.-treas., with E. L. Soule, H. S. Barnhart and P. D. Fenkell, directors.

Cap., $50,000; shares 5c par; 500,000 issued.

Property: 4 claims in the old Tuscarora district, Elko county, Nev.

Development: a tunnel (in 750′, Nov., 1918) being driven to cut the vein. Shallow shafts said to show ore with high values in gold and silver.

NEW WILLARD GOLD MINES CO. **NEVADA**

Address: E. E. Roberts, Lovelocks, Pershing county, Nev.

Officers: E. E. Roberts, pres.; with L. C. Deady and W. J. Beauchamp (mgr.), directors.

Property: 10 claims close to the Sheepherder mine in the Loring district. Surface exposures said to be good.

NEW YERINGTON COPPER CO. **NEVADA**

Company inactive and winding up its affairs, July, 1919. Property at Yerington, Lyon county, fully described, Volume XIII.

NICKLAS MINING CO. **NEVADA**

Address: 11 Pine St., New York.

Officers: E. N. Breitung, pres.; A. S. Mitchell, v. p.; W. A. Hamilton, sec.-treas., with Max Breitung and H. B. Barling, directors. H. B. Menardi, supt.

Inc. Sept. 7, 1916, in Arizona. **Cap.**, $1,500,000; $1 par; 1,300,000 issued. Stock stricken from New York Curb, Sept., 1919. **Bonds:** $300,000, 6% 1st mortgage sinking fund, serial gold bonds, $225,000 outstanding.

Annual report to December 31, 1918, shows: Property and development, $1,655,333; equipment, $25,624; cash, $2,699.

Property: the Nicklas and Plumas mines in Galena district, 13 miles S. W. of Battle Mountain, Lander county. The Nicklas mine has a 1,300′ tunnel, showing a quartz vein in grano-diorite, with value in gold and silver. The Plumas mine, purchased in 1917, is credited with a past production of $6,000,000 in silver-lead ore. There is a 30-ton concentrator on the ground, and carload shipments of concentrates were made to Midvale smelter in 1919.

The Nevada Silverfields Co., was incorporated in 1918 to acquire and merge the holdings of the Nicklas Mining Co. and the Silverfield Mining Co., Ltd., a British corporation fully described Vol. XIII. The exchange privilege called for 5 shares of Nicklas for 1 share of Nevada Silverfields. The president, E. N. Breitung, announced, May 31, 1919, that sufficient stock had been transferred to give control to the new company. Joint operation of the holdings and the proposed erection of a 100-ton mill are given as the most promising feature of the reorganization. Is regarded as a sane mining promotion.

NIVLOC MINING CO. **NEVADA**

Harry Stimler, mgr., Tonopah and Silverpeak, Nev. Operates the Stimler mine, 12 miles W. of Silverpeak, Esmeralda county, developed by 440′ shaft, with good ore reported on the 200′ level. A 520′ drift was driven under contract in 1919.

NIXON-NEVADA MINING CO. **NEVADA**

Offices: 50 Congress St., Boston, Mass.; Gazette Bldg., Reno, Nev., and 15 Broad St., New York.

Officers: P. S. Jones, pres.; J. F. McDonald and R. J. Jefferson, v. p.'s; W. E. Brown, treas.; S. A. Cunningham, asst. treas., with B. J. Dwyer, W. L. Rianhard, and G. H. Allen, directors; J. A. Straussman, sec. and asst. treas.; W. H. Butler, managing director, at last accounts.

Inc. 1915, in Maine. **Cap.**, $1,000,000; shares $1 par; fully paid and non-assessable; all issued. Stock is listed on Boston and New York Curbs; 250,000 shares underwritten at 40c in September, 1917.

Property: 840 acres in Hartlesville Township, known as the Granite Hill mine, 14 miles N. W. of Reno, and 50 acres at Big Mouth Canyon, 50 miles N. E. of Reno, Washoe county.

The Granite Mountain mine opens 2 veins of apparent diverging strike, both of which carry ore. No. 1 averages 1.8′ wide in a shoot 190 to 200′ long on the 200′ level, and stoped for 45′ up. At 300′ there are 10 small shoots in a length of 300′, whose ore extends up 80′ above this level. No. 2 vein is 12″ wide for a length of 110′, and ore goes up 90′ above the level.

Development: by shafts, with a total of 2,849′ of workings, including 720′ on the second and 2,039′ on the third level.

Equipment: at the Granite Hill includes 100-h. p. semi-Diesel engine

and generator, 525 cu. ft. compressor, 25-h. p. hoist, with smaller compressor and hoist, also necessary buildings, numbering 18.

Production: total to end of 1919, about 400 tons of ore said to have averaged 31% copper and $12 gold and silver.

Property shut down most of 1919, as owing to high overhead charges, and lack of large reserves costs were too high to yield a profit. Mine needs further development before it can become a substantial producer.

NONPAREIL MINING CO. NEVADA

Address: M. Helliere, sec., Reno, Nev. L. T. McAtee, pres.

Inc. 1919, in Nevada.

Property: Nonpareil group on Lincoln hill, Rochester mining district, Pershing county; mine is credited with a production of $30,000 in gold.

NORTHERN LIGHT COPPER CO. NEVADA

Property: 6 claims, 20 miles east of Yerington, Lyon county, producing some copper ore in August, 1919. The mine was closed for a considerable time, but late developments are said to be "surpassing expectations."

NORTH MOUNTAIN MINING CO. NEVADA

Controlled by John Dern, 515 Dooly Blk., Salt Lake City, Utah. Mine operated under lease by Marion L. Thomas, 2 Rector St., New York City, and J. W. Walker, Cherry Creek, Nev.

Property: Gilligan group, 11 patented claims in the Egan district, near Cherry Creek, White Pine county, first operated in 1870 under management of General Rosencrans.

Ore occurs in veins cutting quartzite, that are from 4 to 5′ wide, run E.-W. and dip steeply N. In 1884, a 1,600′ tunnel was driven which is reported to have cut the vein 1,100′ from the portal at a depth of about 600′ on its dip. The demonetization of silver stopped further development until 1918, when operations were resumed. Management reports recently opening up 4′ of ore on the tunnel level running 25 oz. silver.

NORTH NEVADA MINES CO. NEVADA

Address: C. K. Jarvis, Reno, Nev.

Property: claims at Fairview, and 7 claims on Rebel creek, northern Humboldt county, acquired late in 1919. The latter have 600′ of tunnels and other work, ore carrying silver and gold.

NORTH STAR MINING CO. NEVADA

Address: G. F. Brown, Mina, Nev.

Property: 6 claims, 3 miles from the Simon mine and near the Olympic. A shaft was to be sunk to develop a gold-bearing vein, in the winter of 1919-20.

OLD IMPERIAL MINING & MILLING CO. NEVADA

Cherry Creek, White Pine county, Nev. Property advertised as sold for $125 delinquent tax, January, 1916.

ONONDAGO MINES CORPORATION NEVADA

Office: 1209 Union Trust Bldg., Providence, R. I.; also 50 Broad St., New York City. **Mine office:** Elko, Nev.

Officers and directors: Homer L. Carr, pres.; Erik F. Carlson, v. p.; E. L. Kerstetter, sec.-treas. M. F. Quinn, mgr.: Frank S. Connors, supt.

Inc. Feb. 16, 1917, in Nevada. **Cap.,** $300,000; par $1; all outstanding. Listed on Boston Curb and traded in on New York Curb. Security Transfer & Registrar Co., New York, registrar and transfer agent. Controlled by Mines Holding & Operating Corporation, New York, which owns 277,560 shares. Operating expenses for 1918 amounted to $66,244.

Property: the Onondago and Zenoli mines about ½ mile apart, in Safford district, Nev. The Onondago group of 6 claims, 100 acres, 1½ miles from Barth, Elko county, is developed by 800′ tunnel and 200′ shaft. Another property of about 200 acres, near Elko and held under option is being developed. Claims said to show 3′ of high-grade silver-lead ore near surface, with the vein outcrop traceable for 2,000′. Ore: sulphide, occurs in fissure vein in limestone and said to average 40% lead and 4 oz. silver. Developed by 165′ incline shaft.

Equipment: power plant destroyed by fire to be re-built, and a 50-ton

mill installed in 1919. Several rich strikes reported, but no shipments made to date.

OPHIR SILVER MINING CO. **NEVADA**

Officers: A. P. Swain, sec., 787 Mills Bldg., San Francisco, Calif., and Virginia City, Nev.

Officers: Whitman Symmes, pres.-mgr.; J. H. Goldman, v. p.; with W. G. Morrow, C. W. Conlisk, A. B. Cooper, J. B. Fraser, and Maurice Schweitzer, directors.

Inc. April 30, 1860, in California. **Cap.,** $201,600; $1 par; all outstanding; assessable. Listed on New York Curb and San Francisco Exchange.

Property: 1 patented claim, 40 acres, extending for 675′ along the Comstock Lode at Virginia City, Storey county; bounded on the north by the Mexican mine, on the south by the Cons. Virginia and operated under the same management. Following the late change of management (see Cons. Virginia) ore has been opened and is being extracted from the 1,800′, 1,900 and 2,000′ levels. Exploration is also being done on the 1,465, 1,600, and 1,700′ levels. Ore, as mined, varies from $15 to $50 per ton, and occurs in veins up to 10′ in width.

Production: to date about $20,000,000. Present output (1919) is about $30,000 per month with equal value in gold and silver. Returns were $38,442 in July, $33,050 in August, 1919, from 1,110 and 941 tons, respectively. Is a well managed property, whose future is not devoid of promise, though it can hardly be expected to equal its past.

ORGANIZERS CONS. GOLD MINES CO. **NEVADA**

Office: 2250 Ninth St., Boulder, Colo.

Officers: Fred A. Fair, pres.; Dudley A. Degge, sec.-treas.-mgr., with T. V. Wilson, directors.

Inc. 1914, in Arizona. **Cap.,** $100,000; par $1; 10,000 shares outstanding.

Property: 4 claims, 3 patented, 60 acres at Montezuma and Wellington, Lyon county, said to show fissure veins with ore, carrying gold, silver, copper and lead.

Development: by 178′ vertical shaft and 200′ tunnel.

The company is the successor to the Wellington Association and related string of Colorado and Nevada incorporations, against which a fraud order was issued by the U. S. Postoffice Department in 1909.

Extravagant literature issued in 1914 was evidently put out solely for stock-selling purposes, as the property was not being developed. Unfavorably regarded.

ORIGINAL BULLFROG MINES SYNDICATE **NEVADA**

Dead. A reorganization planned in 1917, to be known as the Reorganized Original Bullfrog Mines Syndicate, did not materialize, owing to disagreement between judgment creditors.

ORIGINAL MINING CO. OF MANHATTAN **NEVADA**

Address: Tonopah, Nev.

Officers: W. J. Douglass, pres.; F. J. Conley, v. p.; C. C. Boak, sec.-treas., with C. H. McIntosh and Geo. W. Short, directors.

Inc. 1911, in Nevada. **Cap.,** $1,000,000; shares $1 par; assessable; 450,000 issued.

Property: 4 claims, 2 patented, 80 acres in the Manhattan mining district, Nye county, Nev.

Ore: low-grade gold occurs in vein in lime shale contact. Average assays given as $1-$6 gold per ton.

Development: by 200′ vertical shaft with 1,200′ of workings. Idle since 1917.

ORIZABA MINING & DEVELOPING CO. **NEVADA**

Offices: Goldfield and Orizaba, Nev. Company is controlled by the Diamondfield Black Butte Reorganized Mining Co.

Officers and directors: Chas. S. Sprague, pres.; P. V. Rovianek, v. p.; Ben Gill, treas.; Harry B. Ruhl, sec.; J. K. Turner, cons. engr., and L. L. Dellinger.

Inc. 1915. **Cap.**, $1,000,000; $1 par; 715,000 issued; 515,000 shares owned by the Diamondfield Co.

Property: 9 claims, in process of patent, 180 acres, at Orizaba, Nye county, shows veins carrying gold-silver-copper and lead ore. Veins are 2′ to 7′ wide, and occur on a contact between limestone and granite. The main vein strikes S. 20° E., and dips 70° S. W.

Development: by 1,300′ of workings, including 150′ shaft and 900′ of drifts.

C. D. Wilkinson, who reported on the property in October, 1915, estimated 1,500 tons of $20 ore exposed in the mine and 1,200 tons of $12 ore on the dumps. J. K. Turner reported, November, 1918, no ore in sight; $6,000 worth of probable ore between the 35 and 65′ levels; $8,500 worth of possible ore from the 85 to 65′ level; ore on 3 dumps valued at $44,730.

Production: Sept. 1913, to April, 1918, amounted to $22,980 gross and $16,156 net, the largest shipments being made when the price of silver was 60c per oz.

Further development, adequate modern equipment, and better railroad facilities are necessary to insure profitable operations. The nearest railroad point is Millers, about 38 miles south.

ORLEANS MINING & MILLING CO. **NEVADA**

Address: J. W. Dunfee, lessee, Hornsilver, Esmeralda county, Nev.

Inc. Sept., 1916, in Nevada, 1,000,000 shares issued.

Property: 5 unpatented claims, 120 acres, at Hornsilver, 28 miles S. of Goldfield, carries gold-silver ore in 8′ fissure vein in diorite-lime-shale contact. Average assays given as $21 per ton and management claimed reserves of 15,000 tons of mill ore, at last accounts.

Development: by 600′ incline shaft, being deepened in 1919.

Production: reported as totaling $260,000.

ORO AMIGO PLATINO MINING CO. **NEVADA**

Address: Goodsprings, Nev.

Officers: S. E. Yount, pres.; Geo. A. Fayle, v. p.; H. K. Riddell, sec.-treas. and mgr., with N. B. Hunter, directors, at last accounts.

Inc. Nov., 1914, in Nevada. **Cap.**, $1,000,000; shares $1 par; 515,100 shares issued. Listed on Los Angeles Exchange. Annual meeting, January 15th.

Property: 5 unpatented claims, 60 acres, in Yellow Pine mining district, Clark county, about 2 miles N. E. of the Boss mine. Ore carries copper, gold, platinum, palladium, and the rare mineral plumbojarosite, occurring in shoots 6 to 4″ wide.

Development: by 2 tunnels, 70′ and 150′ long, with 1,500′ total workings. No recent returns secured.

ORO ZONA MINES CO. **NEVADA**

Address: Hawthorne, Nev.

Inc. June 12, 1919, in Nevada, by Eugene Grutt, Emil Grutt, and J. B. Platts.

Cap., $150,000; 10c par.

PACIFIC STATES MINING & MILLING CO. **NEVADA**

Office: Goldfield, Nev. **Mine address:** Bellhelen, via Tonopah, Nev.

Officers: T. T. Cornforth, pres.; ex-Gov. W. A. Haggott, v. p.-gen. mgr.; Ben Gill, sec.-treas., with Chas. S. Sprague and J. B. Wainright, directors.

Inc. 1919, in Nev. **Cap.**, $1,500,000; par $1; 500,000 shares in treasury; 100,000 offered at 50c., June, 1919.

Property: 6 claims, 100 acres, in Bellhelen district, Kawich mountains, Nye county, 50 miles E. of Tonopah. Tract covers apex of veins for 3,500′.

Geology: claims show rhyolite lavas cut by a parallel veins running N. E.-S. W.; Midvale vein, the only one developed, has 70° N. dip and shows 2 quartz streaks 6 to 18″ thick linked by splits and forks. This quartz is a high-grade ore, and the pyritized material between is milling ore. Values average $44 per ton for 131 samples, about 10% of value being gold.

Development: 2,300′ of work, including 580′ crosscut tunnel cutting the 3 veins 260′ below apices. One vein at 340′ from portal has 4′ of mill ore; the

Middle vein, 75′ farther, is developed by 2 shafts, one extending to the tunnel level. This was stoped for 100′ in length, 100′ in height, and is proven for 100′ below the tunnel. In the 400′ drift from the tunnel, the third vein shows a width of 10 to 14′ of milling grade.

Production: unknown prior to 1917—since then 1,423 tons with average return of $71.80 per ton, or $102,223.

Ore reserves: 5,000 tons of $80 ore and 10,000 tons of $20 milling ore; also 2,000 tons of $15 ore on dump. Costs are now $35 per ton for mining, hauling, milling, and smelting, but with the mill it is believed they will not exceed $8. Company plans 50-ton mill at mine.

PACIFIC TUNGSTEN CO. **NEVADA**

Office: W. J. Loring, pres.-gen. mgr., Crocker Bldg., San Francisco, Calif. J. H. Bell, supt., Mill City, Nev.

Inc. April, 1917, in Nevada. **Cap.**, $1,000,000; par $1; all outstanding. Listed on Boston Curb.

Property: 30 claims, 600 acres, 8 miles N. W. of Mill City, Pershing county, said to show veins from 1 to 3′ in width, assaying 2½% tungsten at depth of 120′.

Development: by shafts and drifts. Shipments to custom mill at Toulon in 1918 averaged $50 per ton, leaving a net profit of $27.50. Mill recovery was about 70%.

Equipment: a 125-ton mill was erected late in 1918 to treat the output of the Pacific Tungsten and the Mill City Tungsten Co., under the same management. There is also a 2-mile, 24″ gauge tramway, using gasoline locomotives and 3-ton steel cars.

The Pacific Tungsten Co. handled in 1918 a total of 12,586 tons of ore, yielding a recovery of 1.6 per cent. WO_3; 290.74 tons of 70 per cent. WO_3 concentrates were produced, or 20,352 units. During the construction of the mill, covering ten months of 1918, ore was hauled by motor truck to a custom mill, and the company's mill ran only two months and was then forced to close down. Based on mining costs and two months' operation of the mill, the total cost per ton of ore milled was $12.80. The mill will treat 36,000 tons of ore per year, so with an estimated recovery of 1 per cent., 36,000 units, or 600 tons of 60 per cent. concentrates, will be produced at an operating cost of $461,000, or $12.80 per unit. The company has invested $583,500, and to amortize this investment in eight years, allowing only 10 per cent. on the investment and replacing capital by reinvestment of $160,000 annually at 4 per cent., will require a selling price of $17.25 per unit.

PACK SADDLE GOLD MINES CO. **NEVADA**

Address: Carson City, Nev.

Officers: E. H. Walker, pres.; H. R. Mighels, v. p.; E. W. Miller, sec.-treas.; W. E. Casson, mgr., with F. M. Baker, directors. Geo. L. Hedges, supt., Schurz, Nev.

Inc. April 11, 1916, in Nevada. **Cap.**, $1,000,000; $1 par; 630,000 outstanding.

Property: 7 claims, about 120 acres, in Mineral county, four miles from Reservation Station, said to show a large iron-cap or gossan deposit cut by several quartz veins, carrying copper ore with gold-silver values.

Development: by 224′ tunnel. Mine under option and further development planned.

PALISADE COPPER CO. **NEVADA**

Company is controlled in Boston, Mass. Stock listed on Boston Curb.

Property: the old Heckla & Silver King mines, 2 claims, patented, at Bullion, Elko county, held under bond and lease. In May, a large body of high-grade copper ore was found in cleaning out an old tunnel; four 40-ton cars of $50 copper ore were shipped, May 22, 1916. Property is an old silver-lead mine, idle for many years.

PALMETTO CONSOLIDATED, INC. **NEVADA**

Office: Goldfield, Nev.

Officers: Edw. Cebrian, pres.; Robt. Blei, v. p.; L. Alegeri, sec., 57 Post

St., San Francisco, Calif. L. D. L. Cebrian, treas.; Clyde P. Johnson and John T. Murphy, mgr., Goldfield, Nev.

Inc. June 26, 1916, in Nevada. **Cap.**, $1,500,000; shares $1 par; 1,150,000 issued. Stock listed on New York Curb. Was operated as a close corporation.

Property: 25 claims, 12 patented, about 500 acres, 42 miles S. E. of Goldfield in the Palmetto Mountains, Esmeralda county, credited with past production of $6,500,000 in silver. Development by shafts, deepest 400′. The mine is said to contain large bodies of ore carrying good values in gold-silver-copper.

After an idleness of 20 years, the mine was to be re-opened, extensively developed and modern machinery installed, 1917-'18, but no confirmation of this report received. Reported on by J. Pepperberg and W. D. O'Brien.

PANAMA CANAL MINING CO. **NEVADA**

Address: 104 E. Holly St., Bellingham, Wash., and Carson City, Nev.

Officers and directors: Lorenz Neber, pres.; Henry Schupp, v. p.; A. C. Muller, sec.-treas.; Geo. H. Cress, mgr.

Inc. March, 1917, in Washington. **Cap.**, $100,000; par 10c. Income from 150 tons of silver ore sold in 1918, was $3,300.

Property: 12 claims, 224 acres in Voltair district, Ormsby county, 5 miles from Carson City, developed by 550′ tunnel. Quartz veins in granite carry silver ore.

Management planned driving 300′ of tunnel and installing small mill in 1919.

PANTHER CITY MINING CO. **NEVADA**

Office: care M. R. Sanguinet, sec.-treas., 1st National Bank Bldg., Fort Worth, Texas. Wm. Bryce, pres.

Property: 7 patented claims in 2 groups, the Panther City and Olinda, in Salmon River mining district, Elko county, Nev. Ore said to carry copper, silver, and a trace of gold. Planned to start development work in 1917, but no confirmation obtainable.

PATRICK MINING CO. **NEVADA**

See William Patrick Mining Co.

PAY ROLL MINING CO. **NEVADA**

Office: 310 Nat'l Bank Bldg., Tonopah, Nev.

PEER GOLD MINING CO. **NEVADA**

Address: Clyde Garrett, Burney Gordon and Harry Cutler chief stockholders, Reno, Nev.

Property: in Pine Nut range at Como, 8 miles south of Dayton, shows wide vein in andesite. High-grade ore discovered January, 1916, showed values of $73 to $150.

Probably dead. Letters returned.

PEERLESS MINING CO. **NEVADA**

Controlled by Lewis Thompson and M. A. Conant of Springville, Utah.

Cap., 1,500,000 shares.

Property: 23 claims, 360 acres, near Hiko, Lincoln county, said to show a 2½′ vein, carrying ore containing silver, lead, and copper. Development is but slight and property a prospect.

PERSEVERANCE MINES CO., LTD. **NEVADA**

Address: Searchlight, Nev.

Officers: A. M. Buley, pres.; F. E. Sharps, v. p. and mgr.

Is a trust, with $500,000 capitalization.

Property: 4 patented claims, 80 acres, 10 miles N. E. of Searchlight, Clark county, said to show contact vein in rhyolite-diorite. Ore is quartz with free gold and is said to average $22 per ton. Reserves, 4,000 tons blocked out.

Development: by 2 tunnels, 325 and 375′ long. Management sinking 500′ shaft and erecting 10-stamp mill, at last report.

PIERMONT MINES CO. **NEVADA**

Address: F. H. Vahrenkamp, Tonopah, Nev.

Officers: F. H. Vahrenkamp, pres.; R. A. Millick, v. p.; F. B. Matson, sec.-treas.-mgr.; H. G. W. Dinkenspiel, and Edward Bowes, directors.

Property: an old silver mine first worked in the 70's, on the E. slope of Schell Creek range, White Pine county, 27 miles from Ray siding on the

Nevada Northern line (Cobre-Ely) and 46 miles from Gold Hill on Western Pacific line in Utah. Ore used to be hauled 160 miles to Austin, Nev. Past production was considerable, unofficial records giving total as $6,000,000. Mine was closed in 1873, owing to low price of silver and litigation, and only assessment work done since.

Geology: ore occurs in a contact vein between brecciated limestone and porphyry; the vein runs N.-S. and dips W. and is apparently folded near the present face of the tunnel

Development: by 2 tunnels, and several shallow shafts. The upper tunnel, driven on the vein for 350′, has a stope 300′ long, 8′ wide, and 75′ high. This ore-shoot yielded most of the output. The lower tunnel is 382′ long; in it the shoot was 260′ long, 7′ wide, and assays 18 oz. silver and $2.06 gold per ton. Little stoping has been done. Two winzes, 30 and 60′ deep, were sunk from the tunnel to cut the vein on the fold found in the upper tunnel. A sample from the second winze assays $19.70 per ton. It is now estimated that there is a block of ore developed 800′ long, 260 to 300′ wide, and 8 to 14′ thick, equal to 125,000 tons, carrying from 16 to 30 oz. of silver per ton.

A hydro-electric plant, run by water brought a distance of 5,260′ and with a head of 498′ is to be erected, also a mill.

PILOT COPPER CO. **NEVADA**

Office: Chas. P. McColm, receiver, 205 Clay Peters Bldg., Reno, Nev.

Inc. 1917, in Arizona. **Cap.,** $7.500,000; $1 par; 3,095,000 treasury shares; balance was reported pooled. U. S. Corporation Co., New York, transfer office. Stock stricken from New York Curb, May, 1919. Is practically a reorganization of the Nevada Champion Copper Co.

Property: 8 claims, 130 acres, 3 miles from Luning, Mineral county, Nev., said to show large bodies of 3% copper ore.

Development: by 450′ 3-compartment shaft and 2 tunnels.

Equipment: 18-h. p. gas. hoist, shop, buildings, etc.

Property in hands of receiver since April, 1918. Was to be sold on December 29, 1919, at Hawthorne at a minimum price of $10,000. Debts were over $13,000.

PILOT KNOB GROUP **NEVADA**

Property: 5 claims in Snake Creek range, 2½ miles S. of Osceola, White Pine county, developed by 400′ tunnel and 200′ shaft.

Ore: tungsten, occurs in quartz veins in limestone formation. Equipment includes a 20-stamp mill.

Uvada Tungsten Co. was organized by A. V. Taylor, L. Jeffs and C. H. Thompson, of Salt Lake City, to take over the property in June, 1916, but owing to low price of tungsten the lease was allowed to lapse and the mine reverted to the original owners.

PILOT PEAK SILVER MINING CO. **NEVADA**

Address: Mina, Nev.

Officers: Dr. Frederick Bass, pres.; V. Andrus, v. p.; Chas. Lielich, sec.-treas., with Dr. Frank Pache, Chas. E. Bugg, Al. W. Drew, and Geo. W. Myers, directors.

Inc. July 30, 1919, in Nevada. **Cap.,** $150,000; 10c par.

PIOCHE-BRISTOL MINING CO. **NEVADA**

Address: 26 Stock Exchange Bldg., Salt Lake City, Utah.

Officers and directors: John Dorius, pres.; M. C. Morris, sec.-treas.; C. L. Whitney, v. p., with Arnold Herlin and D. H. Livingston.

Inc. Feb. 19, 1916, in Utah. **Cap.,** 1,000,000 shares; 5c par; 839,166 issued. Stock listed on Salt Lake Exchange.

Property: 6 claims, surveyed for patent, in the Jack Rabbit mining district, adjoining the Day Bristol, near Pioche, Lincoln county, said to show lead-silver-copper ore.

Inactive from July, 1917, on account of market conditions until July, 1919, when company let a contract to sink a 150′ shaft.

PIOCHE METALS CO. **NEVADA**

Address: F. B. Cooke, pres., care Columbia Trust Co. Salt Lake City,

Utah. Company levied an assessment of 1c a share in March, 1915.

Property: 6 patented claims at Pioche, Lincoln county, has been shut down for several years.

PIONEER EXPLORATION CO. **NEVADA**

Address: Hobart Bldg., San Francisco, Calif.

Reported to have acquired the Bloody Canyon antimony mine at Unionville, Pershing county, operated up to 1917 by the Antimony Syndicate and described thereunder.

PIONEER EXTENSION MINES CO. **NEVADA**

Office: 107 Boston Bldg., Denver, Colo. **Mine office:** Pioneer, Nye county, Nevada.

Officers: H. A. Riedel, pres.; T. S. Ellis, sec.; Col. A. J. Trone, treas.-gen. mgr.; Edwin S. Giles, supt.

Inc. in Arizona. **Cap.,** $1,500,000; shares $1 par; 400,000 shares in treasury.

Property: the Jolly Jane claim, 20 patented acres, adjoining the Pioneer Cons., at Pioneer.

Development: by 250′ shaft. A crosscut was driven from this level through rhyolite to prospect a contact 175′ E. of the Jolly Jane shaft. Mine reported under 3-year lease to Jolly Jane Leasing Co., since 1916. A prospect.

PITTSBURGH-DOLORES MINING CO. **NEVADA**

Address: Yerington, Nev.

Officers: H. S. McKee, pres., Pittsburgh, Pa.; A. Vignos, v. p.; R. J. Palmer, sec.; H. W. McIntosh, treas.; E. J. Schrader, gen. mgr.; J. B. Perry, mine supt.; C. R. Wilson, mill supt.

Inc. 1912, in Arizona. **Cap.,** $1,500,000; shares $1 par; issued 1,000,000. Bonds: Authorized and outstanding, $175,000. Annual meeting in March.

Property: 16 unpatented claims at Rockland, Mineral county, 27 miles S. of Yerington, comprises the claims of the old Rockland mine, discovered in 1868.

Ore: quartz, containing 1% pyrite with gold and silver values, occurs in a fissure vein from 1½ to 9′ wide, with rhyolite hanging-wall and grano-diorite footwall. Vein strikes N. E., dips 40° E., and carries pay ore in shoots, averaging about 0.44 oz. gold and 3.4 oz. silver, value about $10.50.

Development: by tunnels, greatest depth of workings being 1,300′ and horizontal extension about 13,000′. Ore is extracted by the fill method, stulls being used in timbering. A Sullivan angle compressor furnishes air, power for operating mine and mill is taken from the Truckee River General Electric Co.

Owing to the distance of the property from the railroad, 27 miles, transportation of supplies is expensive, $12 per ton.

Production: for 18 months to Dec., 1916, was 27,268 tons of ore, including some from dumps and tailings, yielding $230,370. Mining costs were $3.50 per ton, including development, and average milling cost was $2.75. In 1916, $18,749 was spent on construction work.

Mine and mill closed down indefinitely in 1918, owing to high costs and unsatisfactory conditions. See Vol. XIII for full details.

PITTSBURGH-ELY COPPER CO. **NEVADA**

Ely, White Pine county, Nev.

Officers: H. P. Harder, pres.; Louis H. Bock, v. p.; J. A. Varney, sec.; Frank Straub, treas., trustee and gen. mgr.

Inc. Dec., 1916, in Arizona. **Cap.,** $5,000,000; shares $5 par; non-assessable; 695,285 shares outstanding at last reports.

Property: 11 claims, unpatented, 220 acres, including the Keyboard group of 6 claims, 120 acres, near the Keystone mine of the Nevada Consolidated, and a small group near the Cumberland-Ely mine of the same company. Lands show porphyry and limestone, and company reports having copper oxides and sulphides, assaying 3 to 12% copper.

Development: by 2 shallow shafts and tunnels of 160′ and 40′.

Equipment: includes a 40-h. p. steam hoist. Inactive, except for annual assessment work, since 1907.

PITTSBURG SILVER PEAK MINING CO. **NEVADA**

Address: B. A. Rives, Silver Peak, Nev.

Property: mine and 10-stamp mill at Silver Peak, Esmeralda county, reported actively operated in 1918-'19.

PLATINO MINES CORPORATION **NEVADA**

Probably dead. R. Mausard, supt., Goodsprings, Clark county, Nev., at last accounts. Mine about 30 miles from Las Vegas, in the Platino district, is said to carry a 2′ vein of copper ore. A winze sunk on vein was reported to have disclosed a body of manganese carrying platinum and gold.

POLARIS GOLD AND SILVER MINING CO. **NEVADA**

Address: Odd Fellows' Bldg., Virginia City, Nev.

Officers: Geo. H. Drysdale, pres.; E. S. Chafey, v. p.; Chas. R. Morris, treas.; G. A. Ballard, sec.

Inc. 1919, in Nevada. **Cap.,** $150,000; par 10c; 780,000 outstanding. Transfer office, Virginia City, Nev.

Property: situated in Santa Fe mining district, 12 miles north of Luning, Mineral county. Country rock is rhyolite, strongly mineralized, with silver and gold in fracture zones.

Development: by 50′ shaft and about 150′ of drifting, etc. A 12′ vein of $12 to $48 ore reported opened in 1919. Will be energetically developed.

POTOSI GOLD & SILVER MINING CO. **NEVADA**

Address: 339 Bush St., San Francisco, Calif.

Cap., $1,120,000; $10 par. Listed on New York Curb, but lifeless.

Property: one of the old mines on the Comstock Lode, operated under lease in 1919 by Comstock Leasing Co., which see.

PRAIRIE FLOWER DEVELOPMENT CO. **NEVADA**

Address: Peter Buol, Goodsprings, Nev.

Inc. Dec. 23, 1916, in Nevada. **Cap.,** $100,000; 10c par; 300,000 issued. Annual meeting, first Tuesday in January.

Property: 4 patented claims, 60 acres, 4 miles W. of Goodsprings, Clark county, adjoining the Yellow Pine mine on the N. Property is owned by the Prairie Flower Mining Co., but is being developed by this corporation.

Claims cover a replacement deposit in limestone with an orebody that is 6′ wide, dips 40° W. and has a N.-S. course. The ore, which contains carbonates of lead and zinc, is said to assay 15% lead, 30% zinc and 10 oz. silver.

Development: by 200′ and 300′ incline shafts and 2,500′ of workings; 55% lead-zinc ore cut at bottom of the 200′ shaft, thought to be the Yellow Pine ore-zone.

Equipment: 18-h. p. hoist, compressor, and distillate engine. Mine reported bonded to Eastern capital in October, 1919.

PRINCE CONS. MINING & SMELTING CO. **NEVADA**

Office: 1118 Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Pioche, Lincoln county. Nev.

Officers: A. H. Godbe, pres.; G. F. Wasson, v. p.; M. C. Godbe, sec.-gen. mgr.; John Pingree, treas., with D. L. Wertheimer, directors. W. C. Browne, mine supt.; Frank Sheperd, mill supt.

Inc. 1907, in Utah. **Cap.,** $2,000,000; par $2; all issued. Company transfers its stock. Stock listed on Salt Lake Exchange.

Annual report for 1918 shows total receipts, $310,350, of which $299,290 was from ore sales; cash on hand, $19,902; profit from operations, $78,969; notes receivable, $22,273; expenditures amounting to $231,381, included development, $45,034; notes payable, $62,617. Deficit for the year was $5,205, after deducting $84,174 for depreciation.

Dividends: $124,924 in 1915; $250,000 in 1916; $200,000 in 1917. None since.

Property: 386 acres in Pioche district, Lincoln county.

Geology: ground contains large orebodies of iron-manganese, outcropping on surface for 800′, having an aggregate thickness of 120′, width of 500′ and proven for a length of 1,200′. The ore occurs as large deposits in bedding planes of lime and shale and is reported to average 3-4% lead, 34% iron, 13%

manganese, 3 oz. silver and some gold, 3% lime, 11% insol. and 14% silica, valued at from $7.50 to $9.50 per ton. Owing to large percentage of iron, the ore is especially valuable as a flux to the lead smelters, the iron commanding a bonus over the cost of smelting, with silver, gold and lead values coming in as a profit. From this source alone the ore yields $3-$4 per ton.

Company also owns the Pioche King group of 9 claims, and about 1,000 acres of patented land at Dry Valley and Bullionville, 12 miles from Pioche, said to contain 120,000 tons of tailings on dumps, showing 5.34% lead, 10 oz. of silver, 0.11 oz. gold per ton, and estimated to average $5 per ton profit.

A 200-ton oil flotation mill was erected to treat these tailings in 1916. The mill results during 1918 did not prove as successful as anticipated, but 100,000 tons of tailings are expected to run 8 oz. silver, 1.80 oz. gold, and 3% lead.

The Davidson mine, adjoining the Prince, was taken over in July, 1918, and is being extensively developed. Receipts from ore sales are more than paying for development work.

Development: the Prince mine is developed by 550′ shaft with several miles of drifts. A new 2-compartment shaft started in May, 1918, and completed to 400′ in July, 1919, is being deepened to 1,300′ so as to explore the quartzite underlying the limestone. Equipment was moved from the old to the new shaft, and the old shaft abandoned. Ore reserves estimated at approximately 1,000,000 tons.

Diamond-drilling is under way; hole No. 3, on the 600′ level, when at a depth of 340′, ran into a bed of oxidized iron-manganese 10′ thick, which assayed 25 oz. silver and $3.60 in gold. At 627′ eleven feet of clean zinc sulphide was encountered, expected to run 30% zinc.

Equipment: includes steam power, hoist, compressor and 9 mile standard gauge railway connecting with the Salt Lake Route from Pioche. Freight rate was $1.75 per ton in 1917.

Production: shipments in 1915 were 117,037 tons; in 1916, 135,643 tons; in 1917, 122,872 tons; in 1918, 84,137 tons; in 1919 (to June), 5,000 to 6,000 tons per month, increased to 8,000 in September.

Present management has put the mine on a paying basis, developed large ore reserves and accumulated a cash surplus. Present high prices for supplies and the development work necessary during past year are responsible for decreased earnings. Costs total $12 per ton.

PROSKEY REGENT MINING CO. NEVADA

Dead. Property at Rawhide, Nev., formerly held by Mogul Mining Co., and purchased 1919 by the Seminole Regent Mng. Co., which see.

PROVIDENCE EXTENSION GOLD MINING CO. NEVADA

Office: Morris, Ill.

Officers: I. F. Hatcher, pres.; W. F. Buck, v. p.; G. A. Leach, sec.-treas., with O. M. Barker, directors.

Inc. 1908, in Nevada. **Cap.,** $1,500,000; shares $1 par; 1,100,000 shares outstanding.

Property 3 patented claims and a fraction at Seven Troughs, Humboldt county, Nev., reported by management to show high-grade free-milling quartz ore in fissure veins, 4″ to 2′ wide and to carry from $14 upwards in gold per ton. Examined by F. A. Wheeler.

Development: by 170′ vertical shaft. Idle since 1917, pending re-financing of the company.

QUEEN REGENT MERGER MINES CO. NEVADA

Office: 337 Monadnock Bldg., San Francisco, Cal.

Officers: J. D. Brown, pres.; H. B. Wade, sec.; J. E. Kerr, gen. mgr.; Wm. P. Miller, cons. engr., at last accounts.

Inc. 1911, in California. **Cap.,** $2,000,000; shares $1 par; 761,000 shares issued.

Property: 5 unpatented claims, bought June, 1915, for $60,000, in Rand mining district, Mineral county, 18 miles E. of Nolan, on the E. side of Walker lake. Tract is said to cover 4,000′ of the main fissure of the Rand district.

Development: by 500′ main working shaft with crosscuts at each 100′ level and 2 prospect shafts, each 100′ deep. Vein on 1st and 2nd levels is 30′-40′ wide in places, between andesite footwall and rhyolite hanging wall. On the 2nd level a 4′ vein cut at 406′ carried sulphides, and an 8′ cross vein cut at 460′ disclosed copper ore unlike the usual ore of the Rand district and carrying sulphides with lead-copper ore, the copper content being 7% to 15%. On the 500′ level dacite replaced the andesite; about 200′ from the shaft the ore changed to heavy blue-black clay and talc. A highly disturbed formation was encountered in which the vein disappeared. Extensive development has so far failed to find the downward extension of the sulphide ore-bodies and all work has been discontinued for the present.

QUICKSILVER MINES CO. **NEVADA**

Address: Winnemucca, Nev.

Controlled by John Ross, Unionville, Nev. Formerly operated by Ruby Silver Mining & Development Co. (Vol. XIII.) M. D. Faretta and Frank Childress are largely interested.

Property: the Ruby or Faretta group, in Jersey Valley, 22 miles S. W. of Battle Mountain, Lander county, equipped with 12-retort reduction plant and reported to have several hundred tons of 5% cinnabar ore on the dumps. In August, 1919, the output was about 15 flasks of quicksilver per week.

QUO VADIS GOLD MINING CO. **NEVADA**

Idle. **Address:** Las Vegas, Nev.

Officers: Peter Buol, pres.; C. C. Ronnow, v. p.; Ed. W. Clark, sec.-treas., with F. A. Clark and J. B. Anderson, directors.

Inc. Dec., 1915, in Nevada.

Property: the Quo Vadis mine at Las Vegas, Clark county, said to show rich stringers of free milling gold ore in latite and andesite formation. Developed by 300′ tunnel and a shallow shaft, which will eventually be sunk to 500′.

RED METALS CO. **NEVADA**

Apparently dead. **Last address:** 16 Washoe Bank Bldg., Reno, Nev. A. W. Holmes, pres.; Geo. T. Milner, sec. and gen. mgr.; Jas. Howell, treas.

Inc. May 12, 1910, in Nevada. **Cap.,** $1,000,000; shares $1 par; non-assessable: in $50,000 preferred and $950,000 common stock; issued, $1,500 preferred and $786,200 common stock. Annual meeting, first Monday in June.

Property: 16 claims, unpatented, 300 acres, on Peavine Mountain, Washoe county, Nev. Claims carry lenticular deposits, between diabase and diorite, that are 1 to 12′ wide, show copper carbonate and bornite ore, said to average 9% copper, 15 oz. silver and $4.80 gold per ton.

Development: by tunnel, 1,200′ long. The mine was opened 1866, for silver, closed 1877, owing to the low price of that metal, and again re-opened 1908. See Copper Handbook, Vol. XI. Geology of this district is given in the U. S. G. S. Bull. 594, p. 194.

RED STREAK COPPER MINING CO. **NEVADA**

Address: Goodsprings, Nev.

Officers: E. B. Price, pres.; Jos. M. Sanders, sec., with N. B. Price, Jack H. Smith, and John O. Kemple, directors.

Property: adjoins the Copperside mine in the Yellow Pine mining district, near Goodsprings, Clark county, said to show 3′ of copper-bearing ore. Carload shipments realized $100 per ton.

Management plans further development at depth.

RED TOP MINING CO. **NEVADA**

Address: N. K. Franklin, supt., Manhattan, Nye county, Nev. Sinking a double-compartment shaft in limestone with crosscutting and drifting on 110′ level. No recent data secured.

Equipment: includes pump and compressor.

RENO SILVER HILLS MINING CO. **NEVADA**

Address: Alex. Boyle, Reno, Nev.

Officers: G. A. Bartlett, pres.; J. J. Rornes, v. p.-gen. mgr.; C. H. Dennison, sec.-treas., with E. Malley and R. E. Vickers, directors.

Property: the Wedekind silver mine located in 1896 and said to have produced $500,000. Ore was extracted by open-cut and treated in a local mill. A 140′ shaft was to be deepened in 1919-1920.

RENO-YERINGTON COPPER CO. **NEVADA**

Officers: E. L. Brown, pres.-mgr., 944 West 6th Street, Reno, Nev.; Victor Cokefair, v. p.; M. C. Brown, sec.; Farmers & Merchants Natl. Bank, treas.; preceding with Walter Harris, O. H. Sonne, Will McDonough, directors.

Inc. Jan. 25, 1907. **Cap.,** $1,000,000; $1 par; 750,000 outstanding.

Property: 5 unpatented claims, about 100 acres, north of the Bluestone mine, at Yerington, Lyon county, said to show sulphide ore in granite with easterly dip, averaging 3% copper.

Development: by 700′ tunnel and 100′ incline shaft sunk on the contact.

Equipment: includes hoist and buildings.

REORGANIZED PIONEER MINES CO. **NEVADA**

Address: Goldfield, Nev. **Mine office:** Pioneer, Nev.

Officers: W. J. Tobin, pres.; J. K. Turner, v. p.; Ben Gill, sec.-treas., with E. A. Blakesley, directors.

Inc. May, 1918, in Nev. **Cap.,** $500,000; 10c par; assessable; 2,250,000 outstanding. Assessment No. 1 of 1c per share, levied March, 1919. Company is a reorganization of the Pioneer Cons. Mines Co. described in Volume XIII., the new company assuming all obligations of the Pioneer Cons. Stockholders were given the privilege of exchanging their holdings share for share upon payment of a 1c bonus for the new stock. Up to March 1, 1919, 2,014,836 shares had been exchanged, and of the $15,836 indebtedness, over $12,000 had been paid off.

Property: 12 claims, 10 patented, 180 acres, at Pioneer, Nye county.

Geology: irregular masses of altered and mineralized rhyolite breccia are traversed by small, irregularly intersecting quartz-filled fractures containing gold-silver values. Isolated bunches of quite high-grade ore have been encountered, but not of commercial size.

Development: by 500′ main working shaft and 15,000′ of workings. The shaft will be sunk to depth of 800′.

Equipment: includes electric power, 40-h p. hoist, 7-drill compressor, hoist, gasoline engine, 50-ton amalgamation and cyanide mill.

In 1918 company acquired the K.-K. claim and now plans developing at greater depth to pick up the main Pioneer vein.

RESERVATION HILL M. & M. CO. **NEVADA**

Address: W. E. Casson, mgr., Carson City, Nev.

Officers: R. A. Trimble, pres.; W. E. Baldy, v. p.; R. A. McKay, sec.-treas., with H. R. Burlington and J. E. Monahan, directors.

Inc. 1907, in Nevada. **Cap.,** $1,000,000; $1 par; 788,000 issued.

Property: 2 claims, 35 acres, 1 mile from Reservation station, Mineral county, Nev., partly under lease.

Development: by short tunnel and shallow shaft, the latter said to show 18″ of ore that assayed high in silver, lead, and gold.

A prospect.

RICHLAND MINES CO. **NEVADA**

Address: Imlay, Nev.

Officers: John R. Tullis, pres.-supt.; B. J. Sears, v. p.-treas.-mgr.; J. W. Ferguson, sec., with F. L. Reber and C. T. Smith, directors. C. T. Smith, res. agent and registrar.

Inc. May 15, 1919, in Nevada. **Cap.,** $150,000; 10c par; 750,000 shares in treasury. Annual meeting, May 15th.

Property: 4 claims, 80 acres, in Richland mining district, 7 miles N. of Imlay, Pershing county, is said to show veins in granite and shale. The main vein has an easterly course and dips due north; it is reported to be 2′ wide and to average $35 per ton in gold, silver and lead.

Development: by crosscut tunnel that is expected to cut both veins at 100′ depth.

ROBUST GROUP **NEVADA**

Address: L. F. Clar, owner, Manhattan, Nev.

Property: 5 claims in Manhattan gulch, Nye county, developed by shallow shafts. Ore occurs in gravel beds said to average $8 per cu. yd. in gold and silver.

Equipment: electric hoist and pump.

Inactive during 1918, owing to scarcity of labor.

ROCK HILL PLACER CO. **NEVADA**

Out of business. **Former officers:** David May, pres.; Wm. I. Mead, v. p.; Jos. S. Jaffa, sec.-treas.

Inc. in Nevada. **Cap.,** $1,000,000; shares $1 par.

Property: 22 claims, 440 acres, in Rock Hill canyon, near Imlay Pershing county, Nev.

ROUND MOUNTAIN MINING CO. **NEVADA**

Offices: 1011 First Nat'l Bank Bldg., San Francisco, Goldfield, and Round Mountain, Nye county, Nev.

Officers: L. D. Gordon, pres. and gen. mgr.; J. R. Davis, v. p.; H. G. Mayer, sec.-treas., with W. H. Weber and W. C. Erb, directors. Gibson Berry, gen. supt.; R. J. Ledwick, mine supt.; E. Michal, mill supt.

Inc. March, 1906, in Nevada. **Cap.,** $1,000,000; increased to $1,500,000 in 1914; shares $1 par; outstanding, 1,357,899. Stock transferred in company's San Francisco office. Anglo-California Trust Co., San Francisco, registrar. Annual meeting, third Monday in February. Listed on San Francisco and Nevada exchanges. Company owns 200,000 shares in Fairview Round Mountain M. Co.

Dividends: total $363,965; the last one, 4c per share, was paid in August, 1913.

The following table gives financial results during the past three years, the 1915-'16 period being for 21 months:

Year	Revenue	Operating profit	Depreciation	Current Assets	Current Liabilities
1918.....	$98,889	$24,646	$39,405	$100,357	$82,886
1917.....	225,586	123,751	28,910	88,027	90,090
1915-'16...	503,508	100,490	35,631	71,198	140,000

Assets do not include buildings, machinery, or pipe-lines; liabilities include notes payable, $120,000 in 1915-'16, $90,000 in 1917, and $60,000 in 1918.

Property: 1,033 acres, 347 patented, chiefly worked by hydraulic mining. Ground is at Round Mountain, 60 miles N. E. of Tonopah, the nearest railroad point. This does not include property in Jett and Jefferson canyons.

Geology: claims show large low-grade oxidized gold-silver deposits that are replacements along fissures and sheeted zones in rhyolite, with E.-W. strike, dip 15°, average width of lode ore, 8′.

In 1914, company took over the Round Mountain Sphinx M. Co.'s claims, thus ending several years of litigation involving apex rights in Los Gazabo claim.

Development: mine by 1,000′ incline shaft, with about 40,000′ of workings. Management reports a large tonnage of $2 to $7 ore blocked out in the mine. Lode exploration disclosed a large sulphide orebody at 900′. Selective mining raised the grade to $7.10 per ton in 1916 from $5.68 in 1915, $6.57 in 1914 and $5.28 in 1913. Four years lode mining indicated that operations were conducted at a small profit with the 180-ton mill, and not less than 500 tons should be treated daily. These large low-grade deposits are the result of dissemination of gold throughout strongly silicified zones in the rhyolite mass of the mountain. In many places the rhyolite is much altered, and the better parts of this ore yielded $4 per ton. Enrichments occur throughout and the mass should be profitable, so a large expenditure on its exploitation is justified.

The ore is free milling. Large scale tests were made in 1917. Separate mill runs being tried on ore from separate zones in the mine. Only three were completed as the fourth was too low-grade. A. W. Geiger was in charge of this

work. From section 921, there was milled 1,422 tons of $3.20 ore, of which 78.5% was recovered by amalgamation. A 55 or 60-cent tailing could be depended upon. This section is one of the largest ore-zones in the mine and is favorable for future exploitation. Sections 710 and 473 are too poor for consideration.

The lode mine is now worked only by lessees, who extracted 180 tons of $44.50 ore in 1917, and 2,131 tons of $36.70 ore in 1918. The royalty paid to the company for those years amounted to $1,817 and $17,442, respectively. The company will probably resume underground work in 1920.

The company's operations for 1918-19 were mainly confined to placer mining. Company has over 367 acres of placer ground and estimates 1,500,000 yards of gravel worth $1 a yard as available. Two monitors are used, tearing down and sluicing 1,200 to 1,500 yd. a day; main tail race is 4,449′ long, with two long laterals. The high-pressure pipe-line is 45,000′ long, is spiral steel, commencing with 30″ and reducing to 20, 18 and 16″; head 600′ with 400 miner's inches of water. Total cost of the Jett Creek pipe-line, water-rights and placer equipment has been over $200,000. Operations started in June, 1915, and have been profitable, especially so, as the lode mine was closed to company operations.

The controlling factor in these placer operations is the water-supply, giving various results in different seasons. In 1916, a shortage of water was aided by teams and scrapers; in 1917, the high-water season lasted 85 days, so a dam was built in Jett canyon, and the waters of Jefferson and Shoshone creeks were purchased; in 1918, the season was the poorest yet experienced, the hydraulic head being only 45% of that in 1917; in 1919, the heavy snowfall indicates a long season. Lessees are working on bedrock, making fair returns.

Equipment: includes two 50-h. p. hoists, 10-drill compressor, electric power and 180-ton plant, including Huntington and tube-mills. Company also operates the Toquima Stores Co., which carries a complete stock of domestic supplies.

Production: to the end of 1918 was $3,430,964 from 411,015 tons of ore, and 374,632 yards of gravel. Of this sum, $959,068 was profit. An analysis of production shows the following:

Year	Tons	Value	Profit	Yards	Value	Profit
To end of 1916.....	398,897	$3,004,229	$752,934	175,477	$139,912	$65,813
1916.....	67,452	357,014	49,007	175,477	139,912	65,813
1917.....	12,118	78,483	29,773	127,788	140,016	91,016
1918.....	.....	.....	.....	71,367	68,324	19,532

The profits do not include royalty or sundry revenue.

Company has an efficient management and has made a good record, despite unfavorable conditions. The future depends on its ability to mill a large quantity of low-grade ore at low cost, and on the profits from placer mining.

ROYAL CONSOLIDATED COPPER CO. NEVADA-ARIZONA

Probably dead. Letters returned, 1915, from former St. Louis, Mo., address. **Mine office:** Hawthorne, Esmeralda county, Nev.

Officers: L. L. Crisp, pres. and gen. mgr.; G. L. Werth, v. p.; R. E. Drake, sec.-treas.; B. H. Martens, supt.; preceding, with Robt. W. Alt and Albert Lawson, directors.

Inc. April 27, 1907, in Arizona. **Cap.,** $2,500,000; $1 par; issued 1,434,477, Dec. 31, 1910. **Bonds:** $300,000, authorized, at 7%; issued, $2,300, Dec. 31, 1910. Annual meeting, first Monday in April.

There are two companies of this title; one an Arizona, the other a Nevada corporation; the Arizona company apparently holding stock in the Nevada operating company.

Property: 10 claims, 1 fractional, 200 acres, 8 miles from Luning and 16 miles from Hawthorne and Mina. According to the company's former expert, the formation is "dyarite," porphyry and limestone, with large "burns" of iron gossan, the ore deposits consisting of copper, gold and silver, lying in a fissure "cutting" a contact of porphyry and lime, the orebody being 250′ wide.

The company's past literature contains other ridiculous and misleading statements. Fully described Vol. XI., Copper Handbook. Unfavorably regarded.

RUBY SILVER MINING & DEVELOPMENT CO. **NEVADA**

Dead. Fully described Vol. XIII. See Quicksilver Mines Co.

RYE PATCH MINES CO. **NEVADA**

Office: Judge Bldg., Salt Lake City, Utah.

Directors: B. F. Bauer, Geo. W. Morgan, Judge H. A. Smith, Clinton D. Day, C. W. Peck, Sr., Lorin Hall, and Jos. E. Ray, all of Salt Lake City, Utah. Has some directorate as American Mining & Exploration Co.

Property: 17 claims, includes the Silver Bell, Alpha and Rye Patch mines, at Rye Patch, Pershing county, worked by the Rye Patch M. & L. Co. (Vol. XIII) and now operated by the American M. & Expln. Co., which see.

RYE PATCH MINING & LEASING CO. **NEVADA**

Fully described Vol. XIII. Property reverted to Rye Patch Mines Co., which see.

SAFFORD COPPER CO. **NEVADA**

Office: 67 Milk St., Boston, Mass.

Officers: Jas. H. Kimball, pres.; Jas. S. Whitelock, v. p.; Owen Goldsmith, treas.; Frank W. Smith, supt.; preceding officers are directors.

Inc. 1915. **Cap.,** $300,000; shares $1 par. Metropolitan Trust Co., Boston, transfer agents.

Property: 4 claims in Safford mining district, Eureka county, said to show copper-silver ore in quartz veins from 18″-30″ wide, traversing porphyry and rhyolite formation.

Development: by 2 shafts, 30′ and 100′ deep, on the Evening Star claim. First shipment on January 30, 1917, to Garfield, Utah, smelter, returned 8.28% copper and 128 oz. silver per ton. Merely a prospect.

SAINT ANTHONY MINES CO. **NEVADA**

Owned by Atolia Mining Co.

Property: Toy tungsten mine and a 75-ton mill at Toy, 21 miles S. W. of Lovelocks. Ore occurs in an 8′ vein of 3% scheelite. Developed by 100′ shaft, winze and adit.

Property operated on a small scale by lessees during 1918.

SAINT ANTHONY MINING CO. **NEVADA**

Address: Goodsprings, Clark county, Nev. Jos. Dederichs, gen. mgr. and chief owner.

Property: 7 claims, 140 acres, in the Yellow Pine mining district, 2½ miles W. of Goodsprings, Clark county. Ore is said to assay 10% to 18% copper in orebodies up to 15′ width. Developed by 2 incline shafts, 240 and 175′ deep, located 500′ apart.

Equipment: includes 2 gasoline hoists and an aerial tram 850′ long.

Production: to June, 1915, reported as $60,000. Reported shipping one car of ore every 6 weeks during 1916, but no recent returns secured.

SALMON RIVER MINING CO. **NEVADA**

Probably defunct. **Former office:** 19 West Granite St., Butte, Mont. Mine near Contact, Elko county. Carries gold and silver-bearing copper ore. Had gasoline power and a small smelter. Not operating, at last accounts.

SALT LAKE TUNGSTONIA MINES CO. **NEVADA**

Office: care Allen T. Sanford, counsel, Boston Bldg., Salt Lake City, **Mine office:** Tungstonia, White Pine county, Nev.

Officers: L. W. Roberts, pres. and gen. mgr.; Gustav Wissler, v. p.; A. F. Stumpf, sec. and treas., with S. T. Merrill and J. A. Rasmussen, directors. William Peterson, cons. eng.

Cap., 1,000,000 shares; assessable.

Property: 15 claims adjoining the Shepherd mine, in north end of Snake range, shows a number of veins 1-48″ wide, carrying hubnerite ores said to average 2% tungstic acid. The veins occur in granite, near a limestone contact.

Company has a 25-ton mill, using Marcy ball-mill and Wilfley tables. Concentrate is said to contain 71% tungstic oxide.

A lower tunnel was 300′ long in January, 1918, had cut 3 fissure veins and within a total of 500′ seven more are expected to be cut.

SEATTLE CONTACT MINING CO. **NEVADA**

Idle at last report. **Address:** J. V. Marshall, gen. mgr., Contact, Elko county., Nev. T. A. Marshall, pres., L. B. Walters, sec., Seattle, Wash.

Property: the Delano mine, 8 claims, very near Contact, Nev., carries the Brooklyn contact vein, and the Palo Alto and Blue Bird veins, 150′ apart. The latter is a fissure vein, 1-15′ wide, in grano-diorite, with high-grade streak mined for 2′ to 10′ wide, and yielding copper ore.

Geology: and development of this group are fully described by Schrader, Bull. 497, U. S. Geol. Survey, 1912, pp. 119 and 121.

Development: mainly by tunnels and a 170′ shaft.

Production: Feb.-July, 1916, 1,950 tons, averaging $45 per ton, and carrying 18% to 23% copper, 6 oz. silver and 80 cts. gold per ton. Production costs given at $17.50 per ton. No recent returns.

SEATTLE MINING, MILLING & POWER CO. **NEVADA**

Contact, Nevada. Henry Smith, mgr. Company owns the Mammoth mine, covering 12,000′ along a contact deposit 20′ to 125′ wide, reported to show 55′ of 5% ore in one face.

Production: from May 20, 1916, to Aug., 1916, amounted to 165 tons containing 9.5%copper, 6 oz. silver and $2 gold, averaging $43 per ton. No recent returns.

SEMINOLE-REGENT MINING CO. **NEVADA**

Address: 314 Clay Peters Bldg., Reno, Nev. **Mine address:** Rawhide, Nevada.

Officers: Alexander S. Proskey, pres.-gen. supt.; W. R. Grant, sec.-treas., with S. Frederic Taylor and Dr. Byron E. Eldred, directors.

Inc. Feb., 1919, in Nevada. **Cap.,** $1,000,000; $1 par; 400,000 outstanding.

Property: the Proskey Regent group, formerly operated by the Mogul Mng. Co., about 14 full and 3 half claims, 300 acres, 2 miles from Rawhide, Mineral county and 27 miles by wagon-road from Schurz on the Goldfield branch of the S. P. R. R.

Ore: carrying gold and silver occurs in veins said to be from 1 to 6′ in width.

Development: by 400′ shaft. **Equipment:** includes 125-ton Black Eagle mill, compressors, tools and houses.

The mine is credited with past production of $150,000. Re-opened late in 1919, and crosscut driven on 400′ to cut the orebody.

SEVEN TROUGHS BUCKHORN MINING CO. **NEVADA**

Probably dead. Formerly operated near Vernon, Humboldt county, Nev.

SEVEN TROUGHS COALITION MINING CO. **NEVADA**

Office: First Nat'l Bank Bldg., Lovelocks, Nev.

Officers: L. A. Friedman, pres.; Wm. Adams, v. p.; R. Nenzel, sec., with M. R. Vanderloot, and J. T. Goodwin, directors; Frank Bird, supt.

Inc. Sept. 29, 1908, in Nevada, to take over the Seven Troughs Kindergarten Mining Co. and the Seven Troughs Therian Gold Mining Co., together with some other ground. **Cap.,** $1,500,000; $1 par; outstanding August 27, 1915, 1,433,027 shares. Security Transfer & Registrar Co., New York, transfer agent and registrar. Listed in Salt Lake City and on New York Curb.

Dividends: paid in 1915 totaled $180,380, consisting of four quarterly and one extra dividend in December, all of 2½ cents per share. Total dividends paid, $252,533.

Property: 264 acres including 14 patented claims at Seven Troughs, Humboldt county, has high-grade gold-silver ore in a narrow vein which varies in width from 4″ up to 20 and 30″.

Development: to the 1,630′ level which is 1,900′ on the dip. In 1915 the output totaled 4,509 tons of ore, yielding $416,084; the ore handled by the 50-ton mill averaged about $93 per ton.

Idle since April, 1918. No annual report seems to have been issued since 1915. Probably the rich shoots are exhausted. In September, 1919, the mill was

stopped after treating old dumps and tailings and the camp is now almost deserted.

SEVEN TROUGHS BUCKHORN MINING CO. **NEVADA**

Address: Lovelocks, Nev. **Officers:** L. A. Friedman, pres.; A. A. Williams, v. p.; R. Nenzel, sec.-treas., with J. D. Hilger and R. J. Evans, directors. C. W. Poole, gen. mgr.

Inc. Nov. 26, 1906, in Utah. **Cap.**, $1,000,000; $1 par; outstanding. 897,700 shares. Annual meeting, second Monday in June. Listed in Salt Lake City.

Property: 29 claims, 26 patented, including the Fairview mine, for several years one of the heaviest producers of the district, located in the Seven Troughs mining district. Developed by a 700′ vertical shaft. Said to show gold-silver ore occurring in fissure veins in basalt.

Equipment: includes a 50-h. p. gasoline hoist. Output in 1915 consisted of 260 tons of ore with a gross yield of $15,000.

Idle, owing to war conditions, for 3 years past.

SEYLER-HUMPHREY GOLD MINING CO. **NEVADA**

Address: C. T. Lawrence, agt., Manhattan, Nev.

Officers: R. E. Seyler, pres.; F. G. Humphrey, v. p.; J. C. Humphrey, sec.; C. T. Lawrence, directors.

Inc. 1906, in South Dakota. **Cap.**, $1,000,000; $1 par; 975,000 issued.

Property: 5 claims, 2 patented, 100 acres, includes the April Fool, War Eagle, Ida and Lottie claims at Manhattan, Nye county. Ore, which occurs in pockets, is said to average better than $40 per ton.

Development: by tunnel driven towards a lime-shale contact. Operated intermittently by lessees on a royalty basis.

SHEPHERD SILVER MINING CO. **NEVADA**

Address: B. B. Shepherd, 1108 Hearst Bldg., San Francisco, Cal.

Inc. 1919, in Nevada.

Property: 2½ miles from the Silver Gulch mine in the old Black Mountain district, 10 miles S. of Mina. Two 35′ shafts and surface cuts have exposed lead-silver ore. A crosscut tunnel was being driven in December, 1919.

SHEEPHERDER MINE **NEVADA**

Lovelocks, Humboldt county, Nev.

Operated under lease by Jose-Davis M. & M. Co., which see.

SHIPPER COPPER MINING CO. **NEVADA**

Address: Luning, Mineral county, Nev. Frank Everett, pres.; Jas. E. Quinlan, mgr.

Property: 2 claims, 4 miles S. E. of Luning, developed by a 400′ shaft, shows a small vein of high-grade copper ore in dolomite, shipments from which are reported to have yielded 8% copper.

SHOSHONE POLARIS MINING CO. **NEVADA**

Idle since 1911. See Vol. XII.

SIERRA NEVADA MINING CO. **NEVADA**

Office: 335 Mills Bldg., San Francisco, Calif.

Officers: W. G. Morrow, pres.; W. E. Sharon, v. p.; Jas. Newlands, Jr., sec., with Whitman Symmes (supt.), W. W. Turney, directors.

Inc. Nov., 1904, in California. **Cap.**, $200,000; $1 par; assessable; all outstanding. Listed on New York Curb and on San Francisco Exchange.

Property: 5,000′ at the north end of the Comstock Lode, north of the Union Consolidated mine, in the Virginia mining district, Storey county, credited with a production of over $1,000,000.

Exploration is now being done on the 2,000 level from the Union Con. shaft. The pumping is handled by the United Comstock Pumping Ass'n.

SILGOLED MINING CO. OF NEVADA **NEVADA**

Address: Pioche, Nev.

Officers: John W. Hamilton, Jr., pres.; Arthur Reall, v. p.-sec.-mgr.; Walter Pincus, treas., with E. M. Cooper and Wm. J. Ysell, directors.

Inc. 1915, in Nevada. **Cap.**, $100,000; 25c par; 248,000 shares in treasury, July, 1919.

Property: Ely Valley group, 9 patented claims, 134 acres, in Ely mining district, near Pioche, Lincoln county.

Ore: occurs in fissure veins and as chamber deposit in limestone, said to average 0.325 oz. gold, 3.05 oz. silver, 9% lead.

Development: by incline shaft to depth of 445′, with 4,500′ of workings.

Equipment: includes 25-h. p. hoist and compressor.

Management estimates ore reserves at 3,000 tons, with 1,500 tons blocked out. Planned 350′ of core-drilling in 1919.

SILVER BELL & ALPHA CONSOLIDATED MINES CO. NEVADA

Officers: Lorin Hall, pres., Salt Lake City; Clinton D. Ray, sec.; C. B. Smith, supt., Rye Patch, Nev.

Inc. 1915, in Utah. **Cap.,** $1,000,000; shares $1 par; 450,000 in treasury; 100,000 were to be sold June, 1916, to erect a mill.

Property: two noted silver-gold mines at Rye Patch, Nev., Pershing county, with reported production of $11,000,000. Mine is 3.6 miles from rail.

Development: by shaft sunk through old workings and tapped by 1,000′ working tunnel, with reserves of 200,000 tons of ore in old workings, said to assay 5 to 30 oz. silver per ton with 40c to $1.40 gold per ton. Company figures $2 mine and transportation costs and was to erect a mill. A streak of ore was cut in 1916, carrying 2,520 oz. silver per ton in brittle silver and black sulphurets.

SILVER CENTER MINING CO. NEVADA

Address: Clay Peters Bldg., Reno. Nev.

Inc. May 3, 1919, in Nevada, by H. M. Hamlin, E. C. Dalzela and W. D. Jones. **Cap.,** $200,000; 10c par.

SILVER CHIEF MINING CO. NEVADA

Address: Nixon Bldg., Reno, Nev.

Officers: D. A. Smith, pres.; W. T. Wilson, v. p.; J. B. James, sec.-treas., with E. H. Smith and B. S. Gregory, directors.

Inc. 1919, in Nevada. **Cap.,** 1,500,000 shares.

Property: 6 claims in the Gillis range, 12 miles N. of Luning, Mineral county, on the Rawhide-Luning road. Claims show granite-rhyolite contact, in which silver occurs. Work was started in August, 1919.

SILVER COMET MINING CO. NEVADA

Address: Panaca, Lincoln county, Nev.

Officers: at last accounts, E. D. Smiley, pres.-mgr.; M. J. Smiley, sec.; J. W. Baker, treas., with W. A. Burnett, directors, all of Boston, except E. D. Smiley.

Inc. Jan., 1913, in Nevada. **Cap.,** $500,000; shares $1 par. Annual meeting in July.

Property: 5 unpatented claims, 100 acres, in the Comet mining district, Lincoln county. Ore: gold-lead-silver-tungsten, occurs in nearly vertical fissure veins in quartzite, said to assay $30 per ton in gold, silver and lead. Developed by 145′ vertical shaft, with 950′ of workings.

Equipment: includes a gasoline hoist and 50-ton mill completed in 1915; the mill contains a crusher, rolls, mill and magnetic separator. No recent information.

SILVERFIELDS AJAX MINES CO. NEVADA

Name changed to Elgin-Bellehelen Divide Mining Co., which see in list of Divide companies herein.

SILVERFIELDS MINING CO., LTD. NEVADA

Address: J. M. Hamilton, sec., 11 Pine St., New York.

Inc. Dec. 27, 1906, in Great Britain, as Golconda Consolidated Co., Ltd., and changed name to present title Feb., 1909. **Cap.,** £250,000; shares £1 par; issued, £143,353, fully paid.

Property: sundry claims in Battle Mountain district, Lander county, formerly owned by the Humboldt Sm. & Red. Co., with a third interest in the Honolulu group, balance of which is owned by the Golconda-Nevada Copper Co., in the Kennedy district, Humboldt county.

Development: by a 250′ shaft showing a 3′ vein in limestone said to assay, 8% copper, 26% lead, 390 oz. silver and $4 gold.

Equipment: includes a 25-h. p. hoist and necessary mine buildings.

Property idle many years. The Nevada Silverfields Co. was organized 1918 by the E. N. Breitung interests to take over the holdings of the Silverfields and the Nicklas M. Co. Each company is separately described herein.

SILVER GLANCE MINING CO. **NEVADA**

Address: Louis Sigmund, Goldfield, Nev.

Inc. in 1919.

Property: 4 claims, 3 miles S. of Redlich station on the T. & G. railroad in Esmeralda county. Limestone, schist-gneiss, and shale are cut by 5 veins, that are from 5″ to 14′ wide and carry ore assaying from $2.50 to $222 per ton in gold, silver, and copper. Former owners did 2,000′ of stoping from a 60′ inclined shaft. Sixty tons recently shipped yielded from $4 to $15 per ton net. Thirteen tons in 1917 gave 25.7 oz. silver per ton. A prospect.

SILVER GULCH MINING CO. **NEVADA**

Address: H. B. Vandersole, Mina, Nev. C. E. Noble, mgr.

Inc. 1919, in Nevada. **Cap.,** $150,000.

Property: 3 claims in the old Black Mountain district of Mineral county, 10 miles S. of Mina and the same distance W. of Belleville. Eleven narrow, though rich, silver veins have been exposed. Work was started late in 1919, and by December there was 27 tons of 60% lead and 200 oz. silver ore ready for shipment.

SILVER HORN MINING CO. **NEVADA**

Address: care L. R. Thatcher, Elko, Nev.

Property: 4 claims, on which a 70′shaft cut ore running from $5 to $40 per ton.

Equipped with 25 h. p. hoist and 3-drill compressor.

SILVERMINES CORPORATION, THE **NEVADA**

Office: S. H. Brady, receiver, Tonopah, Nev. **Mine office:** Hornsilver, Esmeralda county, Nev.

Inc. in Nevada. **Cap.,** $1,500,000; shares $1 par; non-assessable.

Property: owns 85% of capital stock of Southwestern Mines Co., which has 9 claims at Hornsilver, 28 miles S. W. of Goldfield. The company also owns 6 other claims, the townsite of Hornsilver, telephone line to Goldfield and a 150-ton cyanide plant, built, 1917, to treat Southwestern company's ore. An extraction of from 92-96% was reported.

Equipment: 45-h. p. hoist, 6-drill compressor, 200-h. p. semi-Diesel engine engine and 120 k. w. generator and modern cyanide mill. Company also owns a 5″ pipe line from Lida to Hornsilver, 8½ miles long. Company's lease on the Southwestern property was cancelled and mine and mill closed down in November, 1918, presumably on account of financial difficulties. See Southwestern Mines Co.

SILVERPAH CONS. MINES CO. **NEVADA**

Controlled by Frank D. Qualey, pres. of the Excelsior Mtn. C. Co. L. T. Brockbank, sec., Tonopah, Nev. Rolla E. Clapp, cons. engr. J. Callahan, supt.

Inc. June, 1919, to operate the Silver Hill group in Lone Mountain range, 20 miles from Tonopah, Nye county. Originally worked in the early 70's.

To August, 1919, only prospecting work by shallow shafts has been done, but rich silver ore was reported opened at depth of 65′ in ground between 2 shafts.

SILVERPAH EXTENSION MINES CORPORATION **NEVADA**

Address: Silverpah Consolidated Mines Co., Tonopah, Nev.

Inc. Aug., 1919, in Nevada.

Property: 10 claims adjoining the Silverpah Cons. in Lone Mountain district, Nye county.

Extensions of veins from its neighbor are believed to run through this ground.

SILVER REEF MINES CO. **NEVADA**

Address: Chas. E. Van Riper, 50 Broad St., New York.

Inc. 1919. in Nevada. **Cap.,** $100,000: par 10c.

Property: 5 claims adjoining those of the Arizona Extension and Cons.

Silver, which see, near Unionville, Pershing county. The only information obtainable is from various brokers' circulars and advertisements. Early in 1920 it was proposed to merge the Silver Reef, Arizona Silver, Arizona Extension, Arizona Tip Top, and Consolidated Silvers, Inc., into the Universal Silvers Co., the "final Silver" of the above named brokerage house.

SILVER STANDARD MNG. & EXTRACTION CO. **NEVADA**

Address: R. W. Martin, Las Vegas, Nev.

Officers: R. W. Martin, pres.; W. C. Borchers, v. p.; W. E. Ferron, sec.-treas.; with R. T. Leonards and C. D. Breeze, directors. G. A. Duncan, supt.

Property: the Duncan mine, Flagstaff group, Nelson townsite, and water-rights in Eldorado canyon, Clark county. The Flagstaff property is said to have yielded $500,000 in silver and gold up to 1915. One shoot was 8′ wide and 450′ long, and yielded 18,000 tons of $22.80 ore. Recent development has opened a new 6′ vein of high value. Property is fully equipped, and enough ore was said to be available early in 1920 to supply the mill.

SILVER TUNGSTEN MINING CO. **NEVADA**

Office: 222 Judge Bldg., Salt Lake City. Raymond Ray, pres.; Ernest Kimball, sec.-treas.

Inc. 1916, in Utah. **Cap.**, $50,000; shares 10c par; assessable; outstanding 38,000 shares. Listed in Salt Lake City. Cash on hand, April, 1916, $458; no debts except a bond of $1,750 due May, 1917.

Property: 3 claims, unpatented, in the Cherry Creek mining district, White Pine county, 8 miles from a railroad, said to show an 8′ vein, containing tungsten ore.

Development: consisted only of 24′ of trenching and 20′ of tunneling. One of the mushroom tungsten companies started when tungsten was selling at war prices.

SILVERZONE EXTENSION MINING CO. **NEVADA**

Organized by Geo. W. Quigley, J. W. Hanson and O. G. Wolther, of Tonopah.

Property: 5 claims, covering 3,000′ on a ledge or dike said to assay $13 to $147 per ton, mostly in silver.

A new shaft is being sunk 400′ west of the old Silverzone glory hole.

SILVERZONE MINES CO. **NEVADA**

Silverzone (Hannapah), Nev.

Inc. 1919, by Wm. F. Gray and J. J. Clark of Tonopah.

Property: the Silver Glance mine, which was worked by "glory hole" years ago. An ore-shoot opened for 150′ in length and to depth of 125′, said to run $8-$10 per ton, with 160,000 tons developed. Company has given leases on parts of its holdings.

SILVERZONE MOHAWK CO. **NEVADA**

Care Wm. F. Gray, Silverzone (Hannapah) P. O., Nevada. This is also a Gray & Clark property.

A new shaft sunk in 1919 is said to have cut 4′ of $30 ore at a depth of 80′, with $445 ore on the hanging wall. On the west end of this group, leased to Chas. Spilman, ore in the old Tripod shaft said to range from $10 to $80 per ton.

SMITH VALLEY MINES CO. **NEVADA**

E. J. Cooper, Receiver, Yerington, Nev. H. L. Van Valen, representing the stockholders, 410 Advertising Bldg., Chicago, Ill., at last accounts.

Inc. 1912, in Nevada. **Cap.**, $2,000,000. Placed in receivers' hands Oct. 30, 1914; debts were about $17,000. Reported January 5, 1916, that obligations "are being rapidly paid off; it is expected that the Receiver will be discharged in about 60 to 90 days from present date."

Property: 23 claims, 467 acres at Yerington, Lyon county, said to show gold ore in a contact deposit between andesite and porphyry; width of ore, 6″ to 3′ with average assay reported of $16.80 per ton. Claims 60,000 tons ore in sight.

Development: 200′ incline shaft, with 900′ of workings. **Equipment:** includes 25-h. p. gasoline hoist and a 6-drill compressor.

Letters returned and company presumably out of business.

SOUTHEASTERN MINING CO. **NEVADA**

Formerly the Arrow Mining Co., reorganized in May, 1918.

Address: 418 Vermont Bldg., Salt Lake City, Utah.

Officers: Geo. F. Busch, pres.-treas.; Willard Scowcroft, v. p.; J. H. Moss, sec.; M. J. West, supt.

Inc. May, 1918, in Nevada. **Cap.,** 1,000,000 shares.

Property: 26 claims (4 patented and 14 in process), 500 acres, in Arrow mining district, Lincoln county, 8 miles from Groom and 65 miles N. E. of Las Vegas.

Ore occurs in fissure veins in quartzite and lime, said to carry silver, lead, and copper.

Development: by 206′ shaft. A drift is being driven at bottom towards the contact fault-fissure. Bunches of ore were cut in the shaft assaying 0.03 oz. gold; 90.40 oz. silver, 45.90% lead, and 9.97% copper. About $20,000 was spent on property by previous owners, and $40,000 during the past 2 years.

Equipment: head-frame, gasoline hoist, shaft-house, smithy and shop, tools, dwellings, bunk-house, 2 autos, truck, assay outfit, etc.

A prospect that seems to have good indications.

SOUTHWEST COMSTOCK EXTENSION MINING CO. **NEVADA**

Address: Thurman Roberts, Virginia City, Nev.

Property: 7 miles S. W. of Virginia City, Storey county; 5′ of $50 silver-gold ore opened to depth of 70′ in 1919, is said to be similar to that of the Comstock lode. A second ore-shoot was reported opened in the last part of the year.

SOUTHWESTERN MINES CO. **NEVADA**

Office: care S. H. Brady, receiver, 301 Nat'l Bank Bldg., Tonopah, Nev. **Mine office:** Hornsilver, Esmeralda county, Nev.

Inc. in Nevada. **Cap.,** $1,250,000; shares $1 par; non-assessable. The Silvermines Corporation, a holding company, controls 85% of shares in the Southwestern, and built a 150-ton cyanide plant.

Property: 9 claims, 135 acres, at Hornsilver, 28 miles S. W. of Goldfield, formerly known as the Great Western mine. Claims said to show silver-gold ore with silver predominating, occurring as chlorides and bromides, the gold being free milling. The veins occur in limestone and shales intruded by diorite dikes, the largest vein said to vary from 5′ to 20′ in width and to traverse the property for 4,000′.

Development: by 900′ shaft and 3,000′ of lateral workings.

The lease held by the Silvermines Corporation was cancelled owing to non-payment of royalties and mine was closed down in September, 1918.

SOUTHWESTERN NEVADA MINES CO. **NEVADA**

W. G. Benham, sec., Room 515-E. 30 Church St., New York. An inactive company with holdings in Reveille district, Nye county.

SPANISH BELT EXTENSION SILVER MINES CO. **NEVADA**

Address: Tonopah, Nev.

Officers: Warren V. Richardson, pres.; Hugh H. Brown, v. p.; Arthur Keenan, sec., with E. H. Merrill, Chas. W. Leege, and Clarence Phillips, directors.

Inc. 1919, in Nevada. **Cap.,** $1,000,000.

Property: the Blizzard group of claims in Spanish Belt district, Nye county, adjoining to the east the holdings of the Cons. Sp. Belt S. M. Co. and said to carry the continuation of the Ernest and Barcelona veins. To be developed in conjunction with the Cons. Sp. Belt.

SPARTA MINING CO. **NEVADA**

Mina, Mineral county, Nev. W. E. Bell, pres.

Cap., $1,000,000; shares $1 par.

Property: 19 unpatented claims in Gold Range mining district, with about 300′ of development work, said to show 3,000 tons silver-lead ore. Is a prospect.

SPRUCE MONARCH MINING CO. **NEVADA**

Address: C. S. Woodward, mgr., Wells, Elko county, Nev.

Officers: Herman Badt, pres.; David Neff, v. p.; J. L. Vandiver, sec.; with Samuel Neff, all of Salt Lake City, directors.

Property: on Spruce Mtn., south of Wells, Elko county, developed by 550′ tunnel, being driven 300′ further to reach the orebody. Ore occurs in veins carrying lead and silver. Past production reported to have totaled $200,000. High-grade ore shipped in October, 1919.

In January, 1920, rich ore was reported opened at depth of 400′, and 7 cars of ore awaited shipment. This company had extracted 24 cars to that date, three of which netted $4,089.

STANDARD METALS CO. **NEVADA**

Address: A. L. Chappel, 153 North Virginia St., Reno, Nev.

Inc. April, 1916.

Property: claims on Peavine mountain, 5 miles N. of Reno, in Washoe county, first worked in 1863.

The main vein is in andesite; strikes N.-S., and dips 42° W. The principal oreshoot is in a crushed zone, and is 155′ long, up to 61′ wide, and 67′ high. Ore carries copper, silver and lead.

Development: by 350′ tunnel and 215′ incline shaft near mouth of tunnel; further sinking is under way. Water amounts to 300 g. p. m.

Equipment: includes 6-mile transmission line, hoist, 60-ton (to be enlarged to 100 tons) mill employing rolls, ball mill, tables, and flotation machine, making a $75 to $211 concentrate, auto-trucks and loading bins on the W. P. R. The product is sent to Utah smelters.

STANDARD METALS CORPORATION **NEVADA**

Offices: 805 Arrott Bldg., Pittsburgh, Pa., and Reno, Nev.

Cap., $3,000,000; $1 par.

Officers: W. P. Lemley, pres.; A. L. Chappel, and B. L. Elliott, v. p.'s; W. K. Elder, sec.-treas.; A. G. McCaughan, asst. sec.-treas.; with J. A. Sharp, D. H. Collins, John Lofink, Jr., and W. H. Slifer, directors.

Property: 3 patented claims and millsite, 47 acres, including the Paymaster and Poe mines bought from the Standard Metals Co. in 1919 for 1,725,000 shares of Standard Metals Corporation. The claims are on Peavine mountain, 5 miles N. of Reno, in Washoe county. The first work done in this district was in 1863. Old workings were to a depth of 100′, where a wide vein is said to have been opened. Ore carries silver and galena. In March, 1920, an electric hoist and pump were erected, and shaft sinking started.

STAR OF THE WEST MINING CO. **NEVADA**

Offices: 1482 Broadway, New York, and Reno, Nev.

Officers: Robt. B. Todd, pres.-mgr.; Leonard L. Griffiths, v. p.; J. C. Punderford, sec.-treas, with R. G. Withers and John F. Clapisson, directors.

Inc. April, 1919, in Delaware. **Cap.,** $1,000,000; $1 par; 500,000 shares in treasury. Security Transfer & Registrar Co., registrar and transfer agents.

Property: 6 claims, 4 patented, in Gold Park district, Nye county, formerly owned by the Nevada M. Co. Ore occurs in fissure veins in porphyry with N. E.-S. W. course and dip of 45°, said to average $50 per ton in silver and gold.

Development: by 5,000′ of drifts and tunnels. Is an old producer claiming a past production of $1,000,000. A 30-ton concentrating mill was to be installed in 1919.

Management estimated reserves, April, 1918, at 30,000 tons, averaging $25 per ton.

STATES MUTUAL CONS. MINES CO. **NEVADA**

Address: Searchlight, Nev.

Officers: Mrs. V. H. Brewer, pres.-mgr.; J. W. Carnic, v. p.; Robt. McKee, sec., with Geo. Allan and Albert Cappel, directors.

Cap., $5,000,000; $1 par.

Property: 140 acres in Campaign copper mining district, Searchlight, Clark county, said to carry a deposit 4,500′ long running from 2 to 30% copper. **Development:** by tunnels.

Mrs. Brewer has been running the the mine for several years, and, judging

by a printed letter addressed to the stockholders in March, 1918, she is sorely in need of funds for herself and the mine.

STEPTOE VALLEY SMELTING & MINING CO. **NEVADA**

Company dissolved 1914. Property owned and operated by Nevada Cons. Copper Co., which see.

SULTANA SILVER MINES CO. **NEVADA**

Address: C. N. Miller, P. O. Box 1137, Tonopah, Nev.

Cap., $1,000,000; $1 par; 750,000 issued.

Location: via Black mountain district, Mineral county, 15 miles W. of Belleville on S. P. R. R. (Keeler branch) and 4 miles from Marietta. Accessible by good road from Tonopah via Candelaria, and 30 miles from Mina, the nearest supply point.

Property: 3 claims, 60 acres, covering 2,000′ on outcrop of strong vein, running N. W.-S. E. on south slope of Big Elephant mountain in Excelsior range. Ore: argentiferous galena with silver sulphide. The mine is in the heart of district, extending for 8 miles from Foster mine on east end of Excelsior range to Borax (F. M.) Smith mine on west. The range shows limestone intruded by quartz-porphyry, the silver-bearing rock of the region.

Development: old workings at 5 places along the vein to depth of 135′ and a 100′ shaft show the vein to have 3 to 5′ of ore that carries 60 to 250 oz. silver. Several hundred tons of ore on dump is said to assay $32 per ton. An 8′ width of vein in shaft samples $96.80 in gold, silver and lead. Water is obtainable at Marietta.

Mine reported on by J. Young Anderson and A. F. Price. Part of the ground was leased in August, 1919, when but 2 men were working on company's account.

SULTAN MINE **NEVADA**

Address: Henry Robbins, owner, Goodsprings, Nev.

Property: in Goodsprings district, Clark county, said to show a replacement orebody in limestone. Minerals are zinc and lead carbonates, averaging 1¼ oz. silver to each 1% lead. Surface outcrops are said to be extensive.

Equipment: includes 50-ton dry concentrating plant, separating the lead, making a 35% lead and 40 oz. silver concentrate. Tailing carries 15% zinc, 4% lead and 4 oz. silver per ton.

SUNSET MINING & DEVELOPMENT CO. **NEVADA**

Office: 265 Russ Bldg., San Francisco, Cal. **Mine office:** Unionville, Pershing county, or Rhyolite, Nye county, Nev.

Officers: Edw. S. Van Dyck, pres.-treas.; Herman Zadig, v. p., with O. A. Newcomer, directors. Chas. D. Olney, sec.; F. W. Lockman, mgr.

Inc. Dec. 9, 1912, in Nevada, as a reorganization of the Tramps Consolidated Mining Co., Bullfrog Sunset Mining Co. and Denver Bullfrog Annex Mining Co. Cap., $5,000,000; $1 par; issued, 1,750,000. Stricken from New York Curb August 1, 1918. Security Transfer & Registrar Co., New York, transfer agent and registrar.

Property: 20 acres, patented, in the Bullfrog district, Nye county, said to show ore occurring in fissure veins in rhyolite, with dip of 30°. Veins vary from 6′ to 20′ in width.

Development: by 5,000′ of tunnels. During 1918 the Denver shaft was deepened to 700′ and a drift run on a quartz vein, assaying $11.20 per ton.

Late in 1918 the Arizona mine at Unionville was taken over and drained to depth of 400′. Management claims to have opened 26,000 tons of ore averaging 26.3 oz. silver. Ore occurs as a sulphide of silver in a blanket vein 2′ wide, reported to also carry tungsten. A 35-ton flotation mill was completed in February, 1919, and in August, three teams were hauling concentrate to rail at Mill City.

SYNCLINE GOLD-SILVER-COPPER MINING CO. **NEVADA**

Address: Lida, Esmeralda county, Nev.

Officers: L. Kershaw, pres., Tacoma, Wash.; H. C. Peet, v. p.; L. E. Campbell, sec.-treas. and gen. mgr., with F. A. Campbell, B. A. Howes, E. P. O'Leary, E. B. Campbell and E. C. Peet, directors.

Inc. June 4, 1910, in Nevada, as successor of Washington-Nevada Mining & Milling Co. **Cap.**, $1,000,000; shares $1 par; non-assessable; issued $799,420. Annual meeting, first Monday in January.

Property: 11 claims, 3 patented, 57 acres, with 120 acres mill and smelter sites, 30 miles S. W. of Goldfield and 10 miles from a railway, in the Lida district. District shows Cambrian limestone and shale, cut by quartz monzonite, capped by volcanic rocks. The ores occur as impregnations and veins. The claims are reported by the management to carry 12 deposits, 4 under development of 4 to 20′ average width, traceable 5,000′, carrying a sulphide ore, said to give assays of 8.7% copper, 17 to 19% lead, 11% zinc, 11 oz. silver and $1.90 gold per ton.

Development: by 9 shafts, of 31 to 120′ depth, and by 6 tunnels of 12 to 140′ length; the tunnels are not being used.

Equipment: includes a 15-h. p. gasoline hoist and 5 mine buildings. The management planned deepening the main shaft to 200′ at last report.

TEACUP MINING CO. **NEVADA**

Address: McGill, or Cherry Creek, Nev.

Officers and directors: Geo. Granopolus, pres.; J. M. Lockhart, v. p.; H. J. Mueller, sec.-treas.; J. W. Wenzel, mgr.

Inc. June 27, 1919, in Nevada. **Cap.**, $1,000,000; $1 par; assessable; 322,500 issued. Operating expenses for 1918 averaged $5,000 per month.

Property: 22 claims, 2 patented, 440 acres in Cherry Creek district, White Pine county.

Geology: there are two veins under development; the Teacup, worked since 1868, lies along a contact between lime and shale, is from 4 to 12′ wide, runs N.-S. and dips 45° W. The Exchequer is a fissure vein in quartzite, is 4 to 11′ wide, and runs S. 70° W. crossing the Teacup vein 675′ S. of shaft. Claims cover 5,000′ along strike of Exchequer vein and 3,000′ on the Teacup.

Development: by a 1,000′ shaft and a 450′ incline shaft; a total of 4,000′ of workings to depth of 1,000′. A crosscut on 900′ level intersects the Exchequer vein.

Equipment: includes 60-h. p. gasoline hoist, assay-office and buildings; compressor, 7,250′ tramway, and 100-ton mill with flotation and cyanide unit to be installed.

Mine is credited with past production of 3,000,000 oz. silver, and management reports reserves of 100,000 tons, running 14 to 27 oz. silver.

TECHATTICUP MINE **NEVADA**

Address: R. T. Walker, lessee, Nelson, Nev. Owned by Joseph Wharton Estate, Philadelphia, Pa.

Property: 9 claims, 8 patented, 1 mile E. of Nelson, Clark county, Nev., said to show a quartz vein in monzonite, dipping 10 to 80° and pitching E. W. Ore is a sulphide.

Development: by 600′ incline shaft, and 3,000′ of workings.

Equipment: 25-h. p. gasoline hoist, 3 compressors and 50-ton cyanide mill.

Production: in 1916 was 7,676 oz. gold and 58,393 oz. silver. Operating, but no record available.

TECOMA CONSOLIDATED MINES CO. **NEVADA**

Address: C. S. Woodward, mgr., Montello, Elko county, Nev.

Property: a silver-lead mine near the Utah border, first opened in 1860, when mine was made to pay its way by the proceeds of rich ore shipped. Since 1916, $140,000 has been spent in reopening the mine and a "red lime" on the foot-wall of the silver-lead orebody was found to be zinc oxide. A block 100x100′ of 20% zinc ore is developed. Development is extensive on 1,000′ level. Dumps contain 10 to 20% lead and 5 to 10 oz. silver ore.

TENABO MILL & MINING CO. **NEVADA**

Property acquired in 1920 by Consolidated Cortez Silver Mines Co., which see. Fully described in Vol. XIII.

Production to date is said to be 12,000,000 oz. of silver and 25,000 oz. of gold. Reserves are now estimated at 39,000 tons.

THOMPSON-WALSH MINES CO. **NEVADA**

Address: Mina, Nev.

Officers: J. H. Walsh, pres.; G. F. Thompson, v. p.; G. W. Dwight, sec.-treas.

Inc. June, 1919, in Nevada. **Cap.,** $150,000; 10c par; 702,000 shares outstanding.

Property: adjoins Cons. West Extension on W., developed by 40′ shaft.

THOUSAND MEMBER GOLD MNG. ASSOCIATION **NEVADA**

A get-rich-quick scheme fostered, if not fathered, by the G. S. Johnson Co., in 1914, in an attempt to sell Eastern Star Mng. Co. stock.

TIGER MINING CO. **NEVADA**

Not incorporated. Address: Lovelocks, Nev.

A. L. Towne, mgr.; G. E. Pitt, supt.

Property: 4 claims, 80 acres, 9 miles E. of Lovelocks, Pershing county, said to carry a 4′ vein with gold, silver and copper. Owners claim to have 2,000 tons of ore blocked out. An 18-ton concentrating mill installed, May, 1919.

TODD MINING CO., R. B. **NEVADA**

Merged early in 1920 into the Luning Consolidated Silver Mines Co. of Nevada, which see.

TOHOQUA MINING CO. **NEVADA**

Property: acquired by Leadville Divide Mng. Co., which see.

TONOPAH KAWICH MINING CO. **NEVADA**

Address: J. J. Sweet, sec.-treas.-gen. mgr., Tonopah, Nev.

Property: at Bellehelen, near Tonopah, developed by 350′ shaft and said to carry gold-silver ore. Operated intermittently by a small force.

TOO CLOSE MINING CO. **NEVADA**

Address: P. O. Box 315, Winnemucca, Nev.

Officers: A. L. Waggoner, pres.-engr.; J. D. Varger, v. p.; J. E. Ward, sec.; First National Bank, Winnemucca, treas.

Inc. April 26, 1919, in Nevada. **Cap.,** $100,000; 10c par; 400,000 shares in treasury. Annual meeting, second Tuesday in July.

Property: 10 claims, 200 acres, 2 miles N. of Winnemucca, Humboldt county. Ore occurs in veins and lodes in diorite and granite formation. Narrow veins in quartzite and limonite said to assay better than $50 per ton in silver, gold and lead, with a trace of copper.

Development: by tunnels with 600′ of workings. Several small shipments made.

Company offered 40,000 shares at 15c. in September, 1919, to get funds for further development.

TUSCARORA-NEVADA MINES CO. **NEVADA**

Bankrupt. **Address:** J. E. Harrington, chairman of Reorg. Committee, 1482 Broadway, New York. Henry Stanley Haskin, receiver, $150,000 receiver's certificates authorized; 95,000 issued; $600,000 claim against company allowed by Court.

Property leased August 18, 1915, for ten years to Jas. E. Harrington and part of property transferred to Holden M. & M. Co. in 1917.

The mortgage held by the Dexter Tuscarora Cons. G. M. Co. on the Dexter group of this company has been foreclosed and the property purchased by the mortgage holders for account of the reorganization committee. This includes 17 claims and the Jack Creek power plant, all under bond and lease for $175,000. A concentrator erected in 1919, to treat both the ore in sight and the old stope filling, should make concentrate to value of $1,000 daily.

UNEVIDA GOLD MINING CO. **NEVADA**

Described under Utah mines.

UNION AMALGAMATED MINING CO. **NEVADA**

Fully described in Vol. XIII. Reorganized December, 1917, as Manhattan Union Amalgamated Mng. Co., which see.

UNION CONSOLIDATED MINING CO. **NEVADA**

Officers: 787 Mills Bldg., San Francisco, Cal., and Virginia City, Nev.

Officers: Whitman Symmes, pres.-supt.; J. H. Goldman, v. p.; A. P. Swain, sec., with Geo. F. Bennett, A. L. Rader, C. W. Conliss, directors.

Inc. Nov., 1904, in California. **Cap.**, $200,000; shares $1 par; all outstanding; assessable. Last assessment, the 45th, of 10 cents, called October 31, 1919.

Transfer office: 381 Bush St., San Francisco, Cal. Registration Surety Co., San Francisco, registrar. Annual meeting, third Thursday in November. Listed on New York Curb and San Francisco Exchange. Company is under same management as Mexican Gold & Silver Mining Co., which see.

Gross earnings for 1916 were $378,818, less $164,727 for operating charges.

Property: about 600 acres along the Comstock lode at Virginia City, north of the Mexican mine and south of the Sierra Nevada mine.

Development: following a change in management, work on the 2,700′ and 2,900′ levels was abandoned. The ore in sight on the 2,600′ level was extracted and the water allowed to rise to 2,100′. Exploration is now being carried on by the Mexican near the Union Cons. south line, and by the Union in its own ground on the 1,600′ level. This has not yet resulted in finding ore.

Production: during past two years about $1,000,000, the ore averaging $30 per ton. Total production approximately $4,000,000.

UNION COPPER CO. NEVADA

Yerington, Nev. Title changed to Standard Copper Co., in 1912.

UNION MINES CO. NEVADA

Office: Union, Nev.

Officers: W. P. Fairman, pres.; E. T. Comfort, sec.; L. R. Thatcher, mgr. A close corporation and prefers not to have us publish information.

Operates a silver-lead mine, 35 miles S. of Palisade, Eureka county, Nev.

UNIONVILLE MINING CO. NEVADA

Address: J. A. Spiker, pres.-mgr., Unionville, Nev.

Property: at Unionville, Pershing county, said to show 17,500 tons of $20 gold-silver ore. There are 5 fissure veins in rhyolite with 3′ of ore on hanging wall. A 50-ton cyanide mill moved from Seven Troughs in Humboldt county, was erected in 1919.

UNITED COMSTOCK PUMPING ASSOCIATION NEVADA

Operates electrically-driven pumps to drain the lower levels of the Northend mines on the Comstock Lode at Virginia City, owned and operated by the Sierra Nevada Mining, Cons. Virginia Mining, Mexican Gold & Silver Mining, and Union Cons. Mining companies.

The lower levels were completely re-opened to the 2,900′ level in September, 1917, after being filled with water for 33 years. Expenses incurred are apportioned among the mines.

The system comprises 3 Riedler pumps on the 2,000′, 3 centrifugals on the 2,310′, 3 vertical centrifugals on the 2,500′, and 2 vertical centrifugals on the 2,700 and 2,900′ levels.

UNITED MINING CO. NEVADA

Probably dead. Letters returned from former mine office: Carson City, Nev.

Officers: H. D. Cowden, pres. and gen. mgr., Bloomington, Ill.; R. H. Hingston, treas. and gen. supt.; F. W. Boston, sec.; L. B. Perry, asst. sec.

Inc. 1905, in Nevada. **Cap.**, $3,000,000; shares $1 par; non-assessable; 500,000 preferred and 2,500,000 common; issued $1,876,150.

Property: 34 claims, 680 acres, in the Delaware district, 12 miles from Carson City, Washoe county.

Reported in 1915 that the Nevada mine was abandoned and stockholders given shares in the Boston American Mining Co., Wash., an equally unpromising and doubtful proposition. It is evident from the literature sent out by these companies that the management preferred to mine the public instead of its mines.

Management reported, January, 1916, "property is not working now, as we are looking for some process that will enable us to handle our ores and have our own plant."

UNITED STATES TUNGSTEN CORPORATION NEVADA

Operated a mill for concentration of tungsten ore at Tungsten, S. of Osceola, White Pine Co., Nev. Company was dissolved December 21, 1917, and assets

sold to pay indebtedness, the balance to be distributed among the stockholders. Fully described, Vol. XII.

UTAH-YERINGTON MINING CO. **NEVADA**

Reorganized as the Mason-Yerington Mines, which see.

UVADA COPPER CO. **NEVADA AND UTAH**

Address: W. F. Snyder, Pioche, Lincoln county, Nev.

Inc. 1915 (by F. C. Richmond, pres., Richmond Machinery Co., 117 W. Second St., Salt Lake City, Utah,) to take over property of the Day Bristol Cons. Mines Co. **Cap.,** $600,000; $1 par. Initial dividend of 1c a share paid September, 1916, equal to $6,000.

Property: 30 claims, 460 acres, 15 miles west of Pioche, includes the May Day, Hillside, Tempest, Gypsy, Vesuvius, National, Inman, Tempest, Oregon Short Line, Iron and Day mines. The Day mine comprises 5 claims on the opposite side of the mountain and was needed in order to drive a tunnel through the mountain, giving direct access to the railroad.

Ore is a mixed sulphide carrying silver, lead, copper, and some zinc, occurring in limestone cut by fissures.

Development: by 2 old shafts, the 700′ Gypsy and 500′ May Day, both out of commission in 1915. Old workings exceed 10,000′. In 1916, new work included mining ore on the 300′, 350′, and 450′ levels and sinking a winze from 500′ to 630′ level.

The future lies in the Bristol property, in which high grade ore persists to 500′ depth.

Equipment: 4 hoists, 3 compressors, 5 oil engines, 4 boilers (400 h. p. total), 2 mile aerial tram, machine shop, assay office, buildings, etc., complete.

Production: in 1916 was 11,000 tons of copper-lead-silver ore.

The Day group is operated (1919) under lease and bond by the Black Metal Mines, which see.

UVADA TUNGSTEN CO. **NEVADA**

Organized 1916, by A. V. Taylor, Dooly Block, Salt Lake City, to take over the Pilot Knob group near Osceola, White Pine county, said to show quartz veins in limestone, overlying quartzite, underlain by granite.

Owing to low price of tungsten the property was allowed to revert to original owners in June, 1917.

VICTORIA COPPER MINES CO. **NEVADA**

Address: F. A. Strehlke, Goldfield, Nev.

Property: the Victoria mine, an old copper producer.

VICTORIA NEVADA MINING CO. **NEVADA**

Address: Pioche, Nev.

Officers: Edw. P. Donohue, pres.; Chas. Stindt, v. p.-mgr.; R. H. Nix, sec.; M. L. Lee, treas.

Inc. 1919, in Nevada. **Cap.,** $300,000; $1 par.

Property: 4 claims, adjoining Amalgamated Pioche at Pioche, Lincoln county. Reported sinking shaft in 1919.

VICTORY GOLD MINES CO. **NEVADA**

Address: H. W. Robinson, Lovelocks, Pershing county, Nev.

Officers: W. H. Schewan, pres.; H. W. Robinson, v. p.; W. C. Van Huit, sec.; R. J. Pierson, treas., and B. B. Goodman, directors.

Property: a group of claims in the Loring district, on which a tunnel was being driven in mid-1919.

VIRGINIA LOUISE MINING CO. **NEVADA**

Address: Pioche, Nev.

Officers: Chas. Lee Horsey, pres.; H. W. Rand, v. p.; C. A. Thompson, sec.-treas.; L. G. Gillette, supt.

Inc. 1912. **Cap.,** $1,000,000; $1 par; 731,550 shares issued. Authorized $60,000, 6% first-mortgage convertible gold bonds, maturing June 7, 1920.

Property: 1 patented claim, adjoining Prince Cons. M. & S. Co., in Ely mining district, 4 miles S. W. of Pioche, Lincoln county.

Ore occurs as a blanket deposit. Five veins have been opened varying from 5 to 80′ in thickness, and said to carry low-grade silver-lead ore with a high

excess of iron and manganese, making a desirable smelter flux. Litigation with the Prince Cons. during 1917-18 terminated in favor of the Virginia Louise, the latter obtaining a judgment of $27,334 for trespass. A compromise was effected whereby the Prince Cons. dismissed the apex suit filed against the Virginia Louise and granted the right to ship ore over its private railroad at the rate of 50c. per ton in return for the dismissal of the trespass judgment.

Development: by 600′ shaft and 2,500′ of drifts and raises. Ore blocked out is estimated as equal to 3 years' supply at 100 tons per day, and an equal quantity probable ore.

During 1918 the property was entirely re-equipped, development work resumed and shipments commenced in September to the Midvale smelter in Utah at the rate of 50 tons daily. Total tonnage shipped was 5,447 dry tons. In October, 1919, daily shipments were 100 tons. Net profits are reported to be $3 per ton. Extraordinary expenses are practically at an end, and future profits can be devoted to paying off bonds and distributing dividends.

VULCAN MINING, SMELTING & REFINING CO. **NEVADA**

Office: 708 First Nat'l Bank Bldg., Denver, Colo.

Officers: H. Ornauer, pres.; E. E. Whitted, v. p.; A. E. Brooks, sec.; O. L. Dines, treas., with H. C. James, Tyson S. Dines and J. M. Herbert, directors.

Inc. in Wyoming. **Cap.**, $2,500,000; $1 par; 2,000,000 outstanding.

Property: Hunter mine, 16 patented claims, 132 acres, in the Hunter district, White Pine county, about 30 miles from Ely, the nearest rail point, shows copper, silver and lead ores occurring in fissure veins in monzonite and limestone. Developed by 300′ and 500′ shafts and tunnel, with a total of 2,000′ underground workings.

Equipment: includes hoist, compressor and steam power. Lessees produced 65 tons of ore in 1915, averaging $38 per ton, and in 1916 had 400′ of ground to work and were shipping fair quantities of ore to Murray, Utah. Company has been inactive since 1912.

V 7 MINING CO. **NEVADA**

Address: W. E. Casson, sec., Carson City, Nev. G. L. Hedges, mgr.

Property: 5 claims in the Reservation district near Schurz, Mineral county. A 3′ vein, a contact between lime and granite, carrying silver-lead ore, had been opened to a depth of 100′ by December, 1919. Shipments were expected to start early in 1920.

VULTURE-WONDER MINES CO. **NEVADA**

Title changed to Nevada Silver Consolidated Co., which see.

WALKER RIVER COPPER CO. **NEVADA**

Offices: 403 Madison Ave., New York, and Yerington, Nev.

Officers: Chas. N. Edge, pres.; H. W. Miller, v-pres., with H. B. Lake, J. A. Martin, J. H. Sussman and Wm. C. Hand, directors. R. A. Atwater, sec.; C. S. Dodge, treas.; J. E. Gelder, mgr.

Inc. June, 1915, in Nevada. **Cap.**, 2,500,000 shares; $5 par; outstanding 675,000 shares. Transfer office: Company office; registrar, Registrar & Transfer Co., New York.

Property: 15 claims, 250 acres, including millsite, near Yerington, Lyon county, being developed in conjunction with the Empire Nevada mine of the Empire Nevada C. M. & S. Co., held under a perpetual lease. Title will pass to the Walker River Co. when royalties paid amount to $500,000. Claims show a low-grade copper deposit said to cover an area 1,000 by 4,800′ so far as drilled.

Ore is said to assay 3% Cu.; 0.5% S.; 72% SiO_2; 5% Fe_2O_3; 11% Al_2O_3; 2% CaO; 1% MgO.

Development: 350′ vertical shaft. During 1918, $36,000 was expended in diamond-drilling on the Empire Nevada, said to have proved the orebody to extend to 500′ depth. Present work is by quarrying.

Ore reserves: management claims 550,000 tons of 2% ore proven by drilling and surface and underground work.

Equipment: includes 25-ton leaching plant, built to use the Midland ferric chloride process, but changed 1920 to leaching with precipitation on scrap iron.

Production: total output to date 32,861 tons, representing a gross value of $615,550. Shipments during 1918 averaged 4.16% copper.

Company plans further drilling and installing 2,500-ton plant. Examined by Louis A. Wright and John H. Banks.

WALL STREET COPPER CO. **NEVADA**

Address: W. S. Norris, Luning, Nev.

Controlled by A. H. Howe, W. Norris and C. Evans of Goldfield, Nev.

Property: said to be one of the best in the Luning district, Mineral county, having shipped $600,000 worth of ore in 18 months to September, 1917. Development amounts to over 8,000′. The vein in one stope is 4′ wide.

During 1918 the mine was reported shipping 700 tons of 7% ore per month, with 50,000 tons of low-grade ore in stopes and on dumps. Mine closed down January, 1919, on account of market.

WARMACK GOLD MINING CO. **NEVADA**

Office: at last accounts, S. C. McIntyre, 110 S. Dearborn St., Chicago, Ill. H. Warren, Winnemucca, and G. R. Stevens, supt., Golconda, Nev.

Officers: J. T. Cawthorn, pres.; Harry Warren, v. p.; S. C. McIntyre, sec.; also directors.

Inc. March 31, 1916, in Arizona. **Cap.**, $200,000; shares $1 par; non-assessable; all issued. Annual meeting, April 15.

Property: 945 acres of placer ground, 12 miles S. of Golconda, Humboldt county, Nev. Examined in May, 1912, by J. A. St. Clair, editor of *"Inside Investments."* Gravel available estimated at 22,000,000 cu. yd., with a probable gold value of 61 cts. per yard. Gold in the disintegrated quartz formation said to be "triangular."

If even one quarter of the above value actually occurs it is good ground, and it is hoped the owners will find it true.

WASHINGTON GOLD QUARTZ MINING CO. **NEVADA**

A reorganization of the Randolph Mining Co.

Office: 26 Liberty St., New York City.

Officers: Jas. W. McCoy, pres.; G. G. Wolf, v. p.-treas.; with Frank Lindley, Frank W. Donaldson, A. S. Terrill, Geo. N. Neise, directors. W. H. Tice, sec.; J. K. Turner, mgr.

Inc. October 30, 1917, in Nevada. **Cap.**, $1,000,000; $1 par; 713,400 issued. Listed on New York Curb. U. S. Corporation Co., registrar and transfer agent.

Property: 9 claims in Gold Mountain district (not the Gold Mountain of Divide district), 9 miles from Bonnie Clair, Esmeralda county. Ore: lead sulphide and carbonate occurs in veins 5-15′ wide said to carry gold and silver. There are 3 veins crossing the ground, most of the work being done on the Butte Goldfield.

Development: by 726′ tunnel and 410′ shaft at its end, to be sunk to 600′ Exploration by the old company amounted to 2,200′, and production was considerable.

WASHOE COPPER CO. **NEVADA**

Presumably idle.

Officers: Wm. H. Butler, pres., 27 Pine St., New York; Percival S. Jones, v. p.; S. A. Cunningham, sec.-treas., with B. J. Dwyer, Robt. W. Schuette, P. P. Brady and Geo. J. Gould, Jr., directors.

Inc. September 28, 1917, in Delaware. **Cap.**, $3,000,000; $1 par; 1,108,335 shares outstanding. Listed on New York Curb as a prospect. Registrar & Transfer Co., New York, registrar and transfer agents.

Property: about 695 acres at Copperfield, Washoe county, near the holdings of the Nixon-Nevada and controlled by same interests.

A syndicate was formed in April, 1918, to underwrite a block of stock, sufficient to finance running a 1,000′ tunnel and equipping the mine, which plans apparently did not materialize.

WATERVILLE M. & M. CO. **NEVADA**

Office: Nelson, Clark Co., Nev.

Officers: Dr. Roy W. Martin, pres.; F. A. Wait, v. p., with M. E. Fisher, Jas. German and Harry Dale, directors.

Property: in Eldorado canyon, near Nelson. A small mill installed 1919.

WEDGE COPPER CO. NEVADA

Address: Luning, Nev. H. H. Hunter, managing director, Lovelock, Nev. Mark Walser and H. O. Howard, directors. Knud Freitag, cons. engr.

Inc. March, 1916, in Nevada. **Cap.,** $1,000,000; $1 par.

Property: 6 claims, 8 miles from Luning, Mineral county, developed by crosscut tunnel cutting copper ore at 800′ depth. Said to show 2′ of 2% ore in a 6′ vein.

Company reported consolidated with adjoining properties and flotation plant erected in 1918, but no confirmation available.

WEST ARROWHEAD MINES CO. NEVADA

A new company organized to operate in the Arrowhead district.

WESTERN MINES DEVELOPMENT CO. NEVADA

Out of business. Fully described in Vol. XIII.

WESTERN ORE PURCHASING CO. NEVADA

Address: F. M. Manson, Reno, Nev. Company operates a 900-ton sampler at Hazen; also has plants at Goldfield, Nev., and Murray, Utah. Handled 29,262 tons of ore in Nevada plant in 12 months ending November, 1918. Is well and favorably known.

WESTERN SILVER MINES CO. NEVADA

Office: Dooly Blk., Salt Lake City, Utah.

Officers: J. M. Howell, pres.-mgr.; A. R. Irvine, v. p.; W. G. Howell, sec.-treas., with David Neff and J. A. Spencer, directors. C. F. Williams, Elko, Nev., resident agent.

Inc. 1917 in Nev. **Cap.,** $1,500,000; $1 par; 600,000 shares outstanding March, 1919. Stock offered at 50c. in 1918 to provide capital for 500-ton mill and further development.

Property: 10 patented claims, includes the Moho mine, 20 miles from Mina, in Mineral county. Silver-lead ore occurs in fissure veins in andesite, and is said to assay $9.

Development: 5,000′ of workings to depth of 360′. Management reports ore reserves of 200,000 tons.

WEST SPANISH BELT SILVER MINING CO. NEVADA

Property adjoins holdings of the Cons. Spanish Belt Silver Mng. Co. on the west in Spanish Belt district, Nye county, said to be explored through workings of that company.

WHALE MINING CO. NEVADA

Officers: J. M. Hays, sec., 20 S. 9E St., Salt Lake City, Utah; R. M. Salisbury, C. W. Whitley, L. Greene, trustees.

Property: the Whale mine, 6 unpatented claims, 120 acres, 8 miles W. of Goodsprings, Clark county. The mine has deposits of zinc ore which occur in limestone and dip 45°, the pay ore being found in shoots 2′ to 5′ wide.

Development by a 600′ tunnel. Greatest depth of workings, 300′. The mine is still in development stage.

Equipment: includes 10″x10″ compressor. A shipment of carbonate ore said to have averaged 38% zinc. Presumably idle.

WHITE CAPS EXTENSION MINES CO. NEVADA

Address: J. G. Kirchen, Tonopah, Nev. **Mine office:** Manhattan, Nev.

Officers: J. G. Kirchen, pres.; J. H. Miller, v. p.; A. G. Raycraft, sec.-treas., with Hugh H. Brown and W. L. Mangum, directors.

Inc. 1917, in Nevada. **Cap.,** $200,000; shares 10c par; assessable; 1,595,005 issued. Listed on New York Curb and San Francisco Exchange.

Property: 13 claims, in Manhattan district, Nye county, said to show ore deposits occurring as chimneys in limestone, with 50° dip. Ore carries gold and a trace of silver.

Development: by vertical shaft to depth of 400′.

Equipment: includes 50-h. p. hoist, compressor, drills and pumps, all motor driven.

Property: is in development stage, but is backed by strong interests and regarded as promising.

Work temporarily suspended, 1919, awaiting developments in neighboring mine.

WHITE CAPS MINING CO. **NEVADA**

Offices: Tonopah and Manhattan, Nev.

Officers: John G. Kirchen, pres.; H. R. Cooke, v. p.; A. G. Raycraft, sec.-treas., with C. J. Blumenthal and W. L. Taylor, directors. R. L. Taylor, supt.; H. A. Burk, mill supt.; Jay A. Carpenter, cons. metallurgist.

Inc. June, 1915, in Nevada. **Cap.,** $200,000; 10c. par; 1,915,300 shares issued; assessable. Assessment No. 5, of 2c. per share, levied December 29, 1919. Listed on New York Curb and San Francisco Exchange. U. S. Corporation Co., New York, transfer agent and registrar.

Balance sheet of April 30, 1918, shows assets: property and equipment, $560,477; accounts receivable, $25,953. Liabilities show surplus, $108,288; current liabilities, $181,918. Net income from ore sales amounted to $110,254; expenditures were $269,111, including depreciation, $25,752, litigation, $14,730; operating deficit, $35,380.

Property: 3 patented claims and 4 unpatented near Manhattan, Nye county, formerly owned by the Dexter White Caps M. Co. and the milling plant of the Assoc. M. Co. paid for with 1,295,000 shares of treasury stock. In August, 1917, holdings of the White Caps So. Extens, were obtained for $6,500 cash and 50,000 shares of treasury stock. Litigation started by the Morning Glory Co. was decided in favor of the White Caps, May, 1918.

Geology: ore is a replacement of limestone by quartz, containing pyrite, realgar, orpiment, and stibnite along old fault-planes. Later faulting is very common and complex. Ore is hard to reduce and requires an oxidized roast prior to cyanidation. Company has experienced considerable difficulty in getting good extraction of the gold.

Development: by 650′ vertical shaft, with levels at 210, 310, 435, 550 and 650′. Three ore-shoots have been opened showing more or less irregular values and averaging about $15 per ton. There is sufficient water in the mine for milling purposes.

Equipment: includes hoist, 2 compressors, drills, sinking and station pumps, 100-ton milling plant with crushers, rolls, trommels, 7-hearth Wedge roasting furnace, tube-mill and cyanide plant.

Production: 8,480 tons in fiscal year ending April 30, 1918, averaging $13 per ton. In May the output was $30,352; in June, $22,715; in July, $28,473. An average monthly yield of $25,000 is expected to be maintained.

Metallurgical troubles persisted during 1918 and by mid-1919 the staff was preparing to alter the plant. Arsenic in the ore is one of the troubles. Company has had a rather unhappy career with finances, litigation, and treatment problems, but seems to be improving slowly and surely. In January, 1920, mill was closed down and ore was being shipped elsewhere for treatment.

WHITE PINE COPPER CO. **NEVADA**

Address: 602 Kearns Bldg., Salt Lake City, Utah. Managed by the U. S. Sm., Ref. & Mng. Expl'n. Co.

Officers: John F. Cowan, pres.; B. Binnard, v. p.; E. F. Mobley, sec.-treas., with G. T. Hansen and F. B. Stephens, directors.

Inc. November, 1918, in Utah. **Cap.,** $1,000,000; $1 par assessable; 600,000 shares issued. Authorized bond issue, $300,000; $180,000 outstanding. During 1918 expenditures for development work amounted to $36,000.

Property: 10 claims, 186 acres, at Aurum, White Pine county, developed by 1,500′ of workings to depth of 250′. Ore occurs as chalcopyrite in fissure veins in shaly limestone, said to average 5% copper and 4 oz. silver.

Equipment: includes 1,400′ aerial tram. Developing in 1919.

WHITE PINE MINING CO. **NEVADA**

Idle. **Address:** Las Vegas, Nev.

Officers: D. M. Hewey, pres.; D. H. Killion, Jr., v. p.

Inc. August 5, 1915, in Nevada. **Cap.,** $1,000,000; $1 par; 850,000 shares issued. Bonds outstanding $25,000. Annual meeting, first Wednesday in January.

Property: Green Monster Extension mine at Goodsprings, Clark county, Nev. Produced 35 tons of zinc ore in 1915-16. A prospect.

WHITE PINE SILVER MINES CO. **NEVADA**

Address: Web. Greene, sec., care Fritsch Loan & Trust Co., 201 Felt Bldg., Salt Lake City, Utah.

Officers: August Vogeler, pres.; Arthur Robinson, v. p.; W. H. Penney, treas.; L. R. Nelson, mgr.

Inc. 1918, in Utah. **Cap.,** $100,000; 10c par; 500,000 shares in treasury.

Property: 8 claims, adjoining the Siegel mines at Schellbourne, White Pine county, developed by tunnel and shaft said to show copper, lead, and silver, running from $16 to $80 per ton. Developing only in 1919.

WILLARD METALS MINING CO. **NEVADA**

See New Willard Gold Mines Co.

WILLARD MINES CO. **NEVADA**

Idle, at last accounts.

Officers: F. H. Bird, pres.; J. T. Goodwin, v. p.; R. Nenzel, sec.; V. A. Twigg, treas., with L. A. Friedman, D. C. Wheeler, directors. H. H. Hunter, mgr. and supt.

Inc. in Nevada. **Cap.,** $1,000,000; $1 par; outstanding, 662,000. No bonded indebtedness. Annual meeting, third Wednesday in January.

Property: 3 unpatented claims, 8 miles E. of Lovelock, Pershing county, Nev., which show a vein carrying pay ore in shoots.

Development: by several shafts, deepest 50′, and a 70′ tunnel. Shipments averaged $54 per ton in gold and silver.

Property in a district that was feverishly active in 1915, but the temperature subsided in 1916. See Nevada Honeybee and other mines of Loring (formerly Willard), Nevada.

WILLIAM PATRICK MINING CO. **NEVADA**

Address: Manhattan, Nev.

Officers: Wm. C. Houppert, pres.-mgr., Otto Johnson, v. p.; W. P. Socwell, sec.-treas., with Wm. E. Osborn and W. A. Bastian, directors.

Inc. December 26, 1917, in Nevada. **Cap.,** $100,000: 10c par; 847,000 issued.

Property: 2 patented claims, 40 acres, near Manhattan, Nye county, said to show free-milling ore in quartz vein with E.-W. course and dip of about 35°. Pay-ore occurs in shoots assaying from $2-$18 per ton in gold. Developed by 169′ shaft and crosscuts. Ore is mined by glory-hole method.

Equipment: includes 25-h. p. electric hoist, pump, tramway, 35-ton mill.

Management reports 1,200 tons of ore on dump, assaying about $8 per ton, and 20,000 tons of ore blocked out.

The mine was closed down December, 1918, but was to be re-opened when conditions return to normal.

WILSON-NEVADA MINING CO. **NEVADA**

See Nevada Lincoln Mining Co.

WILSON SILVER MINES CONS. CO. **NEVADA**

Main office: Goldfield, Nev. **Agent's office:** A. P J. Theo, 15 William St., New York City.

Officers: J. B. Kendall, pres.; N. P. Theo, v. p.; M. A. Kendall, sec.-treas.

Inc. in Nevada. **Cap.,** $2,000,000; $1 par. Traded in on New York Curb.

Property: 18 claims, 16 patented, 300 acres, in Esmeralda county, 5 miles from McLean on the T. & G. R. R.

Silver-lead ore occurs in a replacement deposit in limestone and is reported to carry from 50-300 oz. silver and 70-80% lead per ton.

Development: by 3,000′ of old workings, with reserves estimated at 10,000 tons blocked out, valued at $500,000, and 20,000 tons of ore on the dumps.

Past production given as $325,000 net. Shipments are made to Hazen sampler. Treasury stock was offered the Eastern public June, 1919, to provide funds for necessary equipment.

WINNEMUCCA MOUNTAIN MINING CO. **NEVADA**

Address: Winnemucca, Nev.

Officers: H. A. Swanson, pres.; with W. G. Adamson, sec.-treas.

Cap., $2,000,000; $1 par; outstanding, 1,200,000; no bonded indebtedness.

Property: 25 claims, 2 patented, 7 miles from Winnemucca, Humboldt county, including 9 claims owned by the Winnemucca and Bonanza companies now merged with the present organization. The claims show a N. E.-S. W. fissure vein, traceable through the property for 3,000′. This vein cuts shale intruded by dikes of diorite and andesite. The orebody varies from 3′ to 30′ in width, and ore carries gold and small silver values. Dumps contained 3,000 tons of $15 ore.

In July, 1917, company purchased 6 potash-bearing claims in Coal Canyon, 8 miles from Lovelock, for $100,000.

Development: by 5,000′ of tunnel work. The working tunnel, 425′ long, enters a fault-zone at a point 29′ below an ore-shoot 175′ long and 30′ wide. The work defines 15,000 tons of indicated ore said to average $15 per ton. In 1917 a shaft was sunk below 300′ tunnel-level and good ore was reported. The mine was taken over by W. G. Adamson, under lease, in 1919, who is reported drifting and crosscutting 175′ below the old tunnel-level.

Equipment: includes electric hoist, compressor and a 50-ton cyanide mill. Property is a prospect.

WOLFTONE EXTENSION MINING CO. **NEVADA**

Mail returned from former address: V. J. Bonaby, sec., 110 Sutter St., San Francisco, Cal.

Dividends paid in 1914 amounted to $2,820.

Property: in Manhattan district, Nye county; includes the Sunrise and African claims said to show 12 parallel quartz veins, 2 to 12″ wide, supposed to be feeders to the main orebody that should be found in the limestone. Ore from a shaft on the Sunrise reported to have yielded $18 gold per ton.

WOLVERINE COPPER CO. **NEVADA**

Probably defunct. **Last address:** E. S. Deardorf, mgr., Winnemucca, Nevada.

Property: 15 claims, 300 acres in Harmony or Sonoma Mts., 5 miles S. E. of Winnemucca, Humboldt county, shows 5 veins carrying copper ore with silver and gold values.

Development: merely a 65′ shaft showing gold ore in the bottom.

Equipment: includes gasoline hoist.

WYOMING MINING & MILLING CO. **NEVADA**

Not incorporated. **Address:** W. S. Bennett, mgr-treas., Cody, Wyo.

Company is a syndicate of five members who put up $75,000 for development and equipment.

Property: 10 claims, 2 patented, includes the old Argus silver-gold mine at Taylor, White Pine county, 16 miles S. of Ely. Orebody is a contact deposit in limestone, dipping 40° with an E. course and is from 7-40′ thick. Silver occurs as chloride and ore assays $26 per ton.

Development: by 236′ incline shaft.

Equipment: 25-h. p. gasoline hoist and a 100-ton cyanide plant erected in April, 1919.

Management planned sinking a vertical shaft in 1919. Ore reserves: reported to have 60,000 tons blocked out besides ore on dump.

WYOMING-NEVADA COPPER CO. **NEVADA**

Officers: Fred. C. Fisher, pres., Cheyenne, Wyo. C. T. Smith, supt.

Property: includes the old Fifty-Six copper mine near Humboldt, Pershing county, said to be the first quartz mine located in Nevada in 1856.

YELLOW JACKET G. & S. MNG. CO. **NEVADA**

Property sold to and company merged with Jacket-Crown Point-Belcher Mines Co., March 10, 1915, for 360,000 common and 12,000 preferred shares of the new corporation.

YELLOW PINE EXTENSION CO. **NEVADA**

Main office: Goodsprings, Nev.

Officers: A. J. Robbins, pres.-gen. mgr.; E. B. Critchlow, v. p.; Reynolds Robbins, sec.-treas., with A. J. McDermott and G. A. Fayle, directors.

Inc. in Utah. **Cap.**, $100,000; 10c par; assessable; 575,000 issued.

Property: 12 claims, 190 acres, in Yellow Pine district, Clark county, Nev., said to show a chamber deposit in limestone, dipping 45° W., with N. S. course. Ore shoots are 2 to 8′ wide and 10 to 40′ long. Ore contains carbonates of zinc and lead, with some copper and silver; zinc content is 35%.

Development: by 800′ incline shaft, 200′ tunnel and total of 4,500′ of workings. During 1918 only about 500′ of drifting was done on the lower level of the shaft.

Production: to 1917 about $100,000, average in 1916 being $25 per ton. In 1918 output was 250 tons.

Owing to market and labor conditions management did only sufficient work to hold the property in 1919.

YELLOW PINE MINING CO. — NEVADA

Main office: Goodsprings, Nev.

Officers: J. F. Kent, pres.; R. B. Chapman, v. p.; Morris P. Kirk, sec.-mgr.; C. W. Kent, treas., with S. E. Yount and S. H. Westfall, directors.

Inc. 1905, in Nevada. **Cap.**, $1,000,000; $1 par; non-assessable; all issued. No bonded indebtedness. Stock transferred and registered, 431 Security Bldg., Los Angeles, Cal. Listed on Los Angeles Stock Exchange.

Financial statement for year ending January 10, 1918 shows: gross receipts, $662,256; total expenditures, $248,575; gross profit, $414,778.

Dividends: in 1918, $300,000; in 1919, $150,000.

Property: 13 patented claims, 240 acres in Yellow Pine district, Clark county, 4½ miles N. W. of Goodsprings, and 12 miles W. of Jean, nearest rail point. In 1917, the Charleston claim, held under lease, was turned over to the Charleston Mining Co. (which see), the Yellow Pine retaining a half interest in the new company.

Ore occurs as replacement deposits in limestone, and averages 30% zinc, 14% lead and 14 oz. silver. The main deposit dips about 30° W. and strikes N. S. Faulting is frequent, and oxidation continues to present depth. Lead increases, and zinc decreases at depth. The property and plant were described in "Mining and Oil Bulletin" of Los Angeles, by H. A. Walker, in October, 1919.

Development: by an incline shaft, 900′ deep, greatest depth of workings being 950′ and linear extent 29,000′. New work in 1917 amounted to 3,180′, costing $12.08 per foot.

Equipment: includes 50-h. p. oil engine, hoist good for depth of 2,500′, compressors, generator, 4½ miles of tramway from mine to mill, 12 miles of 36″ gauge railway with Shay locomotive between Goodsprings and Jean on the Salt Lake Route; 120-ton wet concentrator using jigs and tables. The mill, strictly speaking, is a separator rather than a concentrator. The ore is a high-grade silver-lead-zinc material, and in the treatment at this plant no rejection is made, all products of the mill being shipped. In 1919 a calciner was added to eliminate moisture and carbon dioxide in the zinc carbonates.

Production:	tons Ore.	% Lead.	% Zinc.	oz. Silver.	Cost Total
1917	19,976	14.85	29.1	7.55	$12.348
1916	20,581	10.5	30.4	4.53	9.919
1915	16,136	10.2	31.8	5.40	.....

Total production to January 1, 1919, 138,156 tons.

Operations were suspended from March to August, 1919, on account of fire, which destroyed much of the plant, since re-built. The Yellow Pine is well managed and should pay dividends for a long while.

YERINGTON BULLION MINING CO. — NEVADA

Idle, and mail returned from former address, Ludwig, Lyon county, Nev.

Officers: A. J. Schmidt, pres.; J. A. Knox, sec.-gen. mgr.; J. M. Moyle,

mgr.-treas., preceding with J. A. Sisk, E. W. Brush, F. S. Stanley and Henry Hertz, directors. W. F. Pflegler, supt., at last accounts.

Inc. May 31, 1909, in Nevada. **Cap.**, $2,500,000; shares $1 par; 1,000,000 shares preferred stock, fully paid and non-assessable; 300,000 shares issued; 1,500,000 shares common or promotion stock; assessable, 1,275,759 shares issued.

Property: 56 mining locations, 1,120 acres, 2 miles N. of the Nevada Douglas property in Yerington district, developed by 400′ main working shaft and 2 tunnels 300′ long, E. and W. of the shaft on the 300′ level, showing a deposit of sulphide ore with gold and copper values.

Equipment: includes a smelter, 2 hoists, compressor and tools.

Company apparently without funds and its literature of a suspicious character.

YERINGTON CONSOLIDATED COPPER CO. **NEVADA**

Office: 312 McCornick Bldg., Salt Lake City, Utah. **Mine:** Mason, Lyon county, Nev. **Officers:** F. J. Hagenbarth, pres.; John Dern, v. p.; M. B. Johnson, sec.

Inc. February 11, 1917, in Utah. **Cap.**, $100,000; shares 10c par; assessable; issued, 725,000 shares. Assessment No. 1 of 1c. per share levied February 23, 1918. Debentures, $100,000 at 6%, authorized. Annual meeting, second Monday in July.

Property: 14 claims, patented, in 2 groups, known as the Copper King and Copper Deposit, the former, lying between the Bluestone and Mason Valley mines, developed by a 70′ shaft and 2 tunnels of 500′ and 600′, showing carbonate ores. Worked in a small way by lessees in 1918.

YERINGTON MALACHITE COPPER CO. **NEVADA**

Office: 414 Judge Bldg., Salt Lake City, Utah. **Mine office:** Yerington, Lyon county, Nev.

Officers: W. F. Snyder, pres.; Grant Snyder, v. p.-gen. mgr.; Gideon Snyder, sec.-treas., with S. M. Levy, C. D. Ellingwood and W. F. Snyder, directors.

Inc. October, 1906, **Cap.**, $5,000,000; shares $5 par; assessable; issued, 666,333 shares.

Property: 11 claims, patented, adjoining the Mason Valley mine, show 3 mineralized zones of 20 to 150′ width, proven on surface for a distance of 2,000′. Orebodies are fissure veins in limestone, carrying oxidized ores to a depth of about 100′, below which ore minerals are mainly chalcopyrite, associated with epidote and garnet.

Development: by numerous short tunnels, shafts, etc., totaling 3,800′, on the vein with the Mason Valley workings. Ores as mined average about 6% copper. An examination, 1917, reported to have revealed 800,000 tons of 2% oxide ore to a depth of 100′, where the sulphide zone commences.

Equipment: includes a 125-h. p. motor, steam hoist good for 600′ depth and compressor. There are several mine buildings.

Production: was begun May, 1912, and company shipped ore returning 174,407 lb. copper to the Mason Valley smelter in 1913. No later output reported.

YERINGTON MINES & EXPLORATION CO. **NEVADA**

Office: Yerington, Lyon county, Nevada.

Officers: C. S. Durand, pres.; B. F. Kurz, v. p.; V. B. Durand, sec.; Geo. F. Willis, treas., with W. S. Weaver and Wm. Cramer, directors.

Inc. February 27, 1909, in Nevada. **Cap.**, $1,000,000; shares $1 par; non-assessable; issued $735,000. Annual meeting, first Monday in March.

Property: 24 claims, unpatented, including the Effie May group of 2 gold claims, the Copper Flat group of 10 copper claims, and the Mohawk group of 12 gold-copper claims, latter being the principal property, located 1 mile N. W. of Yerington.

The **Mohawk** group is developed by a 125′ incline and several shallow shafts of 20′ to 80′ depth, sunk in the copper-bearing formation. Development: a 15-h. p. gasoline hoist has been added and development work is now in progress

on No. 3 shaft which was 70′ deep (June, 1919), showing stringers of ore from the surface. A carload in 1916 yielded 4.45%.

The **Copper Flat** group, 1 mile E. of Yerington is developed by about 20 pits and shallow shafts, deepest 60′, showing malachite and cuprite of about 6% copper tenor. Shipments in 1917 averaged 6.46% copper.

The **Effie May** group is a gold prospect developed by a 135′ shaft, with about 2,000 tons of ore blocked out. Property is on the Nevada Copper Belt railway.

YERINGTON MOUNTAIN COPPER CO. **NEVADA**

Offices: 302 Natl. Bank Bldg., Tonopah and Golconda, Nev.

Officers: J. G. Kirchen, pres.-mgr.; E. M. Kirchen, v. p.; H. Perry, sec.-treas., with H. J. Toner, W. A. Krasselt, H. R. Cooke and E. J. Haug, directors. W. L. Taylor, supt.

Inc. February 10, 1912, in Nevada. **Cap.**, $3,000,000; shares $1 par; non-assessable; issued $2,300,000. First Natl. Bank of Tonopah, Nev., and U. S. Corporation Co., New York, registrars and transfer agents. Listed on New York Curb and San Francisco Exchanges.

Property: 46 claims, 920 acres, in the Mountain View district, 9 miles N. W. of Schurz and 12 miles E. of Yerington, shows fissures in granodiorite, that run N. 40° E., and dip 65°. Ore minerals are mainly chalcocite, with chalcopyrite, chrysocolla, malachite, cuprite and occasional native copper. Ore assays 4½ to 8% copper, 2 to 4 oz. silver and 80c. to $2 gold per ton.

In July, 1916, company purchased the Adelaide mine, near Golconda, Humboldt county, from the Glasgow & Western Dev. Co.

At the Adelaide mine there is a contact deposit in limestone and granite, opened by a 300′ shaft and 1,450′ of tunnels, with a total of 6,500′ of openings. In August, 1917, the orebody on the 200′ level was 20′ wide, and monthly shipments were 200 tons of 5% ore.

In 1918 a group of five gold-silver claims 100 miles N. W. of Tonopah was acquired.

Development: at the Yerington by a vertical 300′ main shaft, and 1,200′ of tunnels, with about 8,000′ of openings. The Azurite tunnel was driven from the other side of the mountain to cut ore exposed in the Levine tunnel and at 400′ greater depth. Tunnel discloses ore in bunches and streaks. The Beach tunnel yielded a good grade of shipping ore of about 5.5% copper.

Equipment: includes gasoline hoists, 2 compressors, pumps, etc.

Production: in 1916 was from 400 to 600 tons per month. All work was temporarily suspended February, 1918, on account of heavy flow of water in lower workings.

YUBA LEASING & DEVELOPMENT CO. **NEVADA**

Out of business. Formerly at Pioche, Lincoln county.

ZANZIBAR MINING CO. **NEVADA**

Address: P. O. Box 374, Reno, Nev.

Officers: J. M. Short, pres.; L. S. Reese, sec.-treas.

Property: 2 claims between the White Caps and White Caps Extension at Manhattan, Nye county, developed by 400′ shaft. Idle, pending reorganization, 1919.

THE DIVIDE (OR GOLD MOUNTAIN) DISTRICT.

This district, which is six miles south of Tonopah and on the main road to Goldfield, was known and under development at the time when the remarkable discoveries at Goldfield lured everyone away from the prospects of Gold Mountain, as the district was then called. In 1912, the Tonopah Divide Mining Company was organized by Mr. H. C. Brougher, to acquire and develop the property now known as the Divide mine, then owned by the moribund Gold Mountain Mining Co., whose shareholders were offered new stock for old on payment of 3c. a share.

New work at this property opened up a remarkable orebody in a vein hitherto considered worthless, and started a mining boom early in 1919, that rivalled that of the Goldfield stampede. The country was located for miles around the Divide

mine, and shares sold in over a hundred companies, whose sole holdings were a few locations for which the incorporators usually took half the stock out of a million and a half shares capitalization.

During the height of the excitement, fully fifty or more companies were financed to the extent of $25,000 to $100,000 cash, for prospecting work. Head frames were put up, machinery installed and shaft sinking started at many places and strange to say, actual veins were found, most of which showed more or less mineralization at most of these properties.

The boom proved short-lived, being killed by a miners' strike with consequent shut down of all properties in July, 1919.

The neglect of a district almost on the outskirts of Tonopah, is explainable by the character of the veins, which are fault fissures practically devoid of quartz, and with little discoloration or other surface evidence of mineralization.

The district consists of rhyolitic rocks, of volcanic debris cut by dikes, eroded and in part covered by rhyolite-lava flows, and long after by tuffs and lakebed sediments.

Quartz-filled fissures in the massive rhyolite, worked in former years, show gold values in small shoots, but the silver ores occur in the deeper seated breccia made of angular fragments of rhyolite, and the ores are oxidized down to the 600′, the deepest level yet opened.

Post-mineral faulting is observed but has not proven troublesome as yet. The vein system is not simple, showing main line of N. W. fracturing, and vein intersections are regarded as favorable factors, though extensive development at the Gold Zone and Brougher Divide mines, both on the main Divide vein, have so far failed to find ore in commercial amount at such intersections. Theories as to this and all other hypotheses of ore occurrence at the camp need the acid test of development work.

In January, 1920, ore was being mined and shipped from the Tonopah Divide, Divide Extension, and Hasbrouck properties, and a half dozen other properties have also found excellent ore, though apparently of limited extent.

AETNA DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev. George W. Allen, of Boston, Mass., president. Sponsored by John E. Allen & Co., 85 Devonshire St., Boston.

Inc. July, 1919, in Nevada.

Property: 6 claims E. of the Myra Divide, about 3 miles S. E. of Gold mountain, formerly owned by Onie Dougherty and Dick Finn.

AIREDALE DIVIDE MINING CO. **NEVADA**

Organization: (same as Albany Divide, which see).

Officers: G. W. Allen, pres.; J. H. Shepard, v. p.; H. C. Price, sec.-treas.; with John Barrier and Wm. Forman, directors.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 4 claims and fraction, 100 acres, south of the Eureka, South Divide and Hecla, and 2¾ miles S. E. of Gold mountain. Claims show usual surface conditions of the district.

The entire capital stock of the Airedale Divide ($150,000), together with that of the Albany Divide, Hecla Divide, and St. Patrick Divide, was optioned to John E. Allen & Co., Boston Curb brokers. Property is under systematic exploration by diamond drilling.

AJAX DIVIDE MINING CO. **NEVADA**

Office: I. S. Thompson, res. agt., Tonopah, Nev.

Inc. 1919, in Nevada. **Cap.,** $150,000. Listed on Boston Curb.

Officers: J. M. Healy, pres.; F. M. Manson, v. p.; H. J. Coogan, sec.-treas.; J. K. Turner, cons. engr., with I. S. Thompson, directors.

Property: the Ajax group of 4 claims adjoining the Chariot, in the Ben Hur section of district.

Development: outcrops are reported as encouraging. An open-cut gave assays of $1.80 per ton.

ALADDIN DIVIDE MINING CO. **NEVADA**

Office: C. N. Miller, Tonopah, Nev.

Inc. May 27, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c. par, assessable; 700,000 issued.

Officers: Elmer Bisbee, pres.; Gust Hanson, v. p.; C. N. Miller, sec.-treas., with W. G. Robertson and E. N. Bannon, directors.

Property: 160 acres including Little Belle claim, 3 acres of inside territory adjoining the Gold Reef group; Star section near the Gold Zone shaft, and the Doughboy group, 13½ acres, surrounded by the Knox, Florence, and Smuggler mines. The Doughboy is the main holding. The Mornington placer ground along the Feather river in California, controlled by C. N. Miller and associates, is presumably included.

Development: shaft being sunk at about 200′ from the Knox shaft. A vein was cut at 12′ containing ore carrying free gold.

ALBANY DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: G. W. Allen, pres.; John Barrier, treas.; H. C. Price, sec.; with Wm. Forman and John Shepard, directors. C. R. Evans, asst. sec.

Inc. March, 1919, in Nevada. **Cap.,** 1,500,000 shares, 10c par. Listed on Boston Curb.

Property: 3 full and 2 fractional claims, adjoining the Hecla, Eureka, Congress, Bullion, and Hudson groups. Core-drilling was to be started during June, 1919, to prospect to depth of 800′.

Stock of the company was manipulated to $23 a share on the Boston Curb in 1919, giving the property a market value of $34,500,000, though only surface work had been done on the claims.

ALDA DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev. E. Carter Edwards, res. agt.

Officers: G. H. Duell, pres.; J. L. Woodward, v. p.; W. E. Edwards, sec.-treas., with William Huggard and E. C. Edwards, directors.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; shares 10c par. **Transfer office:** 66 Broadway, New York City.

Property: 8 claims about 2¾ miles S. W. of Gold mountain. A prospect.

ALLIED DIVIDE EXTENSION MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: H. B. Ruhl, pres.; Albert Ninnis, v. p.; B. E. Garnett, sec.-treas., with Gust Hanson, directors. J. K. Turner, cons. eng.

Inc. in Nevada. **Cap.,** $150,000; shares, 10c par.

Property: a prospect, consisting of 2 claims and a fraction just south of the Allied Divide.

ALLIED DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: H. B. Ruhl, pres.; Albert Ninnis, v. p.; B. E. Garnett, sec.-treas., with Gust Hanson, directors. J. K. Turner, cons. engr.

Inc. February 26, 1919, in Nevada. **Cap.,** 1,500,000 shares; par 10c. Listed on San Francisco Stock Exchange. Has a good treasury fund.

Property: 4 claims, southeast of Gold Zone and surrounded by the Liberty Bell, Mammoth, Divide Extension, and East Divide. Is said to be on direct trend of main Divide vein.

Development: 200′ shaft sunk on Marquette claim.

Equipment: 20-h. p. gasoline hoist 10x10, compressor, tools, etc., purchased from companies at Belleville and Candelaria.

ALPHA DIVIDE MINING CO. **NEVADA**

Office: 314 Clay Peters Bldg., Reno, Nev. Alex. S. Proskey, agent.

Property: a group of 5 claims, 2¾ miles N. W. of Gold mountain. In October, 1919, company was being financed and work was to be commenced soon after. Is a prospect only.

ALPINE DIVIDE MINING CO. **NEVADA**

Inc. April, 1919, in Nevada. **Cap.,** $150,000; shares, 10c. par.

Property: 6 claims bounded on W. by the Doughboy and Treadwell, 1¾ miles slightly N. E. of Gold mountain. A prospect without known merit.

ALTO DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: Joseph Mayer, pres. and mgr.; J. K. Turner, v. p.; and cons. engr.; Ben Gill, sec.-treas.

Inc. February 13, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c. par. Listed on San Francisco Stock Exchange.

Property: 3 claims, 70 acres, on eastern boundary of Tonopah Divide, Gold Zone, and Gold Reef groups.

Development: a shaft started in March, 1919, at a point 135 ft. S. of Arkansas claim of Gold Zone, near a prominent outcrop, was 300′ deep in August.

Equipment: 50-h. p. motor and 30 h. p. hoist, 6-drill compressor, machines, etc.

AMALGAMATED DIVIDE MINING CO. **NEVADA**

Office: 312 Clay Peters Bldg., Reno, Nev.

Officers: A. G. Miller, pres.; O. J. Clifford, v. p.; A. A. Smith, sec.-treas.; with H. D. Danforth and L. H. Bartholomew, directors.

Inc. in Nevada, 1919. **Cap.,** $150,000; shares, 10c par.

Property: 34 acres, north of Sutherland Divide Extension and south of Roosevelt Divide; and 80 acres in Ben Hur section. A prospect on the outskirts of the district.

AMERICAN DIVIDE MINING CO. **NEVADA**

Address: Allen Case, Tonopah, Nev.

Inc. 1919, in Nevada.

Property: 6 locations adjoining the Rand, and between the Croesus and Mizpah, ¾-mile N. E. of Gold mountain.

ANACONDA DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Inc. 1919, in Nevada.

Property: about 90 acres N. W. of North Divide and 2¾ miles N. W. of Gold mountain. Joint shaft being sunk with the Nevada Divide, down 75′ in July, 1919. Assays at 65′ returned $1.80 per ton. A prospect showing favorable looking shear zones.

ANCHOR DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev. J. W. Hutchinson, mgr.

Officers: J. G. Crumley, pres.; C. E. Oyster, v. p.; E. J. Erickson, sec.-treas., with George Wingfield and H. C. Brougher, directors.

Inc. 1919, in Nevada. **Cap.,** $150,000; shares, 10c par.

Property: 4 claims and a fraction adjoining the Rosetta, Black Hawk, Portland, and Hercules, in the southern section of the field.

Development: by shaft, 50′ deep in July, 1919. **Equipment:** 30-h. p. hoist, 9½x12″ compressor, etc.

APEX EXTENSION DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Inc. 1919, in Nevada. **Cap.,** $150,000; par 10c.

Owns 40 acres adjoining Apex, Mohawk and Crown groups.

APEX DIVIDE MINING CO. **NEVADA**

Office: Tonopah. Nev. J. W. Hutchinson, mgr.

Officers: J. G. Crumley, pres.; W. V. Richardson, v. p.; E. J. Erickson, sec.-treas., with H. C. Brougher and George Wingfield, directors. James Dike, supt.

Inc. March 31, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par. 750,000 shares in treasury. Listed on San Francisco Stock Exchange.

Property: 13 claims, adjoining North Divide on S. W. and north of Wilson Divide.

Development: sinking started in July, 1919, and shaft was 365′ deep in December. Seams of talc, of low silver value were showing. Crosscutting at 350′. Equipment: electric hoist and air-compressor, etc.

ARGENTINE DIVIDE MINING CO. **NEVADA**

Office: 314 Clay Peters Bldg., Reno, Nev.

Officers: A. S. Proskey, pres.; A. N. Salisbury, v. p.; H. E. Scott, sec.; E. F. Lunsford, treas., with S. F. Taylor, and L. Little, directors.

Inc. March, 1919, in Nevada. **Cap.,** 1,500,000 shares; $1 par; 850,000 outstanding. Listed on San Francisco Stock Exchange.

Property: 2 claims, 28 acres, between the Divide Cons. and Mohawk. Examined, 1919, by A. H. Elftman, who reports that several veins cross the ground, and that pay-ore should be found at shallower depth than in other parts of the district.

Development: by shaft, 102′ deep early in October.

Equipment: electric and gasoline power, 25 h. p. hoist, and compressor.

ARGONAUT HASBROUCK DIVIDE MINING CO. **NEVADA**

Address: A. H. Elftman, Tonopah, Nev.

Inc. 1919, in Nevada. **Cap.,** $150,000; par 10c.

Property: 60 acres in the Divide district, W. of Kendall Divide. In July, 1919, a 50-h. p. hoist, compressor, and accessories were ordered. Shaft sinking to be done in 1920.

ARGONNE DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: Frank Berry, pres.; C. W. Taylor, v. p.; T. A. Frazier, sec.-treas., with Charles Keilhofer, R. W. Cattermole, and H. H. Brown, directors. A. H. Elftman, cons. engr.

Inc. April, 1919, in Nevada. **Cap.,** $300,000; shares 2c par.

Property: the Homestake-Gold Wedge group of 7 claims, purchased from Charles Kielhofer and others by a syndicate represented by M. B. Cutter, C. R. Miller, and Barron Hoopes, Jr., of the Tonopah Mining Co. Equipment from the Silver Plume shaft of the Tonopah company was brought to mine.

Development: A shaft is to be sunk to 200′ depth and levels started. The ore so far cut assays $3 to $10 per ton in gold and silver. In October, $7.20 assays were reported at lower depth. A hoist and head-frame have been erected.

ARIZONA DIVIDE MINING CO. **NEVADA**

Office: 15 Broad St., New York.

Inc. in Nevada. **Cap.,** 2,000,000 shares. 10c par; non-assessable; 1,575,000 outstanding, of which 400,000 are underwritten for benefit of the treasury; 1,175,000 are issued or set aside for the Arizona Central Gold Mines Co., and to acquire property at Divide. As a reserve, 425,000 shares are held in treasury.

Property: at Divide—the Military group of 5 claims, 1¼ miles S. of the Tonopah Divide. Examined by L. R. Robins and R. C. Knox. Two wide shear-zones said to cross the property, roughly parallel to the course of the Tonopah Divide shear-zone. "The Military is a geological 'gamble' of the same character as other Divide properties. . . . "

At Oatman, Arizona—17 acres, surrounded on three sides by the United Eastern. A quartz-calcite vein, 30 to 60′ wide, outcrops for 1,000′. A 364′ shaft has been sunk on a vein assaying $5 to $6 gold per ton. Pay-ore is expected at 500′. Shaft has a hoist, compressor, etc., adequate for depth of 1,000′.

ATLANTIC DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev. E. Marks, res. agt.

Officers: Wm. Forman, pres.; W. J. Douglass, v. p.; E. Marks, treas.; M. L. Cooper, sec., with Arthur G. Raycraft, director.

Inc. 1919, in Nevada. **Cap.,** $150,000; 10c. par.

Owns Wedge group of 50 acres.

AZTEC DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev. Ben Gill, res. agt.

Officers: J. B. McCann, pres.; J. K. Turner, v. p.; Ben Gill, sec.-treas.; with Joseph Mayer, and F. P. Case, directors.

Inc. 1919, in Nevada. **Cap.,** $150,000; 10c par.

Property: a group covering 50 acres between the East Divide and East Divide Extension. Has electric equipment and plans active development, 1920.

AZTEC DIVIDE MINING CO. **NEVADA**

Office: State Bank Bldg., Tonopah, Nev.

Officers: W. H. Thomas, pres.; Lowell Daniels, v. p.; W. H. Fording, sec.-treas., with E. C. Simpson and H. H. Atkinson, directors. Rudolph Burton, supt.

Inc. in Nevada, 1919. **Cap.,** $150,000; 10c par.

Property: 100 acres in group of claims lying west of the Hasbrouck Divide. **Development:** shaft sinking was in progress latter half of 1919. **Equipment:** well equipped with hoist and other machinery. A prospect.

BANKER DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: D. J. Fitzgerald, A. H. Keenan, R. F. Wendaver, A. T. Goodin, and E. J. Ramsey, directors.

Inc. 1919, in Nevada. **Cap.,** $150,000; shares, 10c par.

Property: 4 claims W of Royal Divide and about 2 miles slightly N. E. of Gold mountain, and adjoining the Clinton, Sioux, and Shamrock on the southeast. Is a prospect.

BANNER DIVIDE MINING CO. **NEVADA**

Inc. 1919, in Nevada. **Cap.,** $150,000; par 10c.

Property: an undeveloped group of 3 claims between the Hull City, Kendall, and Divide Charter, in the southwestern part of the district.

BEAR DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Inc. 1919, in Nevada. **Cap.,** $150,000; par 10c.

Owns 2 claims, and a fraction adjoining Leadville Divide on east.

BELCHER DIVIDE MINING CO. **NEVADA**

(Originally Gold Mtn. Dev. Co.)

Office: Tonopah, Nev.

Officers: George Wingfield, pres.; E. J. Roberts (a surveyor who ran the first lines at Divide 20 years ago), v. p.; C. L. Richards, sec.-treas.; and H. C. Brougher, directors.

Inc. August 28, 1916. **Cap.,** 1,500,000 shares; 1c par; 1,100,000 shares issued. Listed on San Francisco Stock Exchange. New York Trust Co., registrar. Transfer office, Tonopah, Nev.; $58,558 cash in treasury July 1, 1919.

Property: 3 claims, adjoining the Verdi Divide on the N. W. corner and Victory Divide on west. Ground shows a strong vein with 75° dip.

Development: by a new shaft, 215′ deep in mid-1919, and 150′ crosscut on 200′ level to reach an intersection of a northwest fissure and north-south vein, which shows ore at surface. This work has proven an ore-shoot for a length of 700′; the ore is said to average 3½ ft. wide and for a length of 300′. Three shafts were sunk on this ground, all in footwall country, several years ago by Mrs. Phoebe Hearst and "Lucky" Baldwin.

Equipment: electric hoist, 6-drill compressor, etc. Is a promising prospect.

BELCHER EXTENSION DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. C. L. Richards, res. agt.

Officers: George Wingfield, pres.; E. J. Roberts, v. p.; T. J. Lynch, sec.-treas.; and H. C. Brougher, directors. J. G. Crumley, mgr.

Inc. March 29, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par; 1,300,000 issued. Listed on San Francisco Stock Exchange. New York Trust Co., registrar. $51,982 cash on hand July 1, 1919.

Property: 9 claims, 170 acres north of Revert Divide.

Development: new shaft timbered to 260′ level in summer of 1919. The 200′ shaft of the Belcher Divide prospects the eastern ground. Station was cut at 300′, and late in August ore worth $37 per ton was reported cut.

Equipment: good electric hoist, etc. Regarded as an attractive prospect.

BELLEVIEW DIVIDE MINES CORPORATION **NEVADA**

Address: Tonopah, Nev.

Officers: W. J. Douglass, pres.; W. D. Moody, v. p.; J. G. Thompson, sec., with Roger Dougherty, I. S. Thompson, and Harry Powell, directors.

Inc. May, 1919, in Nevada. **Cap.,** $200,000; shares 10c par.

Property: 8 claims and fraction in Bellehelen mining district, Nye county, Nev. Has 150′ shaft and 50′ tunnel. Ore shipped in 1919.

BELMONT DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. B. A. Rives, res. agt.

Officers: J. H. Healy, pres.; J. H. Miller, v. p.; Allen Rives, sec.-treas.; with C. T. Stevenson and Zeb Kendall, directors.

Inc. March, 1919, in Nevada. **Cap.,** 1,500,000 shares, 10c par, 750,000 shares in treasury; assessable.

Property: Bodie and Mustang claims, 36 acres, adjoining Big Divide on S., Trilby on N., Bingo on W., and Divide Syndicate on E. A mineralized fissured dike, said to assay well, runs through the claims. Some surface prospecting has shown favorable indications.

BEN HUR DIVIDE EXTENSION MINING CO. **NEVADA**

Address: Tonopah.

Officers: Ed Malley, pres.; Ben. D. Luce, v. p.-mgr. J. Clarence Kind, sec.; Albert Kelly, treas.; John Barrier, director.

Inc. March, 1919, in Nevada. **Cap.,** $150,000; par 10c.

Property: 5 claims adjoining the Ben Hur on the W. Has 22 h. p. hoist, compressor, etc., and was sinking shaft until shut down by miners' strike.

BEN HUR DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. M. K. Franklin, supt.

Officers: Wm. Watters, pres.; C. W. Brandon, v. p.; R. J. Kelly, sec.-treas.; Roger Dougherty and Albert Kelly, directors.

Inc. March 29, 1918, in Nevada. **Cap.,** 1,000,000 shares; 10c par; assessable. Listed on San Francisco Stock Exchange.

Property: 6 claims in southeastern part of district, near the Chariot and North Ben Hur, and north of Gold Seam; held since 1902 by Watters and Dougherty.

Development: a shaft sunk in 1918 was deepened to 300′ in 1919. The original shaft was sunk on a quartz vein that assayed from $4 to $39 per ton. On the surface, this vein was 25′ wide and of great length. Crosscut at 200′ was in favorable formation, and in December, the orebody was said to be improving at 250′.

Equipment: 15-h. p. gasoline hoist, compressor, 2 machine-drills, buildings, etc., good for depth of 700.

BEVIS DIVIDE MINING CO. **NEVADA**

Office: 301 Nixon Bldg., Reno, Nev.

Officers: S. H. Wheeler, pres.; Wm. Woodburn, v. p.; M. A. Diskin, sec.-treas., with C. T. Stevenson and F. H. Norcross, directors. Edward Bevis, supt.

Inc. April 4, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par. Listed on San Francisco Stock Exchange. Transfers made at company's office.

Property: 2 claims, 40 acres, S. of the Mammoth and N. of the Giant, show a "dike" or vein traceable across Zone and Reef groups into this tract.

Development: sinking shaft to 250′ depth. At 35′, ore of low but consistent value, was cut. This was pronounced as true fault matter in which ore occurs.

Equipment: electric hoist and compressor.

BIG ACE DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev. W. E. Carson, res. agt.

Officers: H. C. Stimler, pres., W. Brougher, v. p.; E. P. Esser, sec.-treas.

Inc. May, 1919, in Nevada. **Cap.,** $150,000; par 10c; 750,000 shares treasury stock.

Property: 5 claims, 100 acres N. of Signal and Sutherland Divide in northern edge of district.

BIG BILL DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: W. W. Booth, Sr., pres.; W. W. Booth, Jr., v. p.; T. J. Lynch, sec.-treas.; G. W. Burgan, supt.

Inc. June, 1919, in Nevada. **Cap.**, $150,000 par 10c.
Property: 4 claims 70 acres adjoining the Apex group.
Development: under way. Is a prospect.

BIG DIVIDE MINING CO. **NEVADA**

Office: 421 Clay Peters Bldg., Reno, Nev.
Officers: A. A. Codd, pres.; H. F. Bruce, v. p. and cons. eng.; H. H. Bates, sec.-treas., with D. T. Donovan and E. C. Lucey, directors.
Inc. April 2, 1919, in Nevada **Cap.**, $150,000; 10c par; 150,000 shares offered at 20c. in 1919.
Property: 9 claims, adjoining Divide Extension on north.
Development: tunnel being driven into Donovan mountain, to be eventually 3,000′ long, opening ground to depth of 900′. Mineralization and fracturing said to be similar to that on Gold mountain.
Equipment: complete with compressor and drills, etc. Is a prospect.

BIG HORN DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.
Officers: R. Crumley, pres.; Fred Ames, v. p.; C. F. Pugh, sec.-treas.-mgr., with J. C. Williamson and J. C. McCabe, directors.
Inc. May 20, 1919, in Nevada. **Cap.**, $150,000; 10c par; 750,000 issued.
Property: Golden Star group, 3 claims, east and south of Ben Hur Divide. Samples of surface quartz and country rock said to assay well in silver.
Development: shaft being sunk and machinery ordered.

BIG LEDGE DIVIDE CONSOLIDATED MINING CO. **NEVADA**

Address: William Oaks, supt., Sylvania mine, via Cuprite, Nev.
Inc. 1919 in Nevada.
Property: 2 claims, S. W. of Telephone Girl Divide, about 3½ miles S. E. of Gold mountain. Also a 5-year lease on the old Sylvania lead-silver mine, 35 miles S. W. of Cuprite, and 50 miles S. W. of Goldfield. Latter property was a good producer, but was idle for many years on account of its isolated position. Examined by D. E. Anderson, R. W. Clapp, R. J. Anderson and W. J. Cooper.
Development: work was started at the Sylvania in August, 1919, and ore was to be sent to Midvale, Utah, for reduction.

BI-METALLIC DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.
Officers: B. H. Smith, pres.; J. K. Turner and J. M. Gilfoyle, v. p.'s.; Otto Falk, sec.-treas., with H. D. Budelman, and W. H. Royston, directors.
Inc. May 5, 1919, in Nevada. **Cap.**, $15,000; shares, 1c par.
Property: the Victor claim and 2 fractions near the Rosetta parallels the Hercules on west, and end-lines the South Divide on north. A promising vein is said to traverse the Victor claim. Prospecting only in 1919.

BINGO DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.
Inc. April, 1919, in Nevada, company not financed at last reports.
Property: a group of 2 claims surrounded by the Big Divide, Trilby, Champion, and Belmont properties. Is a raw prospect.

BLACK HAWK DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nevada. B. A. Rives, res. agt.
Officers: J. H. Miller, pres.; L. B. Spencer, v. p.; Allen Rives, sec.-treas. (not director). C. B. Burkham, Zeb Kendall, P. H. O'Neill, director.
Inc. April, 1919, in Nevada. **Cap.**, $150,000; par 10c.
Property: 100 acres S. of Anchor group and due south of Gold mountain, 2¼ miles, adjoining the Hercules on south. Is a raw prospect, to be developed in 1920.

BLUE JACKET DIVIDE MINING CO. **NEVADA**

Office: A. S. Proskey, 314 Clay-Peters Bldg., Reno, Nev.
Organized in October, 1919. Owns 100 acres in N. E. part of district, near Lookout Divide claims.

BONANZA DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: Harry McNamara, pres.; W. A. Nye, v. p.; H. E. Dugan, sec.-treas., with H. C. Price, directors.

Inc. 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 4 claims, adjoining Golden State Divide. A prospect.

BROKEN HILL DIVIDE MINING CO. **NEVADA**

Officers: John McGee, pres. and mgr.; J. C. Williamson, sec.

Property: 4 claims, adjoining the Anaconda Divide on N. E., 3 miles N. W. of Gold mountain.

Development: sinking was to be started in 1919. A prospect on outskirts of district.

BROUGHER DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: H. C. Brougher, pres.; George Wingfield, v. p.; with G. A. Kernick, James Grimes and Gust Hanson (supt.), directors. E. J. Erickson, sec.-treas.

Inc. March 16, 1918, in Nevada. **Cap.,** $1,000,000; $1 par, 851,508 outstanding, assessable. Listed on San Francisco Stock Exchange. Annual meeting, first Monday in April.

Property: 7 claims, 72 acres, lying immediately north of the Tonopah Divide and southwest of the Divide Extension.

Development: in July, 1918, a vein 70′ wide was crosscut on 200′ (or 177) level. The vein on this level showed no ore, although the drifts were over 500′ long in December. The southeast drift of the 500′ level, 225′ long, cut several rich stringers, and according to reports in the daily papers, a large body of milling ore was cut assaying $24 per ton for a good distance, though the values are spotty. A raise 75′ up, was stopped as the values faded out. Efforts were made to locate the Divide Extension vein by trenching, and a fissure was found.

Equipment: electric hoist, compressor, drills, etc.

Property is rated by engineers as having good chances, but energetic development and abundant funds have failed to find a payable orebody at present depth.

BUCKSKIN DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Inc. 1919, in Nevada. **Cap.,** $150,000; par 10c.

Property: 2 claims south of the Pershing and west of the Bullion Divide.

BULLION DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. Harry Price, res. agt.

Officers: W. F. Reading, pres.; S. A. Kimmel, v. p.; G. M. Reading, sec.-treas., with G. A. Bartlett, J. P. Bell, Roger Dougherty, directors.

Inc. March, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par. Listed on Boston Curb.

Property: Wonder group, 4 claims, 70 acres, south of the Pershing and north of the Albany and Congress. Surface exposure of fissure veins are reported to be well mineralized and a 250′ shaft is to be sunk with levels at 100 and 200′. A prospect of no especial merit.

BUTLER DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. C. L. Lisle, res. agt.

Officers: A. I. D'Arcy, pres.; J. K. Turner, v. p.; C. L. Lisle, sec.-treas., with Branch Smith, L. L. Dellinger, and C. A. Calhoun, directors.

Inc. April, 1919, in Nevada. **Cap.,** $15,000; shares, 1c par.

Property: the Woodbutcher claims, 40 acres, between the Rosetta and Operator mines. Reported to show a number of quartz "blow-outs" on the ground, and that the rhyolite-breccia, the ore-bearing formation, will be reached at shallow depth. A prospect.

BUTTE DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: W. F. Reading, pres.; S. A. Kimmel, v. p.; G. M. Reading, sec.-treas. and supt., with F. G. Corde and F. R. Lewis, directors.

Inc. April 24, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c. par. Listed on San Francisco Stock Exchange.

Property: 2 fractional claims. between the Belcher Divide and Revert. **Development:** a shaft 150′ deep in August, 1919, cut 5′ of $25.00 ore. Vein has a N. W.-S. E. strike. Shipments contemplated. A prospect.

CALIFORNIA DIVIDE MINING CO. **NEVADA**

Address: W. V. Richardson, Tonopah, Nev.

Officers: T. L. Oddie, pres.; A. E. Kane, v. p.; W. V. Richardson, sec.-treas., with H. H. Brown and William Cochran, directors. Roy Hardy, supt.

Inc. April, 1919 in Nevada. **Cap.,** $150,000; par 10c; issued 300,000 out of 750,000 treasury stock.

Property: 100 acres south of the Toggery and west of the Operator. Had $30,000 cash in treasury, July 1, and is well equipped for sinking to 600′ level.

CALUMET DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: C. R. Evans, pres.; W. S. Norris, v. p.; G. W. Allen, sec.-treas., with E. W. Smith, F. T. Miller and M. M. Detch, directors.

Inc. March 6, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par. Listed on San Francisco Stock Exchange.

Property: 4 claims adjoining Gold Seam, 2½ miles southeast of Gold mountain, between the Congress and Eureka on north and south.

Development: sinking shaft in May, 1919.

Equipment: electric plant with compressor (shared with Liberty company) and drills.

CAMP BIRD DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev. H. B. Ruhl, agt.

Officers: H. B. Ruhl, pres.; J. W. Morris, v. p.; B. E. Garnett, sec.-treas., with W. E. Hill and W. B. Morris, directors.

Inc. in Nevada. **Cap.,** $150.000; shares 10c par.

No information received as to property owned by company.

CAPITAL DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: W. J. Tobin, pres.; J. K. Turner, v. p. and cons. eng.; H. J. Coogan, sec.-treas., with P. C. Fisher and J. B. Kendall, directors.

Inc. May, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par, assessable.

Property: Opulense group, 3 claims and 2 fractions, bounded by the Policeman on N. W. and Romance on S. Is an undeveloped prospect of merit.

CENTRAL DIVIDE MINING CO. **NEVADA**

Address: Box 787, Reno, Nev.

Officers: A. A. Codd, pres., H. H. Bruce, v. p. and cons. eng.; R. H. Bates, sec.-treas., with Al. Modeen, directors. H. W. McLime, supt.

Inc. April 2, 1919, in Nevada. **Cap.,** 1,500,000 shares, 10c par.

Property: 4 claims, 80 acres, nearly a mile southeast of Gold mountain, called Central "because of the relation of its group of 4 claims to the geographical and geological center of the famous Divide mining district."

Development: a N. S. and E. W. vein opened near the surface, showed vein assaying from $2 to $8. A compartment shaft on the intersection of the veins started April, 1919, cut ore with low silver values.

Equipment: hoist, 2-drill compressor, etc.

CHAMPION DIVIDE MINING CO. **NEVADA**

Address: Goldfield, Nev. B. E. Garnett, agt.

Officers: F. C. Beedle, pres.; H. B. Ruhl, v. p.; B. E. Garnett, sec.-treas.; with Albert Minnis and F. B. Grube, directors.

Inc. in Nevada. **Cap.,** $150,000; shares, 10c par.

Property: 6 claims adjoin the Liberty, Marne and Pershing groups. A prospect with several good shear zones on the claims.

CHARTER DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Inc. 1919, in Nevada. **Cap.,** $150,000, 10c par.

Property: a group of claims, reported by Elftman to show usual surface conditions and to be on direct extension of several veins.

CHARIOT DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: Wm. Watters, pres.; Zeb. Kendall, v. p.; R. A. Rives, sec.-treas., with A. E. Kane and C. T. Stevens, directors.

Inc. March 18, 1919, in Nevada. **Cap.,** 1,500,000 shares 10c par, assessable. Listed on San Francisco Stock Exchange.

Property: 6 claims, adjoining the Ben Hur on N. E., about 2 miles S. E. of Gold mountain.

Development: reported sinking in July, 1919. **Equipment:** hoist, compressor, etc. A prospect.

CLARKE DIVIDE MINING CO. **NEVADA**

Address and transfer office: Tonopah, Nev.

Officers: Dr. Roy W. Marten, pres.; Las Vegas, Nev.; Chas. R. Topping, v. p., San Francisco; C. P. Campbell, sec.-treas., Los Angeles; with Thos. L. Clark and Clarence L. Putnam, directors.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; par 10c; 750,000 shares in treasury.

Property: 7 claims, about 120 acres in S. Klondike section of Divide. Company financed and sinking shaft.

CLINTON DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Officers: C. W. Slack, pres.; F. H. Norcross, v. p.; I. Havens, sec.; Edward Strauss, treas., with F. S. Strauss, C. A. Clinton, J. P. Stinson and G. A. Bartlett, directors.

Inc. 1919, in Nevada. **Cap.,** $150,000; shares, 10c. par.

Property: Rex group, 5 claims, 2 miles northwest of Gold mountain, and north of the Sioux Divide.

COALITION DIVIDE MINES & DEVELOPMENT CO. **NEVADA**

Office: J. G. Brown, agt., Tonopah, Nev.

Officers: G. W. Warmoth, pres.; R. I. Pierson, v. p.; Robert McSherry, sec.-treas., with G. D. Olson, J. W. Kraner, E. J. Hoak and J. E. Post, directors.

Inc. in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 6 claims, the Burropah group, near the Rosetta; also an old mine, 2 claims in Sante Fe district, near Luning, Mineral county, Nev. Has ore.

COLUMBIA DIVIDE MINING CO. **NEVADA**

Office: H. D. King, agt., Tonopah, Nev.

Officers: H. R. Grier, pres.; H. H. Atkinson, v. p.; H. D. King, sec.-treas., with A. I. D'Arcy and H. E. Clark, directors. R. Wilson, supt.

Inc. April, 1919, in Nevada. **Cap.,** $550,000; shares 10c par.

Property: the Giant King group, 3 claims adjoining Western Divide on N., and Hull City on S., a mile S. W. of Gold mountain. In December the Estaleah-Cerbat Silver M. Co.'s property in Mohave county, Arizona, was taken over.

Development: a shaft to be sunk 215′ with crosscuts and level at 100′ and 200′. A prospect.

COMBINATION DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: W. S. Phillips, pres.; G. A. Nelson and D. Patterson, v. p.; H. W. Nelson, sec.; also directors. J. A. Patterson, supt.

Inc. 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c. par;

Property: 3 claims, 2 miles N. W. of Gold mountain, bounded on north and northeast by the Pyramid and Sunbeam.

Development: a shaft sunk in typical Divide breccia, with yellow jaspery quartz assaying up to $10.20 per ton at 30′ depth.

Equipment: hoist, compressor, and drills were to be installed in 1919. A fair prospect.

COMSTOCK DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Officers: W. J. Douglass, pres.; W. H. Simmons, v. p.; E. Gregory, sec.-treas.; Jas. Boyd, Wm. Watters, directors.

Inc. April, 1919, in Nevada. **Cap.**, $150,000; par 10c.

Property: the Jim claim and 2 fractions adjoining Wild Horse group, Mizpah, and Rand Divide, a mile N. E. of Gold mountain. Surface prospecting has shown shear zones.

CONFIDENCE DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Inc. 1919, in Nevada. **Cap.**, $150,000; par 10c.

Property: a tract of undeveloped ground, 2 claims, adjoining the Sutherland on south, and capped by wash. A raw prospect, but well located.

CONGRESS DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: C. A. Gray, pres.; G. A. Bartlett, v. p.; H. J. Bartlett, sec.-treas., with Zeb Kendall, Roger Dougherty, directors.

Inc. March, 1919, in Nevada. **Cap.**, 1,500,000 shares; 10c par. Transfer office, 419 Crocker Bldg., San Francisco, Cal.

Property: 3 claims, north of Calumet and west of Albany and Bullion. Examined by A. H. Elftman.

Development: by shaft and levels at 100′ and 150′.

CONTINENTAL DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: U. W. Harwood, pres.; F. J. Reilly, sec.-treas.; wtih M. A. Mears, directors.

Inc. June, 1919, in Nevada. **Cap.**, $150,000; shares 10c. par.

Property: 5 claims adjoining the Hull city and Cheyenne. A prospect.

CORNUCOPIA DIVIDE MINING CO. **NEVADA.**

Address: R. M. Henningsen, Tonopah, Nev.

Officers: R. M. Henningsen, pres.; C. E. Butler, v. p.; John Davidson, sec.; William Bercovitch, treas., with J. C. Downey and B. Balliett, directors.

Inc. May, 1919, in Nevada. **Cap.**, $150,000; par 10c.

Property: 4 claims, 2 miles N. E. of the Tonopah Divide mine. Two well-defined veins traverse the ground, samples returning up to $5.80 per ton.

Development: was to be started in July, 1919. A raw prospect.

CRESSON DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: C. S. Sprague, pres.; J. K. Turner, v. p.; Ben Gill, sec.-treas.; with C. A. Leager and L. L. Dellinger, directors.

Inc. April, 1919, in Nevada. **Cap.**, $150,000; shares, 10c par; 750,000 treasury.

Property: Ideal claims adjoining Reno and Jim's Divide, and 2 fractions 1,500′ S. of S. W. corner of Tonopah Divide. An undeveloped prospect, but well located.

CROESUS DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Property: an undeveloped tract 3,000′ E. of Tonopah Divide, and adjoining the High Divide on the west. A prospect.

CROWN CHARTER DIVIDE MINING CO. **NEVADA**

Address: F. C. Beedle, Goldfield, Nev.

Property deeded to Crown Divide Mining Co., which see.

CROWN DIVIDE MINING CO. **NEVADA**

Formerly Crown Charter Divide M. Co.

Office: Goldfield, Nev.

Officers: F. C. Beedle, pres.; H. B. Ruhl, v. p.; B. E. Garnett, sec.-treas., with T. F. Potthoff and A. Ninnis, directors.

Inc. 1919, in Nevada. **Cap.**, $150,000; 10c par.

Property: 6 claims, 115 acres, adjoining the Mohawk and Belcher on N. W. and N. E., respectively, and 3,000′ N. W. of the Tonopah Divide. Examined by J. K. Turner.

Development: ground contains two well-defined and mineralized veins. The main vein is considered to correspond with the course of the "silver" vein of the Tonopah Divide. Workings consisted of a 30′ shaft, and 90′ of other openings. The previous owner states that he shipped some ore that assayed $34 gold and 126 oz. silver per ton. Shaft sunk 100′ during 1919.

Equipment: gasoline hoists, tools, etc., purchased from companies at Belleville and Candelaria, in Nevada.

CUMBERLAND DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: T. L. Oddie, pres.; A. E. Kane, v. p.; Warren Richardson, sec.-treas., with D. T. and P. J. Donovan, directors.

Inc. 1919, in Nevada.

Property: 4 Keystone claims, 50 acres next to the Sutherland and N. of the High Divide Annex.

Development: sinking started in June, 1919. **Equipment:** electric hoist, etc.

DANDY DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

No information obtainable as to holdings, etc.

DESERT KLONDYKE MINING CO. **NEVADA**

Address and transfer office: Tonopah, Nev.

Officers: R. H. Tune, pres.; W. Lucot, v. p.; C. N. Miller, sec.-treas.; with A. F. Price and Gerald B. Hartley, directors.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; par 10c.

Property: Annex and Annex No. 1 claims in Klondike section of Divide district, 6 miles south of Gold mountain.

DETROIT DIVIDE MINING CO. **NEVADA**

Address: care J. B. Evans, Tonopah, Nev.

Property: 6 claims at Divide, 2¾ miles due west of Gold mountain, and also the Carbonate silver-copper mine in the Providence range, near the California-Nevada line, and 3 miles from the Salt Lake Route. A large vein has been opened, showing 3′ of $75 silver and $15 copper ore. Development is by tunnel, and a compressor plant was at work in December, 1919. Examined by J. K. Turner, 1919.

DIVIDE ANNEX MINING CO. **NEVADA**

Office: 415 National Bank Bldg., Tonopah, Nev.

Officers: M. R. Averill pres.; W. J. Douglass and F. W. Taylor, v. p's.; E. J. Ramsey, sec.; M. E. Hill, treas., with I. Tasem, directors. Ralph Wardle, supt.

Inc. January 31, 1919, in Nevada. **Cap.,** 1,000,000 shares; 10c par. Listed on San Francisco Stock Exchange.

Property: 2 claims, directly adjoining the Tonopah Divide at northeast corner. The ground is well located on the middle of East Divide veinzone. Sinking under way in 1919, and machinery erected, sufficient for depth of 750′.

DIVIDE BOY MINING CO. **NEVADA**

Address: Tonopah, Nev.

Unable to locate officers or holdings, etc.

DIVIDE CHARTER MINING CO. **NEVADA**

Office: Tonopah, Nev. H. H. Brown, res. agt.

Officers: J. E. Adams, pres.; J. H. Miller, v. p.; Allen Rives, sec.-treas., with Zeb Kendall, H. H. Brown, and F. M. Manson directors.

Inc. March, 1919, in Nevada. **Cap.,** 1,500,000 shares; 20c. par, assessable; 750,000 outstanding.

Property: 5 claims, 100 acres, S. of the Kendall and N. of Bonanza group. Samples from outcrops assay up to $10 per ton. Examined by J. B. Higgins.

DIVIDE CITY MINING CO. **NEVADA**

Office: F. Pittman, agent, Tonopah, Nev.

Officers: J. H. Miller, pres.; Zeb. Kendall, v. p.; Allen Rives, sec.-treas.; George Wingfield, J. E. Adams, F. M. Manson, directors.

Inc. March 10, 1919, in Nevada. **Cap.**, 1,500,000 shares; 10c. par, assessable. Listed on San Francisco Stock Exchange. Company said to be well financed.

Property: 6 claims and 2 fractions north of Tonopah Divide ground.

Development: cross fissures are being prospected. A shaft was down 140′ July, 1919.

DIVIDE CITY TOWNSITE CO. **NEVADA**

Office: Tonopah, Nev.

Officers: Wm. Watters, pres.; J. H. Miller, v. p.; J. E. Adams, sec. treas.; Allen Rives, asst. sec.-treas., with W. J. Douglass and Zeb Kendall, directors.

Inc. March 10, 1919, in Nevada. **Cap.**, 350,000 shares; $1 par; 100,000 pfd. non-assessable, and 250,000 com. assessable.

Property: company is not a mining concern, but owns surface rights for townsite purposes on ground of the Divide City Mining, a portion of the Dividend, Horseshoe, and neighboring properties.

DIVIDE CONSOLIDATED MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. H. Miller, pres.; F. W. Manson, v. p.; J. E. Adams, sec.-treas., with William Watters, Richard Finn (supt.), directors. A. H. Elftman, cons. engr.

Inc. May 28, 1918, in Nevada. **Cap.**, 1,500,000 shares; 10c. par; assessable, 750,000 outstanding. Listed on San Francisco Stock Exchange.

Property: the Empire group, 8 claims, 2,000′ due N. of the Tonopah Divide, and just N. of the Tonopah Mining Co.'s ground. Reported that two of the master veins of the district cross the ground, while four cross-veins opened in adjoining ground undoubtedly persist into the Empire tract. Parts of the veins are well mineralized, and yield good assays, which indicates that pay-shoots should be found in the underlying breccia.

Development: at a depth of 180′, the shaft of the Divide Consolidated was in the typical ore-bearing material of the district, a silicified highly-oxidized rhyolite-breccia, and samples ranged from $9 to $48 per ton. The crosscuts from the shaft on the 200′ level cut 4 veins, with values, but not in payable quantity. The ground breaks and stands well; little or no timbering being needed, and a 6′ round in lateral work is not unusual.

Equipment: 50-h. p. electric hoist, 8 drill compressor, etc., one of the best plants in the district. Is a promising prospect.

DIVIDE CONTACT MINING CO. **NEVADA**

Address: Tonopah, Nev.

Inc. 1919 in Nevada.

Property: a group of 4 claims, on outskirts of district and over 3 miles southeast of Gold mountain. A prospect.

DIVIDE EXTENSION MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: Zeb. Kendall, pres.; F. K. Pittman, v. p.; B. A. Rives, sec.-treas., with J. H. Miller and C. R. Stevenson, directors. Edward J. Bevis, supt.; Andrew Walz, cons. eng. in charge.

Inc. February 21, 1918, in Nevada. **Cap.**, 1,000,000 shares; 10c par, 800,000 issued. Listed on San Francisco Stock Exchange. New York Trust Co., registrar.

Property: 1 claim, directly N. of central part of the Tonopah Divide. Examined in July, 1919, by Andrew Walz, for Hayden, Stone & Co., who bought 40,000 shares. Vein strikes N. 20° E., and is in rhyolite-breccia.

In January, 1920 company acquired an option on the May Day prospect, situated at the summit near the Luning-Rawhide road.

Development: seams of rich ore were exposed in surface prospecting in May, 1919, on the property, 600′ north of the main shaft. An assessment hole had been dug at this point by "Jimmy" Grimes, a pioneer prospector and

claim-owner of the district, who had abandoned this ground. A shot in the bottom of this hole exposed ore stringers and the superintendent sank a prospect shaft, now known as the Caldwell, using a windlass. Rich seams were found in the course of sinking, and at a depth of 45′ laterals were started northwest and southeast, cross-cutting a wide fracture zone, with a trend that is N. 22° E. Well-defined walls were found 55′ apart, with a S. E. dip, and drifts advanced N. E. on both walls, have continued in high-grade ore, the foot-wall drift having exposed faces continuously sampling from $150 to $320 per ton, and the hanging-wall drift ranging from $20 to $150. The ore between is said to average over $25 per ton and the waste-dump, taken from the shaft and cross-cuts, is of shipping grade. This shaft was timbered, hoisting equipment erected, and was 200′ deep in October. In a winze below this level the value persists 2′ breaking $75 per ton. Drifts at 45, and 100′ depths are out 130′ in ore worth $70 and stringers were reported cut on 200′ level. Surface trenching exposed the vein farther north and near the Dividend side-line, where high assays are obtained from these trenches. The main Kendall shaft is 400′ deep, and a drift will be driven, following the northwest vein, to reach the north vein.

The Kendall shaft is well placed for deep development of the rich ore found in the Caldwell shaft, as the vein dips out of the latter at an angle of 38°.

Development on the 200′ level of the Caldwell was at first along a fault zone, and drifting showed non-commercial values; an extension of the crosscut encountered the vein exactly where the dip would bring it, and in January, 1920, the face showed 6½ feet of 224 oz. ore, with 4″ of $2,000 ore. Later work has shown that the vein is bunchy, and that greater depth is needed to reach a more uniform mineralization.

Equipment: electric hoist, compressor, etc.

Production: 20 tons daily in August, 1919.

Shares in this company rose rapidly to nearly $3 when the rich ore was found, advancing in August to about $4. An unofficial estimate of ore available was $200,000 net, equal to 25 cents per share.

DIVIDE FRACTION MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: M. J. Sullivan, pres.; G. A. Cole, v. p.; H. J. Coogan, sec.-treas., with H. C. Heidtman and F. J. De Lonchamps, directors.

Inc. April, 1919, in Nevada. **Cap.,** 1,500,000; 10c par, non-assessable.

Property: 5 fractional claims, adjoining the Toggery and Operator groups. A prospect.

DIVIDE GOLD DYKE MINING CO. **NEVADA**

Office: 206 Clay Peters Bldg., Reno, Nev.

Officers: R. M. Preston, pres.; Charles Kielhofer, v. p.; A. Murtaugh, sec.-treas., with C. F. Stevens and C. W. Skene, directors.

Inc. in Nevada, 1919. **Cap.,** $150,000, 10c par.

Property: 4 claims E. of the Gold Wedge, and 2½ miles S. E. of Gold mountain.

Development: shaft sinking started in May, 1919. A prospect.

DIVIDE LEADER MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: F. E. Baker, pres.; H. E. Loufek, v. p.; V. M. Place, sec.-treas.

Inc. in Nevada. **Cap.,** $150,000; shares, 10c par.

Property: two groups, one 2¼ miles E. and the other, 2 miles S. of Gold mountain. Surface shows well defined veins.

DIVIDE SYNDICATE MINING CO. **NEVADA**

Office: Russ Bldg., San Francisco, Cal.

Officers: W. A. Sherman, pres.; Charles Kielhofer, v. p.; F. H. Lathrop, sec.-treas., with William Lichtenberg (supt), A. A. Heer, directors.

Inc. March 8, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c. par; as-

sessable. Listed on San Francisco and Los Angeles Stock Exchanges. Transfers made in Company's office.

Property: 3 claims, 55 acres, adjoining the Rosetta on the northwest. Tract has several veins on it and is favorably regarded by engineers.

Development: sinking in 1919, and by October shaft was down 100'.

Equipment: sufficient for prospecting.

DIXIE DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: C. S. Sprague, pres.; C. A. Leager, v. p.; Ben Gill, sec.-treas.; with J. K. Turner and B. W. Ward (supt), directors.

Inc. March, 1919, in Nevada. **Cap.,** $150,000; shares, 10c par; 750,000 in treasury; 200,000 issued.

Property: 3 claims and fraction, 50 acres W. of Portland 2½ miles southwest of Gold mountain, also claims in the southeast, bounded by Liberty, Champion, and Bullion. A prospect.

DOCTOR DIVIDE MINING CO. **NEVADA**

Office: A. K. Warner, res. agt., Tonopah, Nev.

Officers: T. J. O'Donnel, pres.; T. W. Graham, v. p.; G. N. Bachman, sec.-treas.; Chas. Small, A. H. Warner (manager), directors.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; par 10c; 750,000 treasury shares; 100,000 issued.

Property: the Doctor group, 4 claims and fraction adjoining Emacipator on south. Also holds and worked a lease on the Toggery Divide ground.

DOUGHBOY DIVIDE MINING CO. **NEVADA**

Inc. 1919, in Nevada.

Owns a group of 5 claims adjoining Treadwell on S. and 1½ miles E. of Gold mountain.

DOUGLASS DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: N. K.Cooper, pres,; F. B. Caldwell, sec.-treas.

Property: 3 Keystone claims. adjoining Mohawk, Northwest, and North properties.

Development: shaft sinking was started 1919. A prospect.

DUPLEX DIVIDE MINING CO. **NEVADA**

Office: Room 1, Journal Bldg., Reno, Nev.

Officers: A. G. Miller, pres.; W. T. McNeil, v. p.; A. LeCuyer, sec.; C. H. Duborg, treas., with Gray Mashburn and H. H. Donogh, directors.

Property: 3 claims, 1⅛ miles N. of Ben Hur, and the 4 Silver State claims. An undeveloped prospect.

DYKE DIVIDE MINING CO. **NEVADA**

Incorporated to raise funds to prospect on group of claims situated 3 miles N. E. of Gold mountain. A raw prospect.

EAST DIVIDE EXTENSION MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. H. Miller, pres.; P. H. O'Neil, v. p.; J. E. Adams, sec.-treas.; Allen Rives, asst. sec.-treas., with R. F. Brown, directors.

Inc. March 22, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par; assessable. Listed on San Francisco Stock Exchange.

Property: 9 claims, south of Allied Divide and north of Big Divide.

Development: machinery was erected and sinking started in July, 1919.

EAST DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: Joseph Mayer, pres.; J. K. Turner, v. p.; Ben Gill, sec.-treas.; with C. S. Sprague and C. A. Leager, directors.

Inc. March 30, 1918, in Nevada. **Cap.,** $150,000; 10c par; 1,200,000 outstanding. Listed on San Francisco Stock Exchange. Transfers at company's office.

Operations for year 1918-19 cost $10,000.

Property: 10 claims, 160 acres N. W. corner of tract 1,000′ from the Tonopah Divide. Examined by Dr. Elftman and J. K. Turner.

Development: by 400′ shaft, which entered lower breccia zone at 290′. At 93′ from the shaft the east cross-cut on the 400′ level cut a vein 26′ wide, whose full width assayed $7 per ton. The south foot-wall drift was in similar material for 100′, and seams of rich sulphide showed occasionally. Where this drift on the vein intersects the main east fissure, below the great blow-out east of the shaft, an orebody is expected.

Equipment: suitable for depth of 1,000′.

ELDORADO DIVIDE MINING CO. **NEVADA**

Office: R. Nenzel, agt., Lovelocks, Nev.

Officers: Rudolph Nenzel, pres.; A. B. Harlan, v. p. C. H. Jones, sec.-treas.; W. E. Sirbeck, V. P. Twigg, directors.

Inc. April, 1919, in Nevada. **Cap.,** $150,000, par 10c., 750,000 treasury shares.

Property: 4 claims adjoining Frisco Divide and near Ajax Divide, 3 miles S. E. of Gold mountain. Is an undeveloped prospect.

ELGIN-BELLEHELEN DIVIDE MINING CO. **NEVADA**

Name changed from Silverfields Ajax Mines Co.

Office: F. A. Burnham, Tonopah, Nev.

Inc. March, 1919, in Nevada. **Cap.,** $150,000; par 10c.

Property: a gold-silver mine at Bellehelen, 30 miles due E. of Tonopah, in which an 18″ streak of rich silver ore was found at depth of 120′ early in 1919. Second-class ore sent to the West End mill at Tonopah assayed $84.34 per ton.

At Divide, company has 3 claims and 3 fractions N. of and adjoining the High Divide Extension, and next to the Wild Horse, Grass Valley, and others, about 5,000′ N. E. of the Tonopah Divide.

ELKTON DIVIDE MINING CO. **NEVADA**

Officers: C. H. Church, pres, Tonopah; E. R. Yerington, v. p.; S. C. Jameson, sec.-treas., with F. T. and C. F. Krebs, Will Brougher, and W. E. Casson, directors.

Property: 2 claims at N. end of Divide district, and 3-year lease on a silver-lead claim 2 miles from Reservation, Mountain View district, Mineral county, Nev. Operations were to have commenced late in 1919.

EMANCIPATOR DIVIDE MINING CO. **NEVADA**

Address: Wm. Forman, res. agt. Tonopah, Nev.

Operated by controlling interests of the Webster Mines Corporation.

Officers: W. J. Webster, of Wilmington, Del., pres.; W. C. Rannels, v. p. and gen. mgr.; L. P. Carpenter, sec.-treas. and cons. engr.

Inc. March, 1919, in Nevada. **Cap.,** $150,000, par 10 cts.; 750,000 treasury shares.

Property: 4 claims, ¾ mile E. of Gold mountain, is reported to show two strong dikes or veins, showing values at surface.

Equipment: complete for shaft sinking, etc.

EUREKA DIVIDE MINING CO. **NEVADA**

Office: William Forman, agent, Tonopah, Nev.

Officers: J. H. Miller, pres.; F. M. Manson, v. p.; J. E. Adams, sec.-treas.; F. B. Baker, G. F. Sloan, directors.

Inc. March 6, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par; assessable. Listed on San Francisco Stock Exchange.

Property: 7 claims, between the Calumet and Airedale, in southeastern part of district.

Development: by 200′ shaft, equipped with hoist and other machinery. Is a prospect which has produced some ore from old shaft, and which shows good vein.

FARRELL-DIVIDE MINING CO. **NEVADA**

Office: 205 Reno National Bank Bldg., Reno, Nev.

Officers: R. C. Harrison, pres.; B. J. Henley, v. p.; F. G. Hobbs, sec.-treas., with B. Sealy and J. R. Farrell, directors.

Inc. in Nevada. **Cap.**, $100,000; shares, 10c par.

Property: 3 claims adjoining the Rosetta, about 1½ miles south of Gold mountain. Machinery erected and shaft sinking was under way in 1919.

FEDERAL DIVIDE MINING CO. **NEVADA**

Organized in Nevada to finance the development of 2 claims west of Lookout Divide, and 2¾ miles N. E. of Gold mountain.

FLORENCE DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: J. H. Miller, pres.; F. M. Manson, v. p.; J. E. Adams, sec.-treas., with Zeb Kendall and B. F. Baker, directors. E. A. Byler, eng.

Inc. February, 1919, in Nevada. **Cap.**, $150,000; 10c par; assessable, 750,000 outstanding. Listed on San Francisco Stock Exchange. Transfers made at company office.

Property: 4 full claims and a fraction between the Sutherland on N. and Smuggler on S. Outcrops on rhyolite mountain E. of road said to have yielded $5 to $8 assays.

Development: sinking was started and machinery erected by June, 1919.

The Florence Divide company in May, 1919, purchased the Witt-Brandon-Taylor-Mechling lease on part of the Red King claim of the Florence Goldfield property at Goldfield. The lease was renewed from January 1, 1920, with additional rights. Ore as rich as any ever taken from the bonanza leases on that property is being sacked for shipment. The richest, assaying $5 per pound, is stored in bank vaults. The second grade ore assays from $500 to $1,500 per ton, while the third class product, worth from $75 to $200 per ton, is shipped without sacking or sorting. At one point the ore is nearly 2′ wide. It is broken with great care, by stripping the bonanza streak. The output for 1919 was 3,140 tons of $85.60 ore. The net smelter return was $217,142, of which 25% was royalty paid to the Florence Goldfield company. The lessees have secured a renewal of lease from the surface to 530′, including the rich stope, also from 530 to 650′ depth.

FORD DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. H. A. Stewart, agt.

Officers: M. J. Sullivan, pres.; H. A. Stewart, sec.; A. G. Raycraft, treas., with G. J. Murphy, directors.

Inc. in Nevada. **Cap.**, $150,000; shares, 10c par.

Property: 4 claims adjoining Treadwell Divide and Rand Divide. A prospect.

FORTUNA DIVIDE MINING CO. **NEVADA**

Address: A. J. Moore, Reno, Nev.

Officers: A. J. Moore, pres.; Frank A. Anderson, v. p.; B. James, sec.-treas., with E. W. Mower, Wayne J. Wilson, directors. Frank Anderson, supt.

Inc. 1919, in Nevada. **Cap.**, $150,000 par; 10c.; 1,100,000 treasury shares.

Property: 25 acres N. W. of Sutherland Divide and 4 miles N. W. of Gold Mountain. Work commenced in July, 1919.

Also owns 5 claims in Churchill county on which 1,000′ of development work has disclosed pay ore.

FRESNO DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Property: a tract of undeveloped ground one mile N. E. of Gold mountain. Is a prospect.

FRISCO DIVIDE MINING CO. **NEVADA**

Office: H. R. Cooke, agent, Tonopah, Nev.

Officers: R. L. Johns, pres.; M. B. Aston, v. p.; B. A. Rives, sec.-treas.; with Zeb Kendall, and J. E. McCreery, directors. Charles Maher, mgr.

Inc. April 24, 1919, in Nevada. **Cap.**, 1,500,000 shares; 10c par; non-assessable. 750,000 shares treasury stock; 147,000 issued. Listed on San Francisco Stock Exchange.

Property: 6 claims, lying N. of the Chariot and Jupiter and 2¾ miles S. E. of Gold Mountain. A. H. Elftman says surface indications are favorable.

Development: sinking contemplated August, 1919. **Equipment:** adequate for prospecting campaign by shaft sinking, etc.

GEM DIVIDE MINING CO. **NEVADA**

Address: E. P. Esser, res. agt., Tonopah, Nev.

Officers: E. T. Krebs, pres.; O. F. Krebs, v. p.; E. P. Esser, sec.

Inc. May, 1919, in Nevada. **Cap.,** $150,000; 10c par; 750,000 in treasury.

Property: 5 claims W. of Portland Divide.

GIANT DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. G. Crumley, pres.; C. E. Oyster, A. E. Kane, v. p's.; C. C. Boak, sec.-treas., with F. K. Pittman, directors. R. A. Hardy, cons. eng.

Inc. March 26, 1919. **Cap.,** $1,500,000; $1 par. Listed on San Francisco Stock Exchange.

Property: 3 claims and 3 fractions, 100 acres, 1¼ miles S. of Gold Mountain, adjoining the Silver and Divide Syndicate on N. W. and S. E.

Development: contract was let in June, 1919, for sinking a shaft, which early in December was in well mineralized breccia, at depth of 436'.

Equipment: complete with 30-h. p. electric hoist, 8"x10", compressor, drills, and camp.

GOLD BANK DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: H. B. Ruhl, pres.; Albert Minnis, v. p.; B. E. Garnett, sec.-treas., with A. B. Garnett and F. C. Beedle, directors.

Inc. 1919 in Nevada. **Cap.,** $150,000; shares, 10c par.

Property: 2 claims and 3 fractions, 80 acres, adjoining the Rosetta, 2 miles south of Gold Mountain, between the Butler and Anchor ground. A prospect.

GOLD BAR DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: H. B. Ruhl, pres.; Albert Ninnis, v. p.; B. E. Garnett, sec.-treas., with A. B. Garnett and T. F. Potthoff, directors.

Inc. in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 5 claims and a fraction E. of Sutherland and 1½ miles slightly E. of N. of Gold Mountain. Is a prospect only.

GOLDEN STAR DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: Harry McNamara, pres.; W. A. Nye, v. p.; H. E. Dugan, sec.-treas., with H. C. Price and Tim Connolly, directors.

Inc. April 21, 1919, in Nevada. **Cap.,** $150,000; shares 10c. par.

Property: 4 claims in Klondike district, about 4½ miles W. of Tonopah Divide.

GOLDFIELD DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: H. D. Budelman, pres.; Clarence Waldner, v. p.; W. V. Richardson, sec.-treas., with J. R. Blair, H. H. Atkinson, directors.

Inc. April 28, 1919, in Nevada. **Cap.,** $150,000; shares, 10c par.

Property: 6 claims in the N. E. part of the district adjoining the Mizpah. Work has been started.

GOLDFIELD MINING & ORE REDUCTION CO. **NEVADA**

Address: Marvin Arnold, mgr., Goldfield,

Property: 7 claims surrounded by the Trilby, Divide Gold Dyke, Gold Wedge, Calumet, and Argonne.

Development: on the Gold Seam group, 7 claims in S. E. part of district, a 200' shaft sunk several years ago showed seams of high-grade ore. Further sinking under way.

Equipment: 25-h. p. hoist, 4-drill compressor, etc.

GOLD REEF DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. L. Ord, pres.; R. G. Williams, v. p. and mgr.; A. H. May,

treas.; E. S. Harrington, sec., with F. A. Lindlof, directors. Jack Humphrey, supt.

Inc. June, 1908, in Nevada. **Cap.**, $1,500,000; $1 par; 1,100,000 issued. Listed on San Francisco Stock Exchange.

Property: 5 claims, south of the Gold Zone and 1,500′ S. of the Tonopah Divide's eastern end, one of the inside properties, originally located 12 years ago. Examined by J. B. Higgins.

Development: by tunnel and 2 shafts. A shaft sunk several years ago opened seams of sulphide ore. A new shaft, started in April, 1919, was 225′ deep in December. This shaft was located on the strike of the Tonopah Divide vein, and is in hard rhyolite containing intrusions of breccia slightly mineralized. Indications were considered to be favorable for cutting the Tonopah Divide ledge at an early date. Good progress reported and cross-cutting started on the bottom level.

Equipment: electric hoist, compressor, drills, pumps, etc.

GOLD RIDGE DIVIDE MINING CO. **NEVADA**

Organized, 1919, to finance development of 3 claims and a fraction in Klondike district on outskirts of the Divide district and about 3½ miles W. of Gold Mountain.

GOLDSMITH DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. F. K. Pittman, res. agt.

Officers: Herman Albert, pres.; J. M. Fenwick, v. p.; Julius Goldsmith, sec.-treas.; A. I. D'Arcy, cons. eng.; Ivan Arnold, asst. sec.

Inc. April, 1919, in Nevada. **Cap.**, $150,000; 10c par; 750,000 in treasury.

Property: the Gypsy claim, located in 1916, about 3¾ miles S. E. of Gold Mountain. Ore of high value is said to exist at surface, from which small shipments were made from tunnel workings.

Development: by old shaft and now sinking a shaft at intersection of two veins, started in June, 1919.

Equipment: 54-h. p. gasoline hoist moved from the North Star at Tonopah.

GOLD TRAIL DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: Harry McNamara, pres.; W. A. Nye, v. p.; H. E. Dugan, sec.-treas., with A. G. Raycraft and H. R. Cooke, directors.

Inc. April 10, 1919, in Nevada. **Cap.**, $150,000; shares 10c par.

Property: 8 claims, 130 acres adjoining South Divide, over 3 miles S. of Gold Mountain. A prospect.

GOLD WEDGE DIVIDE MINING CO. **NEVADA**

Office: 301 Nixon Bldg., Reno, Nev. P. C. Fisher, res. agt.

Officers: W. Forman, pres.; F. H. Norcross, v. p.; E. H. Mead, sec.-treas., with William Woodburn and Whitman Symmes, directors. W. G. Hellier, supt.

Inc. March 30, 1918, in Nevada. **Cap.**, $150,000; 10c par; 850,000 issued. Listed on San Francisco Stock Exchange.

Property: 4 claims, about 2¾ miles slightly S. E. of Gold Mountain, covering a big fault fissure.

Development: in April, 1918, a 12′ vein giving fair assays, was opened on surface. A shaft was started, and in August, 1919, the bottom was in breccia, assaying up to $4 per ton, which has improved slightly with further depth. A crosscut at 250′ was being driven in breccia in December, and a 4″ stringer assayed $400 per ton.

Equipment: includes 35-h. p. hoist, compressor, drills, etc.

GOLD WEDGE HOMESTAKE MINING CO. **NEVADA**

Controlled by Tonopah Mining Co. of Nevada.

Office: care C. W. Taylor, pres.; Tonopah, Nev.

Inc. 1918, in Nevada. **Cap.**, $150,000; 10c par; 750,000 outstanding.

Property: 5 claims, in S. E. part of district, between the Gold Wedge and Rosetta. Located during 1902.

Development: a 110′ shaft, sunk in 1902 on a gold vein, and 7 shafts,

from 35 to 60′ deep, sunk by lessees. Work was resumed in May, 1919, and in July the formation was reported to be encouraging.

GOLD ZONE DIVIDE MINING CO. **NEVADA**

Office: 416 State Bank Bldg., Tonopah, Nev.

Officers: C. C. Winget, pres.; Wm. Forman, v. p.; F. A. Burnham, sec.-treas. and mgr., with F. K. Pittman, F. Sommer Schmidt, directors. Frank Helm, supt.

Inc. Feb. 21, 1918, in Nevada. **Cap.,** $150,000; 10c par; 1,499,500 issued, assessable. Annual meeting, first Tuesday in March. Six assessments levied to Sept. 6, 1919.

Is a reorganization of the Tonopah Gold Zone Mining Co., whose shares were exchanged, share for share, into stock of Gold Zone Divide Mining Co.

Property: 9 claims adjoining Tonopah Divide mine on S., and first worked in 1901.

Development: by 520′ shaft with collar 250′ lower than that of Tonopah Divide shaft, and 1,600′ underground workings. On the 500′ level, drifts extend to Divide company's boundary and west on vein for 200′. Conditions all indicate that greater depth is needed to get commercial ore, though stringers carry gold and silver, in places up to $385 per ton. A short drift on vein inside of Tonopah Divide boundary showed vein to carry an ore stringer of high value, though not in commercial amount. Shaft sinking will be continued to 800′, as a 100′ winze sunk from the 500′ is said to have cut 6′ of shipping ore, confirming the belief that faulting had dropped the enriched horizon, several hundred feet.

Equipment: 25-h. p. gasoline engine, hoist, 3-drill compressor, blower, jackhammers, houses, etc.

Good location and management.

GREAT DANE MINING CO. **NEVADA**

Address: Tonopah, Nev. H. C. Stimler, agt.

Officers: C. L. Putnam, pres.; L. S. McConnell, v. p.; A. C. Kearns, sec.-treas., with H. W. Albert, H. C. Stimler, and L. W. Horton, directors.

Inc. May, 1919, in Nevada. **Cap.,** $150,000; par 10c; 750,000 shares treasury stock.

Property: 2 claims and fraction, 55 acres, south of the Reno, adjoining the Toggery on W. and 4,000′ S. of the Tonopah Divide. Has 3 distinct veins, with 3 prospect shafts. The vein system of Toggery goes through the tract.

GREAT DIVIDE MINING CO. **NEVADA**

Is a development proposition organized to finance a promising tract S. of Jim's Divide and a mile S. of the Tonopah Divide.

GREAT WESTERN DIVIDE MINING CO. **NEVADA**

Inc., 1919, in Nevada.

No information as to holdings, etc., obtainable.

GRIMES DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. L. Joseph, pres.; J. G. Crumley, v. p.; E. J. Erickson, sec.-treas., with George Wingfield, H. C. Brougher, J. W. Sherwin and J. H. Miller, directors. A. I. D'Arcy, con. eng.

Inc. March 20, 1919, in Nevada. **Cap.,** $150,000; 10c par; assessable. All issued. Listed on San Francisco Stock Exchange. Transfers at company office. Had $56,278 cash in treasury July 1, 1919.

Property: 5 claims, 100 acres, adjoining the Tonopah Divide on southwest side. Originally located 14 years ago and has produced some shipping ore.

Development: a 350′ tunnel was driven prior to sinking new shaft in 1919. **Equipment:** complete includes electric hoist, etc. Is a promising prospect.

HARMILL DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: G. B. Hartley, pres.; Floyd Cable, v. p.; M. B. Hartley, sec.-treas., with W. D. Miller, directors.

Inc. April 1, 1919, in Nevada. **Cap.,** $150,000; 10c par; assessable. Listed on San Francisco Stock Exchange.

Property: Chimney and Nieta claims, 14 acres, the south end adjoining east end of Tonopah Divide.

Development: by a shaft which cut a fracture-zone containing seams of ore assaying $6 per ton at depth of 50′. Development now underway through the 265′ Divide Annex shaft.

HASBROUCK COMSTOCK DIVIDE MINING CO. **NEVADA**

Inc. 1919, in Nevada.

Property: 160 acres adjoining Hasbrouck, Revert and Mecca Divide on west.

HASBROUCK DIVIDE ANNEX MINING CO. **NEVADA**

Office: 421 Clay Peters Bldg., Reno, Nev.

Officers: G. A. Kernick, pres.; A. A. Busey, v. p.; A. A. Codd, sec.-treas., with H. F. Bruce (supt.), and A. H. Butler, Jr., directors.

Inc. May, 1919, in Nevada. **Cap.,** $150,000; 10c par; assessable; 750,000 treasury shares; 815,000 shares issued.

On December 31, 1919, company had $77,000 cash available for working its mine, and the Hasbrouck Divide and Kernick.

Property: Nonpareil 3 and 4 claims, adjoining Tonopah Hasbrouck and Western Divide.

A 300′ tunnel is expected to cut the vein 200′ vertically below the outcrop.

HASBROUCK DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: J. W. Dunfee, pres.; J. E. Ewing, v. p.; E. Marks, treas.; Clyde Cannan, sec. T. Connolly, mgr.; A. H. Elftman, cons. eng.

Inc. March, 1919, in Nevada. **Cap.,** $200,000; par 10c; 1,000,000 in treasury; 150,000 issued.

Property: 8 claims, 1 mile due W. of the Tonopah Divide, and adjoining the Tonopah Hasbrouck.

Development: 100′ shaft with crosscuts and drifts on Hasbrouck vein.

Equipment: complete for 500′ depth with electric hoist, compressor, etc.

HASBROUCK COMSTOCK DIVIDE MINING CO. **NEVADA**

Organized, 1919, to finance development of a group of 8 claims lying west of the Hasbrouck Extension and north of Hasbrouck Divide.

HASBROUCK EXTENSION MINING CO. **NEVADA**

Company, as yet, incomplete, but owns a group of 4 claims adjoining the Tonopah Hasbrouck and Hasbrouck Divide on the south.

HASBROUCK MINE **NEVADA**

Formerly owned by the Hasbrouck Mining Co., but abandoned after doing considerable work and bought at Sheriff's sale by Geo. Kernick, of Tonopah, who organized Tonopah Hasbrouck Mining Co., which see.

HECLA DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: G. W. Allen, pres.; E. R. Evans, treas.; H. C. Price, sec., with John Barrier, Wm. Forman and John Shepard, directors. A. H. Elftman, cons. eng.; Hugh Boyle, supt.

Inc. in Nevada. **Cap.,** 1,500,000 shares; 10c par; 750,000 treasury shares.

Property: 60 acres S. of Albany Divide and 2¾ miles S. W. of Gold Mountain. Diamond-drilling was commenced in October, 1919, and by November the drill at 200′ vertical was reported to have cut formation assaying $54.30 per ton in gold.

This is one of the Allen chain of promotions which snared the members of the Boston Curb, who sold short and led to action in the courts, by, for and against John E. Allen.

HELEN FRACTION DIVIDE MINING CO. **NEVADA**

Owns a group of claims situated about 1¾ miles S. of Gold Mountain.

HENNESSY DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: W. A. Bradley, pres.; E. R. Bennett, v. p.; A. G. Raycraft, sec.-treas., with F. H. Bruce and Agnes Cordingly, directors.

Inc. Feb. 25, 1919, in Nevada. **Cap.,** 1,000,000 shares; 10c par; increased to 1,500,000 in June; non-assessable; all issued. Listed on San Francisco Stock Exchange.

Property: 3 claims E. of the Alto and Harmill, and 800′ E. of the Tonopah Divide.

Development: by 250′ shaft, which cut 4′ of $18 ore, also a 4″ streak high in silver.

Equipment: 15-h. p. electric hoist, 3-drill compressor, drills, etc.

HERCULES DIVIDE MINING CO. **NEVADA**

Office: E. J. Erickson, res. agt., Tonopah, Nev. J. W. Hutchinson, manager.

Officers: J. G. Crumley, pres.; A. E. Kane, v. p.; E. J. Erickson, sec.-treas., with George Wingfield and H. C. Brougher, directors.

Inc. April 10, 1919, in Nevada. **Cap.,** $150,000 shares; 10c par; 750,000 in treasury. Listed on San Francisco Stock Exchange.

Property: 4 claims, between the Anchor and Argonne, and S. of the Rosetta.

Development: shaft down 280′ in December, 1919, and silicified breccia worth $20 per ton reported cut. Has 30 h. p. hoist, compressor, and other machinery.

HIGH DIVIDE ANNEX MINING CO. **NEVADA**

Inc. in Nevada. **Cap.,** 1,000,000 shares; 10c par; 500,000 issued.

Property: 5 claims between the High Divide and Sutherland Divide.

Equipment: suitable plant for sinking, which is under way.

HIGH DIVIDE EXTENSION CO. **NEVADA**

Address: 1131 Hearst Bldg., San Francisco, Calif., or Tonopah, Nev.

Officers: W. C. Pitt, pres.; Grant Y. Alexander, v. p.; J. R. Whitmire, sec.-treas., with George Woodland and F. T. Martens, directors. E. F. Hall, supt.

Inc. March 10, 1919, in Nevada. **Cap.,** $150,000; 10c par; assessable; 800,000 issued. Listed on San Francisco Stock Exchange.

Property: 6 claims, N. of the High Divide.

Development: sinking main shaft by deepening a 150′ shaft sunk in early days of field, following a seam of ore. Fully equipped.

HIGH DIVIDE MINING CO. **NEVADA**

Address: E. J. Erickson, res. agt., Tonopah, Nev.

Officers: H. C. Brougher, pres.; George Wingfield, v. p.; E. J. Erickson, sec.-treas., with W. J. Douglass and Roger Dougherty, directors. Wm. Watters, supt.

Inc. April 13, 1918, in Nevada. **Cap.,** $150,000; 10c par; 1,250,007 outstanding. Listed on San Francisco Stock Exchange. Annual meeting, first Monday in May. $50,406 in treasury July 1, 1919.

Property: 3 claims, over 200 acres, 1,300′ N. E. of the Tonopah Divide.

Development: sinking 300′ shaft which was 230′ deep in August, 1919. At 25 ft. the rock was highly mineralized.

Equipment: electric hoist and 2-drill compressor.

HOBART DIVIDE MINING CO. **NEVADA**

Inc. under laws of Nevada, 1919.

Property: 4 claims adjoining Rex Divide, nearly 2½ miles E. of Gold Mountain.

HOMESTAKE DIVIDE MINING CO. **NEVADA**

Office: J. C. McKay, res. agt., Tonopah, Nev.

Officers: James C. McKay, pres.; Nick Ableman, v. p.; Ben. D. Luce, sec.-treas., with Ed. C. Smith, G. W. Quigley and B. D. Price, directors. Homer O'Connell, supt.

Inc. March 24, 1919, in Nevada. **Cap.,** $100,000; 10c par. Listed on San Francisco Stock Exchange.

Property: 3 claims, S. of the Sutherland and 1 mile N. of Tonopah Divide.

Development: by a 200′ shaft and adequate machinery erected.

HORSESHOE DIVIDE MINING CO. **NEVADA**

Address: Fr. K. Pitman, res. agt., Tonopah, Nev.

Officers: Forest B. Caldwell, pres.; Zeb. Kendall, v. p.; F. A. Burnham, sec.-treas., with T. D. Cummins and Frank Pittman, directors. Frank Helm, mine supt.

Inc. April 7, 1919, in Nevada. **Cap.**, $150,000; 10c par; assessable. Listed on San Francisco Stock Exchange.

Property: 5 claims, 53 acres, adjoining the Hennessy on north. Two N. W.-S. E. and two cross veins said to run through ground. Machinery erected 1919 and shaft sinking begun.

HUDSON DIVIDE MINING CO. **NEVADA**

Address: Frank T. Dunn, res. agt., Tonopah, Nev.

Officers: Ben. Luce, pres.; Roger Dougherty, v. p.; P. Moonev. sec.

Inc. April, 1919, in Nevada. Cap., $150,000; par 10c; 750,000 shares issued.

Property: 4 claims, one fractional, adjoining Circle and Ben Hur Ex. properties.

HULL CITY DIVIDE MINING CO. **NEVADA**

Office: W. J. Gomm, res. agt., Tonopah, Nev. Herman Dauth, supt.

Officers: L. R. Robins, pres.-mgr.; Herman Dauth, v. p.; W. J. Gomm, sec.-treas., with A. G. Raycraft, Gust Hanson, and T. J. Lynch, directors.

Inc. March 8, 1919, in Nevada. **Cap.**, $100,000 shares; 10c par; 500,000 issued. Listed on San Francisco Stock Exchange.

Property: 9 claims, 2 fractional, S. W. of Reno-Divide. Workings from a shaft sunk in breccia will crosscut ground at 200′ depth.

Equipment: electric hoist, etc.

INDUSTRIAL DIVIDE MINING CO. **NEVADA**

Address: J. C. Thompson, res. agt., Tonopah, Nev.

Officers: W. C. McFarland, pres.; Fred Nielson, v. p.; Albert Erickson, sec.-treas., with L. C. and J. G. Thompson, directors.

Inc. May, 1919, in Nevada. **Cap.**, $150,000; 10c par; 750,000 issued.

Property: the Calico group of 5 claims, 100 acres, adjoining the Rainbow on E. and S. Surface prospects considered good.

INTERNATIONAL DIVIDE MINING CO. **NEVADA**

Address: H. J. McSherry, Tonopah, Nev.

No information received as to officers or holdings.

IRON CROWN DIVIDE MINES CO. **NEVADA**

Office: State Bank & Trust Bldg., Tonopah, Nev.

Officers: "Diamonfield Jack" Davis, pres.; "Happy" John Barrier, v. p.; Robt. W. Craghill, sec.-treas., with W. J. Douglass, Rice Maupin and J. G. Thompson, directors.

Inc May, 1919, in Nevada. **Cap.**, $150,000; 10c par; 750,000 issued.

Property: a group S. W. of Goldsmith Divide, about 3½ miles S. E. of Gold Mountain.

Development: ore was extracted from shallow workings in 1909, but it was too low-grade to ship on acount of the low price of silver. A new shaft is to be sunk to cut the andesite-breccia contact.

JIM'S DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev., and San Francisco, Calif.

Officers: N. K. Cooper, pres.; Chas. Ducheneau, v. p.; E. W. Elliott, sec., with James Grimes and F. B. Mechling (treas.), directors. Charles Kirchen, cons. eng.

Inc. April 10, 1919, in Nevada. **Cap.**, $150,000; 10c par; 750,000 in treasury. Listed on San Francisco Stock Exchange.

Property: 3 claims, between the Cresson, Reno, and Keane, 2,200′ S. of the Tonopah Divide.

Development: ore was shipped years ago from shallow workings. A new shaft 100′ deep is sunk in breccia on a well mineralized N.-S. vein showing values.

Equipment: head-frame, electric hoist, etc.

JUPITER DIVIDE MINING CO. **NEVADA**

Address: R. L. Johns, care P. D. Kahn, 308 Bush St., San Francisco, Calif.

Officers: R. L. Johnson, pres.; M. B. Aston, v. p.; B. A. Rives, sec.-treas., with J. E. McCreary, C. J. Blumenthal, directors. Chas. Maher, supt.

Inc. April, 1919, in Nevada. **Cap.,** 1,500,000 shares; par 10c; 750,000 issued.

Property: 130 acres, adjoining Chariot Divide on S. E., and about 2¾ miles from Gold Mountain. Veins show on claims. Ground has buildings, tools, etc.

KEANE DIVIDE MINING CO. **NEVADA**

Office: M. E. Allier, res. agt., Goldfield, Nev.

Officers: Tom Keane, pres.; Chas. T. Allier, v. p.; Floyd Cable, sec.; E. Marks, treas.

Inc. May, 1919, in Nevada. **Cap.,** 1,500,000 shares; par 10c.; 750,000 issued.

Property: 4 acres west of Jim's Divide and 2,200′ S. W. of Tonopah Was sinking an incline shaft following a 6′ vein, 1919.

KENDALL DIVIDE MINING CO. **NEVADA**

Address: care J. B. Kendall, res. agt., Goldfield, Nev.

Officers: J. B. Kendall, pres.; Del Hammond, v. p.; M. A. Kendall, sec.-treas., with C. A. Hammond, and N. P. and J. Theo. directors.

Inc. April, 1911, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 6 claims, 1,500′ S. E. of Hasbrouck Divide and 4,200′ S. W. of Tonopah Divide.

Development: sinking contemplated and machinery erected in 1919.

KENNETH DIVIDE MINING CO. **NEVADA**

Office: 421 Clay Peters Bldg., Reno, Nev.

Officers: A. A. Codd, pres.; H. F. Bruce, v. p. and cons, engr.; W. H. G. Buck, sec.-treas., with R. H. Bates, and A. A. Busey, directors.

Inc. May, 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 110 acres N. of Mizpah Divide, and 9,000′ N. E. of Gold Mountain.

KERNICK DIVIDE MINING CO. **NEVADA**

Office: care A. A. Codd, Reno, Nev.

Officers: Geo. A. Kernick, pres.; H. C. Brougher, v. p.; A. A. Codd, sec.-treas.; H. F. Bruce, supt., with George Wingfield, directors.

Inc. April 5, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par; assessable; 1,150,000 issued. Listed on San Francisco Stock Exchange.

Company has $42,000 cash and has spent $38,000.

Property: Little Zoe group, 3 claims, adjoining Verdi, Revert and Western groups.

Development: shaft down 300′ in January, 1920; at junction of veins $6 ore was reported cut at depth of 20′.

Equipment: electric hoist, etc.

KEYSTONE DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: R. J. Kelly, pres.; George Schmidt, v. p.; Dr. T. A. Musante, sec.-treas.; Wm. Forman, ass. sec., with Ed. Byrne and F. W. Taylor, directors. Jay A. Carpenter, cons. engr.

Inc. March 2, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par; assessable; 750,000 treasury. Listed on San Francisco Stock Exchange.

Property: 4 claims, S. of the Verdi and 700′ south of W. end of Tonopah Divide.

Development: shaft 250′ deep in December, 1919, and expected to cut

one of the Revert veins at 300′. Crosscut at 250′ was said to be within 20′ of 3 strong veins.

Equipment: 30-h. p. electric hoist, 3-drill compressor, etc.

KICKAPAH DIVIDE MINES CO. **NEVADA**

Office: A. H. Hardy, res. agt., Tonopah, Nev.

Officers: C. A. Clinton, pres.; Owen Dougherty, v. p.; C. J. Young, sec.; A. G. Raycraft, treas.; Cliff Stewart, auditor. R. E. Clapp, cons. eng.

Inc. May, 1919, in Nevada. Cap., $150,000; shares 10c par.

Property: 7 claims E. of Lone mountain, which is 4 miles N. W. of Gold Mountain. Three well defined orebodies are said to exist along the vein, assays from 5′ of ore cut in shaft returning $36.10, $38.30, $46.15, and $46.90 per ton, mostly gold.

Development: 150′ shaft, said to show pay-ore. **Equipment:** complete.

KLONDIKE IMPERIAL DIVIDE MINING CO. **NEVADA**

Office: Care R. W. Tucker, res. agt., Tonopah, Nev.

Officers: Thomas Toner, pres.; Chas. Lee, v. p.; R. W. Tucker, sec.-treas.

Inc. April, 1919, in Nevada. **Cap.,** $200,000; par 10c; 1,000,000 treasury shares.

Property: 6 claims, 2 fractional, adjoining Original Klondike group.

KLONDYKE DIVIDE MINING CO. **NEVADA**

Harry McNamara, Tonopah, Nev., largely interested.

Property: about 3½ miles south in direct line from Tonopah Divide; was located in 1899.

Development: planned deepening original 200′ shaft in 1919.

Production: old records show that 100 cars sent to smelters carried 2 oz. gold and 40 oz. silver per ton; 200 cars worth $234,000 shipped by James Golden, a lessee, from September, 1911, to July, 1913, and 2,000 tons additional, mostly from near surface.

KLONDYKE-PORTLAND MINES CO. **NEVADA**

Goldfield, Nev. **Officers:** Peter Felis, pres.; M. F. Hill, v. p.; J. F. Henry, sec.-treas., with J. B. Witt and Mrs. Helen Rosenthal, directors.

Inc. 1915, in Nevada. **Cap.,** $100,000.

Property: 9 claims in the Klondyke district, near Goldfield, Esmeralda county, Nev., developed by 3 shafts, showing gold-silver-lead ore.

Present management plans development at depth.

KLONDYKE STANDARD DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Property: 2 claims in Klondyke section, 6 miles south of Divide mine.

KNOX DIVIDE MINING CO. **NEVADA**

Office: Hugh Henry Brown, res. agt., Tonopah, Nev. Geo. F. Badgett, supt., Tonopah.

Officers: J. M. Gilfoyle, pres.; P. Mooney, v. p.; M. E. Albert, sec.-treas., with A. G. Raycraft, F. T. Dunn, and Ed. Malley, directors. Controlled by Charles E. Knox, of Montana Tonopah Mines Co.

Inc. March 20, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par; non-assessable; 1,100,000 issued. Listed on San Francisco Stock Exchange. Reported $30,000 cash in treasury July 1st, 1919.

Property: 10 claims, 100 acres, adjoining the High Divide on the north and 3,500′ N. of Gold Mountain. At depth of 10′, a 5′ vein was cut in July, 1919, of which 2′ assayed $41 per ton, and at 30′ the shaft showed 4′ of quartz in breccia. Examined by Roy Hardy.

LEADVILLE DIVIDE MINING CO. **NEVADA**

Office: 421 Clay Peters Bldg., Reno, Nev.

Officers: A. A. Codd, pres.; J. T. Dunn, v. p.; W. H. G. Buck, sec.-treas., with F. M. Manson and J. W. Morris (supt.), directors.

Inc. April 22, 1919, in Nevada. **Cap.,** 1,500,000 shares, 10c par.

Property: 2 Butte claims, at Divide, adjoining Knox Divide, 1 mile north of Gold Mountain. Management expects that Divide Extension orebody, nearly a mile away, will extend through the Leadville.

Also owns the Tohoqua lead-silver mine, sometimes known as the Harnan, at Leadville, Washoe county, Nev., 35 miles north of Gerlach. This has been opened to 400′ and has produced nearly $200,000. Ore-shoot said to be 800′ long and from 12 to 72″ thick. Mill heads run $25.

Development: at Divide, sinking to be started at juncton of two vein systems, when found. At Leadville, Nev., deepening main shaft 200′, eventually to 1,000′.

Equipment: at Leadville, Nev., two 80-h. p. oil engines, compressor, two hoists, machine-drills, 50-ton concentrating plant, and complete camp for 35 men. Mill was re-started in Sept., 1919, and 2 cars of concentrate shipped monthly, worth between $8,000 and $10,000.

See Leadville Mines Co., under Nevada (in general) in this volume.

LE ROY DIVIDE MINING CO. **NEVADA**

No record of officers or holdings obtainable.

LIBERTY BELL DIVIDE MINING CO. **NEVADA**

Inc. 1919, in Nevada.

Property: 3 claims and fraction adjoining Gold Reef and Alto, about 2,100′ S. E. of the Tonopah Divide and Gold Zone mines.

LIBERTY DIVIDE MINING CO. **NEVADA**

Office: care M. M. Detch, res. agt., Tonopah, Nev. W. S. Norris, mgr.

Officers: Hon. Chas. R. Evans, pres.; Walter S. Norris, v. p.; Frank R. Hackley, sec.-treas., with George W. Allen and M. M. Detch, directors.

Inc. Feb. 28, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par; 750,000 in treasury. Listed on San Francisco Stock Exchange.

Property: 3 claims and fraction, 55 acres, just N. of the Goldfield M. & O. group and E. of Rosetta.

Development: by shaft, down 50′ in May, 1919.

Equipment: 40-h. p. electric hoist, also 6-drill compressor used jointly with the Calumet Divide.

LINCOLN DIVIDE MINING CO. **NEVADA**

Address: W. V. Richardson, Tonopah, Nev.

Officers: W. V. Richardson, pres.; A. E. Kane, v. p.; G. A. Reading, sec.-treas. D. T. Donovan, P. J. Donovan, directors.

Inc. May 19, 1919, in Nevada. **Cap.,** $150,000; par 10c; 750,000 treasury.

Property: 50 acres, adjoining Florence Divide on N. and 6,000′ north of Gold Mountain.

LONE MOUNTAIN DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev. F. Abbot, agt.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; par 10c.

Property: 18 claims west of Apex Divide. Also Lucy mine in Paymaster Canyon, E. of Lone Mountain. A shaft was being sunk on Divide group and a 60-ton shipment of $100 to $200 ore was sent to the MacNamara mill at Tonopah in November, 1919.

LOOKOUT DIVIDE MINING CORPORATION **NEVADA**

Office: Tonopah, Nev.

Officers: A. T. Wilkinson, pres.; J. M. Fenwick, v. p.; M. J. Gray, sec.-treas., with Julius Goldsmith and P. D. McLeod, directors. J. W. Morris, cons. engineer.

Inc. in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 5 claims, 2 fractions, 3¼ miles northeast of Gold mountain. Material from shaft said to assay well.

LUCKY BOY DIVIDE MINING CO. **NEVADA**

Address: F. T. Dunn, res. agt., Tonopah, Nev. Wm. Farrish, supt.

Officers: Harry MacNamara, pres.; W. A. Nye, v. p.; L. W. Horton, sec.; A. G. Raycraft, treas., with L. R. Robins and Wm. Farris, directors.

Inc. March 31, 1919, in Nevada. **Cap.,** 1,000,000 shares; 10c par; assessable. Listed on San Francisco Stock Exchange.

Property: 2 fractional claims, about 1,500′ E. of Tonopah Divide, dividing property of the East Divide. Sinking shaft in 1919.

LUCKY DIVIDE MINING CO. **NEVADA**

Address: Frank Evans, Tonopah, Nev.

Officers: Fred Nielson, pres.; Albert Erickson, v. p.; L. C. Thompson, sec.-treas.; W. C. McFarland and J. G. Thompson, directors.

Inc. May, 1919, in Nevada. **Cap.,** $150,000; par 10c.

Property: 4 claims, 80 acres N. E. of Mizpah Divide and 2½ miles N. E. of Gold Mountain. Veins show good values at surface. A prospect.

LUNING DIVIDE MINES CO. **NEVADA**

Address: Luning, Nev.

Inc. May 26, 1919, in Nevada, by G. A. Raymer, W. E. Harris, and S. J. Dillbaugh. **Cap.,** $150,000; 10c par.

MACFARLANE DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: T. L. Oddie, pres.; M. M. Detch, v. p.; O. G. Wolther, sec.; W. V. Richardson, treas., with Joe Loeb, Hector Stewart, and A. E. Kane, directors. J. W. Hanson, supt.

Inc. in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 4 claims N. E. of the Ajax and 2½ miles N. E. of Gold Mountain, near the Myra and Ben Hur. A shaft was sunk in 1919.

MAMMOTH DIVIDE MINING CO. **NEVADA**

Office: Room 1608, No. 111 Broadway, New York; and care R. K. Brown, res. agt., Tonopah, Nev.

Officers: S. A. Holman, pres.; C. W. Geddes, v. p.; with Wm. A. Kerr, R. K. Brown (supt.), and P. B. Ellis, directors. A. R. Buchanan, sec.-treas.

Inc. April 18, 1919, in Delaware. **Cap.,** 1,500,000 shares; 10c par; non-assessable, 1,000,000 issued. Listed on San Francisco Stock Exchange and New York Curb. Annual meeting, last Thursday in October. Security Transfer & Registrar Co., New York, and Registration Surety Co., of San Francisco transfer agents and registrars.

Property: 4 claims, 50 acres, 2,500′ S. E. of Tonopah Divide and adjoining the Gold Reef on S., considered to be well located.

Development: by 100′ shaft on Wonder claim, at a point in line with trend of main Tonopah Divide fault-fissure.

Equipment: 30-h. p. electric hoist, compressor, bunk-house, etc.

MARINETTE M. & M. CO. **NEVADA**

Address: care Campbell & Topping, Tonopah, Nev.

Property: 6 claims in Klondyke section of Divide district, 6 miles south of Tonopah Divide mine.

MARNE DIVIDE MINING CO. **NEVADA**

Office: care Hugh H. Brown, atty., Tonopah, Nev.

Officers: H. A. Johnson, pres.; R. Q. McDonald, v. p.; H. H. Brown, sec.-treas., with Wm. R. Bozarth and A. E. Carper, directors, mostly connected with the Tonopah Mining Co.

Inc. April 3, 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 7 claims, N. of Gold Seam, 1½ miles S. E. of Gold Mountain; adjoins the Big Divide and Morris on the N. Surface prospects encouraging.

Development: shaft being sunk at junction of 3 faults was down 50′ in July.

McCOY WEST DIVIDE SILVER MINES CO. **NEVADA**

Address: Tonopah, Nev.

Officers: Al McCoy, pres.; G. H. Cook, v. p.; B. E. Garnett, sec.-treas.

Property: 3 claims north of the West Divide Extension.

MECCA DIVIDE MINING CO. **NEVADA**

Address: Tim Connelly, agt., Goldfield, Nev.

Officers: J. W. Dunfee, pres.; J. E. Ewing, v. p.; Clyde Cannan, sec.; E. Marks, treas., with T. Donnelly, directors. A. H. Elftman, cons. eng.

Inc. March, 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 32 acres, ¾ mile E. of the Tonopah Divide, adjoining Tonopah Hasbrouck on north.

Development: sank shaft and erected hoist, etc., in 1919.

MIDLAND DIVIDE MINING CO. **NEVADA**

Address: W. V. Richardson, Tonopah, Nev.

Officers: T. L. Oddie, pres.; A. E. Kane, v. p.; W. V. Richardson, sec.-treas., with D. T. Donovan, P. J. Donovan, directors.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; par 10c.

Property: 40 acres adjoining California Divide, between the Operator and Portland groups, 9,000′ S. of Gold Mountain.

MIDWAY DIVIDE MINING CO. **NEVADA**

Office: 206 Nixon Bldg., Reno, Nev.

Officers: Dr. J. L. McCarthy, pres.; R. W. Cattermole, v. p.; J. F. Kunz, sec.-treas., with R. G. Myrtle and R. P. Burris, directors.

Inc. May, 1912, in Nevada. **Cap.,** 1,500,000 shares; $1 par; assessable; 468,800 treasury shares issued out of total of 650,000.

Property: 4 claims, 50 acres, adjoining the Dividend and Divide Consolidated.

Development: work started in April, 1919; shaft down 70′ by hand-work. Equipped with hoist, compressor, etc.

MINERAL ZONE DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: R. M. Hampton, pres.; Bert Allen, v. p.; V. M. Place, sec.-treas., with Henry Hanson, T. F. Bannigan, and H. H. Hill, directors.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 6 claims, 1¼ miles S. of Goldsmith Divide and over 4 miles S. E. of Gold Mountain.

MIZPAH DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. H. Miller, pres.; F. M. Manson, v. p.; J. E. Adams, sec.-treas., with J. G. Kirchen, P. H. O'Neill, and Allen Rives, directors.

Inc. March, 1919, in Nevada. **Cap.,** $150,000; shares 10c par; assessable.

Property: 9 claims, 4,500′ N. E. of Gold mountain. Has breccia exposures and rhyolite dikes, with N. E. fissures that are to be opened on Boston & Mizpah claims.

Development: by shaft and machinery erected August, 1919.

MOHAWK DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. H. Miller, pres.; William Watters, v. p.; J. E. Adams, sec.-treas., with A. G. Raycraft and B. F. Baker, directors.

Inc. March, 1919, in Nevada. **Cap.,** $150,000; 10c par; assessable; 750,000 outstanding. Listed on San Francisco Stock Exchange. Transfer office, Tonopah, Nev.

Property: the Stewart group of 4 claims and 2 fractions, 100 acres, N. E. of Divide Consolidated and 3,000′ N. of Tonopah Divide. Promising veins outcrop on property.

Development: shaft being sunk on vein thought to be continuation of Empire fissure of Divide Cons.

Equipment: 40-h. p. electric hoist, etc.; air is purchased from the Divide Consolidated.

MONARCH DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Inc. 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: a group of claims (Sunbeam and others) 2½ miles north of the Tonopah Divide.

MORNING GLORY DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Inc. Dec. 11, 1919, in Nevada.

MUTUAL DIVIDE MINING CO. **NEVADA**

Inc. 1919, in Nevada.

Property: a group of 5 claims 2½ miles S. of the Tonopah Divide. Machinery was erected by Dec., 1919, and a 2-compartment shaft being sunk to depth of 500′.

MYRA DIVIDE MINING CO. **NEVADA**

Address: A. E. Lowe, res. agt., Tonopah, Nev.

Officers: L. E. Browne, pres.; A. E. Lowe, v. p. and supt., with E. P. Baker, W. T. Duffy, F. F. Dunn and M. W. Burdick, directors.

Inc. May 3, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par; non-assessable. Listed on San Francisco Stock Exchange.

Property: the Shoveler group, 4 claims, 70 acres, purchased in June, 1919, over 3 miles slightly S. E. of Gold Mountain.

Development: shaft down 200′ by December, 1919. Cut bunches of ore at 16′, but is bottomed in andesite. Crosscutting on the 200′ level said to show good mineralization. Equipped with hoist.

NATIONAL DIVIDE MINING CO. **NEVADA**

Office: 312 Clay Peters Bldg., Reno, Nev.

Officers: L. H. Bartholomew, pres.; A. G. Miller, v. p.; A. A. Smith, sec.-treas., with S. Mozingo and H. D. Danforth, directors.

Inc. in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 5 claims, nearly 3¾ miles S. E. of Gold Mountain, said to show a strong outcrop. Examined by P. R. Whytock.

NENZEL DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Officers: J. F. Nenzel, pres.; Abraham Wise, v. p.; S. O. Trescott, sec.-treas., with J. J. Murphy and S. N. Snyder, directors. J. C. Huntington, cons. eng.

Inc. May, 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: Tom Boy 1 and 2, Eldorado 1 and 2, and Cresson 1, 2, 3, and 4 claims, S. E. of the Tonopah Divide and S. of the Rosetta. Surface prospects considered good. Property acquired from F. F. Garside, Webb Patton, J. P. Connors, and N. Fitzwilliams. Company also owns some claims over 3 miles N. E. of Gold Mountain.

NEVADA DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Officers: John Holst, pres.; Joseph de Forrest, v. p.; P. J. Daube, sec.-treas., also directors.

Inc. April, 1917, in Nevada. **Cap.,** 1,000,000 shares; 10c par; non-assessable. Listed on San Francisco Stock Exchange.

Property: 6 claims N. W. of Sutherland, about 3 miles N. W. of Gold Mountain. Joint shaft with the Anaconda Divide, in breccia, gave assays of $1.80 per ton at 65′ depth.

NEVADA EXTENSION MINING CO. **NEVADA**

Address: Tonopah, Nev.

Property is near the Hecla, Airedale, and St. Patrick groups in the southeast part of the Divide district.

NEVADA GOLDEN DIVIDE MINING CO. **NEVADA**

Office: 313 Clay Peters Bldg., Reno, Nev.

Officers: Alex. McIntyre, pres.; Albert Fisher, v. p.; Joseph Johnstone, sec.; George Hall, treas., with George McKenzie, M. C. Kloskey and Charles O'Neill, directors.

Inc. in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 188 acres at Golden, Nye county, and at Divide. The 90 and 60′ shafts, which have produced good pay-ore, are to be worked.

NEW SUTHERLAND DIVIDE MINING CO. **NEVADA**

Formerly the Sutherland Divide Mining Co., which see. Old company reorganized and name changed January 10, 1920.

NEW YORK DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Officers: D. S. Dickerson, pres.; M. J. Sullivan, v. p.; H. A. Stewart, sec.-treas., with Joseph Hutchinson and A. G. Raycraft, directors.

Inc. in Nevada. **Cap.**, $200,000; shares 10c par.

Property: 5 claims north of Sutherland and about 2 miles north of the Tonopah Divide.

NOME DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev. Bert Ward, res. agt.

Officers: Chas. W. Brandon, pres.; J. W. Van Winkle, v. p.; with J. T. Walters, James Ford and Chas. McCall, directors.

Inc. May, 1919, in Nevada. **Cap.**, $150,000; par 10c; 750,000 treasury shares.

Property: 12 claims, 141 acres, next to Marinetta and Yukon Divide.

NORRIS DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Officers: Walter Norris, v. p. and mgr.; J. T. Murphy, v. p.; C. P. Johnson, sec.-treas., with Walter Hogg, and E. Marks, directors.

Inc. May, 1919, in Nevada. **Cap.**, $150,000; shares 10c par.

Property: adjoins on the west the East Divide Extension, Big Divide, and Marne. The ground is supposedly crossed by the East Divide vein zone for a distance of 1,800′.

Development: sinking started and machinery ordered in June, 1919.

NORTH BEN HUR DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev. B. E. Garnett, agt.

Officers: F. C. Beedle, pres.; H. B. Ruhl, v. p.; B. E. Garnett, sec.-treas., with Albert Ninnis and A. B. Garnett, directors.

Inc. in Nevada. **Cap.**, $150,000; shares 10c par; 750,000 in treasury.

Property: 3 claims and a fraction, adjoins the Ben Hur, Chariot, Pershing and Romance group. Developing, 1919.

NORTH DIVIDE MINING CO. **NEVADA**

Office: Monadnock Block, San Francisco, Calif., and Reno, Nev. J. T. Boyd, agent.

Officers: J. E. Kerr, pres.; J. D. Brown, v. p.; H. B. Wade, sec.-treas.; with A. M. Tridel and J. G. Crumley, directors. W. E. Davis, supt.

Inc. Feb. 7, 1919, in Nevada. **Cap.**, 2,000,000 shares; 10c par; assessable. Transfers at company office. Listed on San Francisco Stock Exchange.

Property: the Moonlight group, 6 claims, 120 acres north of the Apex Divide and west of the Sutherland. Is one of the oldest properties of the district and covers strong veins.

Development: 3 shafts, 60 to 250′ deep, opened up 3 veins several years ago, which yielded gold ore. The 60′ shaft is to be sunk to 300′ and will open up 4 veins. Equipment good for depth of 1,000′.

NORTHWEST DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev.

Officers: William Forman, pres.; W. J. Douglass, v. p.; C. C. Boak, sec.-treas., with W. E. Fuller (supt.) and M. H. Page, directors.

Inc. March 17, 1919, in Nevada. **Cap.**, 1,500,000 shares; 10c par; 900,000 in treasury; 400,000 issued. Listed on San Francisco Stock Exchange. Had $40,000 cash in treasury July 1st, 1919.

Property: 7 claims, 70 acres, lying N. of Divide Consolidated, and 3,500′ N. of Tonopah Divide.

Development: sinking 200′ shaft, down 50′, in fair formation by July, 1919, and machinery erected. "January" Jones, of Reno, strongly advised buying the shares.

OLD TIMER DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. Ben. D. Luce, res. agt.

Officers: W. Douglass, pres.; Roger Dougherty, v. p.; B. D. Luce, sec.-treas., with Wm. Watters, and R. Finn, directors.

Inc. April, 1919, in Nevada. **Cap.**, $150,000; 10c par; 750,000 shares in treasury.

Property: the 2 Afterthought claims and 2 fractions, adjoining the

Sutherland on north, considered "inside ground," on the trend of well-defined veins, one of which is being prospected.

Equipment: sufficient for shaft sinking and exploration.

OPERATOR DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: Julius Goldsmith, pres.; A. G. Raycraft, v. p.; T. J. Lynch, sec.-treas., with W. W. Kelly and L. Dunn, directors.

Inc. March 8, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par. Listed on San Francisco Stock Exchange.

Property: 4 claims, south of the Toggery Divide, developed by 400′ shaft. Has good showing on claims.

Equipment: 37-h. p. hoist, 5-drill compressor, etc.

ORIENTAL DIVIDE MINING CO. **NEVADA**

Organized by George Wingfield and H. C. Brougher to develop claims near those of Fortuna Divide, over 3 miles N. W. of Gold Mountain.

ORIGINAL KLONDYKE DIVIDE MINING CO. **NEVADA**

Address: Harry McNamara, Tonopah, Nev.

Property: 200 acres in Klondyke district, 6 miles south of Divide, Nye county. Vein said to be exposed for 3,000′, and from 2 to 20′ wide on surface. Mine worked 25 years ago when 123 cars of $28 ore were hauled to Sodaville.

Development: by several old shafts, none below 200′. New owners are to sink 1,000′.

ORO DIVIDE MINING & DEVELOPMENT CO. **NEVADA**

Office: 252 Virginia St., Reno, Nev.

Officers: S. C. Foster, pres.; C. A. Clinton, v. p.; F. W. Collins, sec.-treas., with Lee Henderson, and G. A. Bartlett, directors.

Inc. in Nevada. **Cap.,** $150,000; shares 10c par; non-assessable; 750,000 treasury shares.

Property: 3 claims and 2 fractions, 95 acres, in the N. W. part of the district, said to contain a well-defined fracture zone or ledge leading from Gold Mountain to Fox Mountain.

Development: 2-compartment shaft down below 100′ in Oct., 1919. Crosscutting to be started at depth of 200′.

Equipment: hoist, etc., sufficient for prospect work.

OVERLOOK DIVIDE MINING CO. **NEVADA**

Office: Fenwick & Co., Tonopah, Nev.

Officers: J. A. T. Wilkinson, pres.; J. M. Fenwick, v. p.; M. J. Gray, sec.-treas., with S. M. Wilson and Elmer Burt, directors.

Inc. in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 4 claims and a fraction adjoining the Lookout Divide. Work is under way.

PATSY DIVIDE MINING CO. **NEVADA**

Address: Tonopah, Nev. E. Marks, res. agt.

Officers: Wm. Forman, pres.; W. J. Douglass, v. p.; M. L. Cooper, sec.; E. Marks, treas.; A. G. Raycraft, directors.

Inc. 1919, in Nevada. **Cap.,** 1,500,000 shares; par 10c; 500,000 treasury shares.

Property: the Lazy Boy group of 5 claims, near the Myra, in the eastern part of the district.

PAY DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. Fenwick & Co., res. agts.

Officers: T. Lindsay, pres.; H. F. Danberg, v. p.; A. G. Raycraft, treas.; D. K. Kane, sec. L. R. Robins, mgr.

Inc. May, 1919, in Nevada. **Cap.,** $150,000; shares 10c par; 750,000 in treasury.

Property: 60 acres, 4,000′ N. W. of the Tonopah Divide. Two dykes strike through the ground, and fair assays have been returned from the outcrops.

Development: shaft cut a vein at 70′ in June, 1919. Fully equipped.

PENNSYLVANIA-TONOPAH GOLD MINING CO. NEVADA

Office: J. F. Gaehring, v. p., Oak Lane, Philadelphia, Pa.

Property: 6 claims, nearly 4 miles N. W. of Gold mountain.

PERSHING DIVIDE EXTENSION MINING CO. NEVADA

Office: Lovelocks, Nev.

Officers: L. A. Friedman, pres.; A. B. Harlon, v. p.; R. Nenzel, sec.; with V. A. Twigg and C. H. Jones, directors.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; 10c par; 750,000 treasury shares.

Property: 4 claims adjoining Pershing Divide on the north, and operated by same management.

PERSHING DIVIDE MINING CO. NEVADA

Office: Lovelocks, Nev. R. Nenzel, res. agt.

Officers: L. A. Friedman, pres.; A. B. Harlan, v. p.; C. H. Jones, V. A. Twigg and H. Stimler, directors. J. K. Turner, cons. eng.; W. M. Sirbeck, supt.

Inc. 1919, in Nevada. **Cap.,** $150,000; 10c par; 750,000 treasury shares.

Property: 9 claims, 110 acres, in the S. E. part of district, adjoining the Marne, Champion, and Romance. Formations are said to be favorable.

Development: surface trenching under way late in May, 1919.

PHOENIX DIVIDE MINING CO. NEVADA

Inc. in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 3 claims, ¾ mile N. E. of Sutherland and 7,500′ east of north of Gold Mountain.

PILOT DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev.

Officers: M. R. Averill, pres.; L. L. Mushet, v. p.; E. R. Goetz, sec.; A. G. Raycraft, treas., with A. J. Cormack and R. D. Frisbie, directors.

Inc. in Nevada.

Property: near the Klondyke Divide, 6 miles S. of Divide.

PITTSBURG DIVIDE MINING CO. NEVADA

Inc. in Nevada. **Cap.,** $150,000; 10c par.

Property: 4 claims 1¾ miles N. E. of Gold mountain, and adjoining the Treadwell.

POLICEMAN DIVIDE MINING CO. NEVADA

Inc. in Nevada. **Cap.,** $150,000; 10c par.

Property: 7,000′ south of east of Gold Mountain.

PORTLAND DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev.

Officers: J. H. Miller, pres.; W. A. Bradley, v. p.; B. A. Rives, sec.-treas., with Zeb Kendall, C. F. Wittenberg, and L. L. Mushett, directors.

Inc. April 7, 1919, in Nevada. **Cap.,** $300,000; shares 20c par; assessable; 750,000 treasury shares.

Property: 7 claims, near the Operator Divide, showing well-defined contact, and mineralized fissure zones.

PYRAMID DIVIDE MINES CO. NEVADA

Office: Tonopah, Nev.

Officers: Harry Dunseath, pres.; S. T. Bentley, v. p.-mgr.; Francis Moore, sec.-treas. T. M. Bentley, E. M. Moore, directors.

Inc. April 8, 1919, in Nevada. **Cap.,** $150,000; shares 10c par; 750,000 treasury.

Property: 11 claims, 2½ miles N. of the Tonopah Divide.

Development: the shaft at 75′ depth cut ore assaying from $2.65 to $14.20 per ton, with streaks of higher grade. A hoist and head-frame were erected in November.

QUEEN DIVIDE MINING CO. NEVADA

Office: 109 Russ Bldg., San Francisco, Cal.

Officers: W. F. Sherman, pres.; J. L. Ord, v. p.; F. N. Lathrap, sec.-treas., with W. S. Owensby and Charles Kielhofer, directors. William Lichtenberg, supt.

Inc. May, 1919, in Nevada. **Cap.**, $200,000; 10c par; assessable. Shares to be listed on New York Curb.

Property: 6 claims, 90 acres, adjoining Divide Syndicate, about 1 mile S. of Gold Mountain.

Development: shaft down 50′ in June, 1919.

RAINBOW DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. F. K. Pittman, agt.

Officers: R. J. Cunningham, pres.; J. M. Fenwick, v. p.; E. P. Cullinan, sec.-treas., with H. G. Taylor, Ernest Cole, directors. Homer O'Connell, supt.

Inc. in Nevada. **Cap.**, 1,500,000 shares; 10c par; 750,000 treasury shares.

Property: 2 claims adjoining the Apex on S., and Royal groups on the N.

RAND DIVIDE MINING CO. **NEVADA**

Office: Lovelocks, Nev. H. E. Loufek, agt.

Officers: J. T. Goodin, pres.; F. E. Baker, v. p.; T. P. Ebert, sec.-treas.

Inc. April, 1919, in Nevada. **Cap.**, $150,000; shares 10c par; half treasury stock.

Property: Little Theresa group, 5 claims, 2 fractions, E. of High Divide, 4,500′ N. E. of Gold Mountain.

Development: a shaft, down 70′ in July, 1919, opened ore that assayed up to $6.40 per ton.

Equipment: machinery reported ordered.

RECO DIVIDE MINING CO. **NEVADA**

Office: 25 Broad St., New York, and Goldfield, Nev.

Officers: J. B. Kendall, pres.-mgr.; J. J. Wielip, v. p.; M. A. Kendall, sec.-treas., with T. W. Kendall, and C. B. Higginson, directors. W. C. Ralston, cons. eng.

Cap., 2,000,000 shares; 10c par.

Property: 5 claims north of the Sutherland Divide. Also the old Paradise Valley mines, 6 claims at Spring City, in the Santa Rosa range, 50 miles north of Winnemucca, a mine whose silver-gold output is said to be $3,000,000.

Development: sampling of the Paradise and Bullion mines in 1906 showed 14,000 tons of $18.05 ore, and on dumps 11,000 tons of $22.98 ore, calculated at $1.10 per oz. for silver. It was expected that shipments to smelters would be started by October, 1919. Meanwhile, a shaft is being sunk.

RENO DIVIDE MINING CO. **NEVADA**

Office: 301 Nixon Bldg., Reno, Nev. E. H. Mead, agt.

Officers: S. H. Wheeler, pres.; F. H. Norcross, v. p.; Wm. Woodburn, treas., with G. W. Davey and W. G. Kendall, directors. M. A. Diskin, sec. W. G. Hellier, supt.

Inc. March 27, 1919, in Nevada. **Cap.**, 1,500,000 shares; 10c par; non-assessable. Listed on San Francisco Stock Exchange.

Property: 5 claims to the south, adjoining the Grimes and Gold Zone. Good assays are reported from surface quartz.

Development: shaft down 215′ early in August, 1919. At 10′ the shaft entered a crushed and oxidized zone, carrying silver and gold worth $7 per ton, this oxidized matter has persisted to the present depth.

Equipment: complete electric hoisting plant, etc.

REVELATION DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Inc. in Nevada. **Cap.**, $15,000; shares 1c par.

Property: a group of 2 claims in the northwestern part of district, 3 miles from Gold Mountain.

REVERT DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: A. Revert, pres.; T. E. Bonham, v. p.; Paul Revert, sec.-treas.

Inc. March 26, 1919, in Nevada. **Cap.**, 1,5000,000 shares; 1c par; non-assessable. Listed on San Francisco Stock Exchange.

Property: 4 claims, 1,200′ west of Tonopah Divide, and between which is the Verdi.

Development: shaft down 250′ in July, 1919, is to be sunk 300′. Two sets of lessees are said to be working in favorable ground.

Equipment: hoist and compressor, the latter supplying air to the Verdi Divide.

REX DIVIDE MINING CO. **NEVADA**

Inc. in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 6 claims adjoining the Ajax, over 2 miles S. E. of Gold Mountain.

ROMANCE DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev. J. E. Ewing, agt.

Officers: A. H. Elftman, pres.; J. W. Dunfee, v. p.; Clyde Cannon, sec.; J. E. Ewing, treas., with C. W. Taylor, directors.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; shares 10c par; 750,000 treasury shares.

Property: 5 claims adjoining Capital Divide on S. and Pershing Divide on N. E., in the S. E. part of the district.

ROOSEVELT DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: E. S. Berney, pres.; Fred Strassberg, v. p.; Milton Detch, sec.; A. G. Foster, treas. and mgr.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 60 acres S. of the Sunbeam and 2 miles N. of Tonopah Divide.

ROSALIND DIVIDE MINING CO. **NEVADA**

Office: Kind Co. Store, Tonopah, Nev.

Officers: M. R. Averill, pres.: F. J. Klenzing, v. p.; L. M. Kind, sec.-treas., with W. J. Douglass and S. Fox, directors.

Inc. April 9, 1919, in Nevada. **Cap.,** $100,000; shares 10c par.

Property: 6 claims in the extreme N. E. part of the district, nearly 4 miles from Gold Mountain. Geologic indications considered good. Sinking has been started.

ROSETTA DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: C. W. Taylor, pres.; J. M. Fenwick, v. p.; Julius Goldsmith, sec.-treas., also directors. D. F. Murphy, gen. mgr.; A. H. Elftman, cons. engr.

Inc. Nov. 25, 1918, in Nevada. **Cap.,** 1,500,000 shares; 10c par. Listed on San Francisco Stock Exchange.

Property: 4 claims, in the S. E. part of the district, surrounded by Divide Syndicate, Trilby, Argonne, Anchor, and Operator. Examined by A. H. Elftman, who considered that an extension of the Divide fault-vein is from 100 to 300′ wide, where it passes through the ground, numerous cross veins running into it. The formation is well exposed for 1,000′. Pan tests give good results in gold, and assays show silver.

Development: by August, 1919, main shaft was down 300′ on the Murphy vein, and 400′ away another shaft was 60′ deep on the Rosetta vein. The former found $22 ore at 260′, the latter followed a 6″ streak of rich gold ore.

Equipment: hoist, compressor, etc.

ROYAL DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. L. Joseph, pres. and treas.; E. C. Simpson, v. p.; Otto Falk, sec., with Hugh Brown, Joseph Golden, Joseph Seeley, L. Blumenthal and L. H. Norris, directors. Charles Mayotte, supt.

Inc April 10, 1919, in Nevada. **Cap.,** 1,500,000 shares; 20c par; assessable. Listed on San Francisco Stock Exchange.

Property: the Ford group and others, 13 claims, 4,500′ N. E. of Tonopah Divide.

Development: shaft down 50′ in June, 1919.

Equipment: 50-h. p. hoist, 75-h. p. compressor, drills, and enough timber for depth of 500′.

RYAN DAVIS DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nevada.

Officers: Louis O'Neal, pres.; J. B. Davis, v. p.; J. C. Kind, sec.-treas.; with F. E. Chapin and W. R. Porter, directors.

Inc. in Nevada. **Cap.,** $250,000; 10c par.

Property: a group that adjoins Iron Crown, and another claim near the Hasbrouck; also owns a group of claims at Keeler, Calif.

ST. PATRICK DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: G. W. Allen, pres.; J. H. Shepard, v. p.; H. C. Price, sec.; John Barrier, treas., with Wm. Forman, directors.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 4 claims, 100 acres, in the S. E. part of the district, adjoining the Airedale on the north.

SAUNDERS DIVIDE MINING CO. **NEVADA**

Inc. 1919, in Nevada. **Cap.,** $150,000; par 10c; 750,000 in treasury.

Property: a group of 6 claims in the N. W. part of district, 3½ miles from Gold Mountain.

SCOOP DIVIDE MINES CORPORATION **NEVADA**

Address: Patton and Bonham, Tonopah, Nev.

Property: 5 claims in the Divide district. Funds for development were said to be on hand August, 1919.

SHAMROCK DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. A. H. Keenan, agt.

Officers: M. J. Sullivan, pres.; P. A. McCarron, v. p.; A. H. Keenan, sec.-treas., with Roger Dougherty, and R. F. Wendover, directors.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 4 claims, ½ mile W. of Royal Divide and 1¼ miles N. W. of Tonopah Divide.

SIERRA DIVIDE MINING CO. **NEVADA**

Office: 421 Clay Peters Bldg., Reno, Nev.

Officers: A. A. Codd, pres.; H. F. Bruce, v. p. and cons. engr.; W. H. G. Buck, sec.-treas., with Al Modeen, and R. H. Bates, directors.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; par 10c; 750,000 treasury shares; 776,200 issued.

Property: 3 claims, 3,000′ north of Tonopah Divide, surrounded by Divide City, Horseshoe, Midway, Smuggler, Florence, and Knox. Also owns control of the Morning Glory gold mine at Alleghany, Calif., which adjoins Tightener mine and has a complete equipment costing $50,000, including a 5-stamp mill.

Development: a shaft is to be sunk, and crosscutting done to find the Divide Extension vein.

SIGNAL DIVIDE MINING CO **NEVADA**

Richardson, Woodson & Foster, fiscal agent, Tonopah, Nev.

Officers: G. C. Fetterman, pres.; A. B. Hall, v. p.; Milton Detch, sec.; G. A. Foster, treas.; W. J. Douglass, cons. eng.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; shares 10c par; assessable.

Property: 6 claims, north of Sutherland and over 1¼ miles north of Tonopah Divide. Surface exposures said to be favorable and exploration under way.

SILVER BELL DIVIDE MINING CO. **NEVADA**

Inc. 1919, in Nevada.

Property: 4 claims, adjoining Treadwell Divide on east, about 2 miles north of east of Gold Mountain.

SILVER BOW DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: S. T. Bentley, pres.; C. H. Ellsworth, v. p.; H. B. Ruhl, sec.-treas., with G. W. Morris and G. M. Bentley, directors.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; 10c par; 750,000 in treasury.

Property: 3 claims N. of Ben Hur, nearly 4 miles S. E. of Gold Mountain. Company also has lease and bond on a developed mine at Silver Bow, that has 800′ development tunnel with ore of $20 to $48 per ton in sight.

SILVER DIVIDE MINES CO. **NEVADA**

Office: Tonopah, Nev.

Officers: H. C. Brougher, pres.; J. L. Joseph, v. p.; E. J. Erickson, sec.-treas., with George Wingfield, Gust Hanson (supt.), James Grimes, and H. G. Humphrey, directors.

Inc. March 31, 1919, in Nevada. **Cap.,** 1,500,000 shares; 20c par; assessable. Listed on San Francisco Stock Exchange.

Property: the Bazaar group of 6 claims, adjoining the Gold Reef and Gold Zone on the N. 2,200′ S. of Tonopah Divide.

Development: shaft down 400′ in December, 1919, and gasoline hoist erected. A continuation of the Tonopah Divide vein was reported cut on the 400′ level.

SILVER DYKE DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. H. C. Price, agt.

Officers: Harry McNamara, pres.; W. A. Nye, v. p.; H. E. Dugan, sec.-treas., also directors.

Inc. 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 4 claims and fractions adjoining Bonanza Divide.

SILVER HILL DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: C. O. Rogers, pres.; V. M. Place, v. p.; C. L. Rogers, sec.-treas.; also directors.

Inc. May, 1919, in Nevada. **Cap.,** $200,000; shares 10c par; 1,000,000 in treasury.

Property: 7 claims, 8 miles S. W. of Divide and about 2 miles N. E. of Gold Mountain. Said to show ore at surface.

Development: 335′ shaft. Has spent $30,000 on development.

SILVER KING DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: Jacob Berger, pres.; Charles Baad, v. p.; W. E. Colburn, sec.-treas., with Gust Hanson and H. B. Ruhl, directors.

Inc. Feb. 25, 1919, in Nevada. **Cap.,** 1,000,000 shares; 10c par; 900,000 issued. Listed on San Francisco Stock Exchange.

Property: 3 claims, patented, 40 acres, 2,100′ W. of Tonopah Divide, and adjoining the Mecca and Hasbrouck Extension. Said to show two strong veins.

Development: a 60′ shaft sunk on ore, several years ago, gave assays of $12 to $35 per ton. A new shaft was down 200′ in August, 1919, midway between the two veins; at 172′ $12 ore was cut.

Reported $6,000 spent on development from March to June, 1919.

Equipment: hoist, compressor, etc., good for depth of 300′.

SILVER REEF DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. E. J. Ramsey, sec.-treas.

Inc. 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 6 claims in the S. E. part of the district, 3¼ miles from Gold Mountain.

SILVER STAR DIVIDE MINING CO. **NEVADA**

Office: State Bank & Trust Co. Bldg., Tonopah, Nev.

Officers: W. J. Douglass, pres.; Roger Dougherty, v. p.-treas.; Albert Erickson, sec.; with G. H. Lewis (mgr.), D. Holland, directors. F. H. Nielson, supt.

Inc. May 5, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par. Annual meeting, May 10.

Property: 5 claims, 120 acres, north of Mizpah, contains quartz vein in rhyolite and breccia. Assays said to yield from $2.50 to $17 per ton.

Development: by vertical shaft, down 50′ in July, 1919.

Equipment: 32-h. p. electric hoist and compressor.

SILVER STATE DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. H. C. Price, agt.

Officers: Harry McNamara, pres.; W. A. Nye, v. p.; H. E. Dugan, sec.-treas., with H. C. Price and Tim Connolly, directors.

Inc. April 24, 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: in the Klondyke district, 6 miles south of Divide, adjoining the Golden State.

SILVER TOP DIVIDE MINING CO. **NEVADA**

Address: Ed. Bevis, Tonopah, Nev.

Inc. in Nevada. **Cap.,** $150,000; shares 10c par.

SILVER WEDGE DIVIDE MINES CO. **NEVADA**

Office: Tonopah, Nev. E. J. Ramsey, sec. and res. agt.

Inc. 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 6 claims adjoining Telephone Girl and Legal Divide.

SILVER ZONE DIVIDE MINES CO. **NEVADA**

Office: Tonopah, Nev.

Officers: James Grimes, pres.; W. J. Douglass, v. p.; E. J. Ramsey, sec.-treas., with F. F. Garside and R. F. Wendover, directors.

Inc. May, 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 6 claims, adjoining Divide Charter and Banner Divide.

SIOUX DIVIDE MINING CO. **NEVADA**

Inc. March, 1910, in Delaware. **Cap.,** $150,000; 10c par; 750,000 in treasury.

Property: 7 claims, 4,500′ long, about 2 miles N. W. of Tonopah Divide and N. W. of the Hasbrouck mine.

SMUGGLER DIVIDE MINING CO. **NEVADA**

Address: Elmer Bisbee, agt., Tonopah, Nev.

Officers: John Miller, pres.; A. F. Price, v. p.; C. N. Miller, sec.-treas.; with E. N. Bannon and W. Lucot, directors.

Inc. April 1, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par; assessable. Listed on San Francisco Stock Exchange.

Property: the 3 Lone Cabin claims, 4,500′ north of Tonopah Divide, said to have one of the strongest fracture systems in the district.

Development: sinking under way and machinery erected. In sinking the shaft, which was 100′ deep in December, 1919, stringers were cut, assaying up to $36 per ton. The 200′ level is well mineralized.

SOUTH DIVIDE MINES CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. G. Crumley, pres.; F. K. Pittman, v. p.; C. E. Oyster, sec.-treas., with L. L. Crumley, and A. H. Elftman (cons. engr.), directors.

Inc. April, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par; 750,000 in treasury.

Property: 5 claims, in the S. E. part of the district, 2 miles from Gold Mountain, adjoining the Gold Wedge Divide on the south. Work was done several years ago, with fair prospects. Developing.

SOUTHERN DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. Care R. H. Tune, res, agt.

Officers: C. P. Campbell, pres.; Wm. Huggard, v. p.; R. H. Tune, sec.-treas.

Inc. May, 1919, in Nevada. **Cap.,** $150,000; par 10c; 750,000 shares in treasury.

Property: 40 acres, patented, about 3 miles south of Tonopah Divide mine.

SPARKS DIVIDE MINING CO. **NEVADA**

Inc. 1919, in Nevada.

Property: 2 claims, 3 miles south of Gold mountain and S. W. of the Black Hawk Divide.

STANDARD DIVIDE EXTENSION MINING CO. **NEVADA**

Inc. in Nevada.

Property: 6 claims north of Sutherland Divide and 2½ miles north of Gold Mountain.

STANDARD DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev. H. H. Brown, agt.

Officers: J. C. Martin, pres.; G. A. Trubody, v. p.; H. A. Darms, sec.-treas., with Wm. Watters and W. J. Douglass, directors.

Inc. April 11, 1919, in Nevada. **Cap.**, $150,000; 10c par; 750,000 in treasury.

Property: 5 claims, about 110 acres, 2½ miles north of Gold Mountain, adjoining the Sunbeam and the New England shaft.

STERLING DIVIDE MINING CO. NEVADA

Office: M. E. Scott, res. agt., Reno, Nev.

Officers: Capt. A. S. Proskey, pres.; H. E. Scott, sec.; A. N. Salisbury, treas.

Inc. April, 1919, in Nevada. Stock non-assessable.

Property: 5 claims, ¾ mile N. E. of the Ben Hur.

SUNBEAM DIVIDE MINING CO. NEVADA

Office: Tonopah, Nev.

Officers: E. S. Berney, pres.; Fred Grob, v. p.; M. M. Detch, sec.; G. A. Foster, treas.-mgr., with W. A. Foster, directors.

Inc. April 12, 1919, in Nevada. **Cap.**, 1,500,000 shares; 10c par; assessable; 550,000 issued. Listed on San Francisco Stock Exchange.

Property: 7 claims, 2¼ miles north of the Tonopah Divide.

Development: by 150′ shaft, sunk on a rhyolite dike. Assays showed rock to carry from $1 to $2.80 per ton, but stringers at 120′ returned from $17 to $96 per ton. At 150′ the stringers assayed $133, and 12″ vein $10.50 per ton. Fully equipped.

SUNNY DIVIDE MINING CO. NEVADA

Office: Room 1 Journal Bldg., Reno, Nev.

Directors: A. G. Miller, pres.; C. H. Duborg, v. p.; A. LeCuver, sec.-treas., with G. H. Kent, W. T. McNeil, and O. J. Clifford, directors.

Inc. in Nevada. **Cap.**, $150,000; 10c par.

Property: 7 claims, 1¼ miles S. W. of Tonopah Divide, and adjoining the Aztec Divide on the south.

Development: sinking and erecting machinery. Installed 12-h. p. hoist.

SUTHERLAND DIVIDE ANNEX MINING CO. NEVADA

Office: Goldfield, Nev.

Officers: H. B. Ruhl, pres.; F. C. Beedle, v. p.; B. E. Garnett, sec.-treas., with T. F. Potthoff, and A. B. Garnett, directors.

Inc. April, 1919, in Nevada. **Cap.**, $150,000; shares 10c par.

Property: 4 claims adjoining the Sutherland Divide on the north. Prospecting.

SUTHERLAND DIVIDE EXTENSION MINING CO. NEVADA

Address: T. O. Ward, res. agt., Reno, Nev.

Officers: Jos. McEachin, pres.; R. G. Ward, v. p.; T. O. Ward, sec.-treas.; above, with T. J. Lynch and F. P. Dunn, directors.

Inc. March, 1919, in Nevada. **Cap.**, $10,000; 1c par; 500,000 in treasury.

Property: about 75 acres, adjoining the North Divide on the north.

SUTHERLAND DIVIDE MINING CO. NEVADA

Office: Goldfield, Nev.

Officers: C. R. Evans, pres.; J. B. Kendall, v. p. and mgr.; R. W. Cattermole, sec.-treas., with C. H. Webster and F. B. Mechling, directors.

Inc. May 8, 1918, in Nevada. **Cap.**, 1,500,000 shares; 10c par; non-assessable, 1,150,000 outstanding. Listed on San Francisco Stock Exchange.

A statement issued December 17, 1919, showed that receipts had totaled $25,418, including $23,788 from sale of 471,000 shares. Disbursements were $12,745 for development and supplies; $7,116 for equipment and erection of same, and $2,228 on property account. The balance on hand was $616.

Property: 6 claims, 130 acres, 1½ miles N. of the Tonopah Divide. mine. Examined by J. B. Kendall, and A. H. Elftman, who said that outcrops assayed $2.20 in gold; silver increases with depth; and that sinking should be done to 600′. Ground is crossed by a well-defined vein proved by various open-

cuts and shallow shafts, from two of which ore was shipped by former lessees; a pit 800′ E. of the new shaft now shows $6.50 ore.

Development: by 530′ incline shaft sunk on a fault vein, opened on the 300′ level by 30′ crosscut and 239′ of drifts, and a 25′ crosscut on the 400′ level, with a 201′ drift on the vein. The 400′ showed some $10.55 ore, and narrow seams of rich ore ($70) were found on the 300′ level. This same shaft is said to have produced ore for shipment some 15 years ago, the ground being owned early in 1901 by the South Tonopah Mining Co., the second mining company to be incorporated in the Tonopah region.

Equipment: 50-h. p. hoist and all the machinery needed for development to depth of 1,000′.

The stockholders, at a meeting held on January 10, 1920, authorized a reorganization, the new company, called the New Sutherland Divide Mining Co., to have 1,500,000 assessable shares, new shares to be exchangeable for old at par.

TELEPHONE GIRL DIVIDE MINING CO. **NEVADA**

Office: Portland, Ore., and Tonopah, Nev. H. R. Cooke, res. agt.

Officers: J. J. McGregor, pres.; E. B. Ingram, v. p.; James Moffatt, sec.; James Monahan, treas., and directors.

Inc. in Nevada. **Cap.,** $150,000; shares 10c par; 750,000 in treasury.

Property: 6 claims in the extreme S. E. part of the district, 4 miles from Gold Mountain and N. E. of the Ajax mine.

THOMPSON DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: George Wingfield, pres.; H. C. Brougher, W. J. Douglass, v. p.'s; E. J. Erickson, sec.-treas., with Hugh Sutherland, directors.

Inc. May 14, 1919, in Nevada. **Cap.,** 1,500,000 shares; 20c par; assessable. Listed on San Francisco Stock Exchange.

Property: 7 claims, 90 acres, adjoining Belcher Extension, Royal and Pay Divide properties. Is about 4,500′ N. W. of Tonopah Divide. Fully equipped. Sinking main shaft.

TOGGERY-DIVIDE MINING CO. **NEVADA**

Office: 139 No. Virginia St., Reno, Nev. Eva Keenan, res. agt.

Officers: T. J. O'Donnell, pres., Ernst & Cranmer Bldg., Denver; F. S. Hutchins, v. p.; J. N. Hyman, sec.-treas. (115 Broadway, New York), with J. W. Graham, G. W. Bachman, E. B. Caldwell, directors. A. H. Warner, supt.

Inc. April 19, 1919, in Nevada. **Cap.,** $150,000; 10c par. Listed on San Francisco Stock Exchange, and New York Curb. Corporation Trust Co., 37 Wall St., New York, transfer agent.

Property: 12 claims, 200 acres, adjoining the Gold Zone on north, and 1,800′ south of Tonopah Divide. Located in 1902 by James Grimes. Many strong dikes or iron-stained fracture ledges of appreciable silver value are said to traverse claims. Examined by A. H. Warner.

Development: 4 shafts had been sunk, deepest 200′, before Grimes sold to present company. All surface work had shown minimum assays of 1 oz. silver per ton. At 135′ in main shaft, ore carrying free gold was opened. New shaft, to be sunk 500′, was down 325′ on July 27, 1919, at which depth driving was under way. Leases have been let to the Doctor Divide Mining Co. and to W. A. Hooten, of Reno. Both are sinking shafts.

Equipment: all motor-driven, includes 30-h. p. electric hoist, compressor, blower, transformers, 36′ head-frame, drills, shops, with accommodations for 30 men.

All work stopped in 1919. Early, 1920, company had spent $40,000, was slightly in debt and stock had dropped from 50c to 4c.

TOGGERY EXTENSION MINING CO. **NEVADA**

Office: Reno, Nev. James Boland, res. agt.

Officers: W. A. Hooten, pres.-mgr.; J. R. Chamberlain, sec.-treas.; with James Boland and R. G. Withers, directors.

Inc. June, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par; 750,000 issued.

Property: 2 claims, 600′ N. of Myra Divide. Also has a lease on Toggery Divide. Sinking under way.

Equipment: gasoline hoist and compressor.

TOMBOY DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev., F. F. Garside, res. agt.

Property: the Virginia group, 4 claims, near Lookout Divide; also the "B" group of 5 claims in Lone Mountain section.

TONOPAH BANKERS DIVIDE MINING CO. **NEVADA**

Officers: A. W. Copps, pres.; W. P. O'Meara, v. p. and mgr.; F. W. Gillette, sec.; Thomas Normile, treas., with F. C. Jordan and P. C. Thorn, directors. W. P. O'Meara, supt.

Property: 4,500′ north of Tonopah Divide; with the High Divide Annex, High Divide, Harmill, and Hennessy ground in between.

Development: contract let for sinking first 50′ in 1919.

TONOPAH DIVIDE JUNIOR MINING CO. **NEVADA**

Office: Tonopah, Nev. W. T. Brown, res. agt.

Officers: H. H. Brown, pres.; L. R. Robins, v. p.-gen. mgr.; W. J. Gomm, sec.-treas., with Gust Hanson and James Grimes, directors.

Inc. Feb. 24, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par; non-assessable. Listed on San Francisco Stock Exchange and New York Curb.

Property: 3 claims, adjoining the Tonopah Divide at S. W. corner and the Grimes Divide.

Development: shaft sinking under way, down 150′ June, 1919. **Equipment:** electric hoist, etc.

TONOPAH DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: H. C. Brougher, pres.; George Wingfield, v. p.; W. J. Douglass, v. p.; E. J. Erickson, sec.-treas., with E. W. Blair, directors. S. C. Mitchell, asst. sec.-treas. William Watters, supt.; E. A. Julian, gen. mgr. and cons. eng. G. H. Garrey, cons. geologist.

Inc. June 3, 1912, in Nevada. A reorganization of the Tonopah Gold Mountain Mining Co.

Cap., 1,250,000 shares; $1 par; 1,010,800 issued. Listed on San Francisco and New York Stock Exchanges. Annual meeting, first Wednesday in March. Tonopah Banking Corporation, registrar.

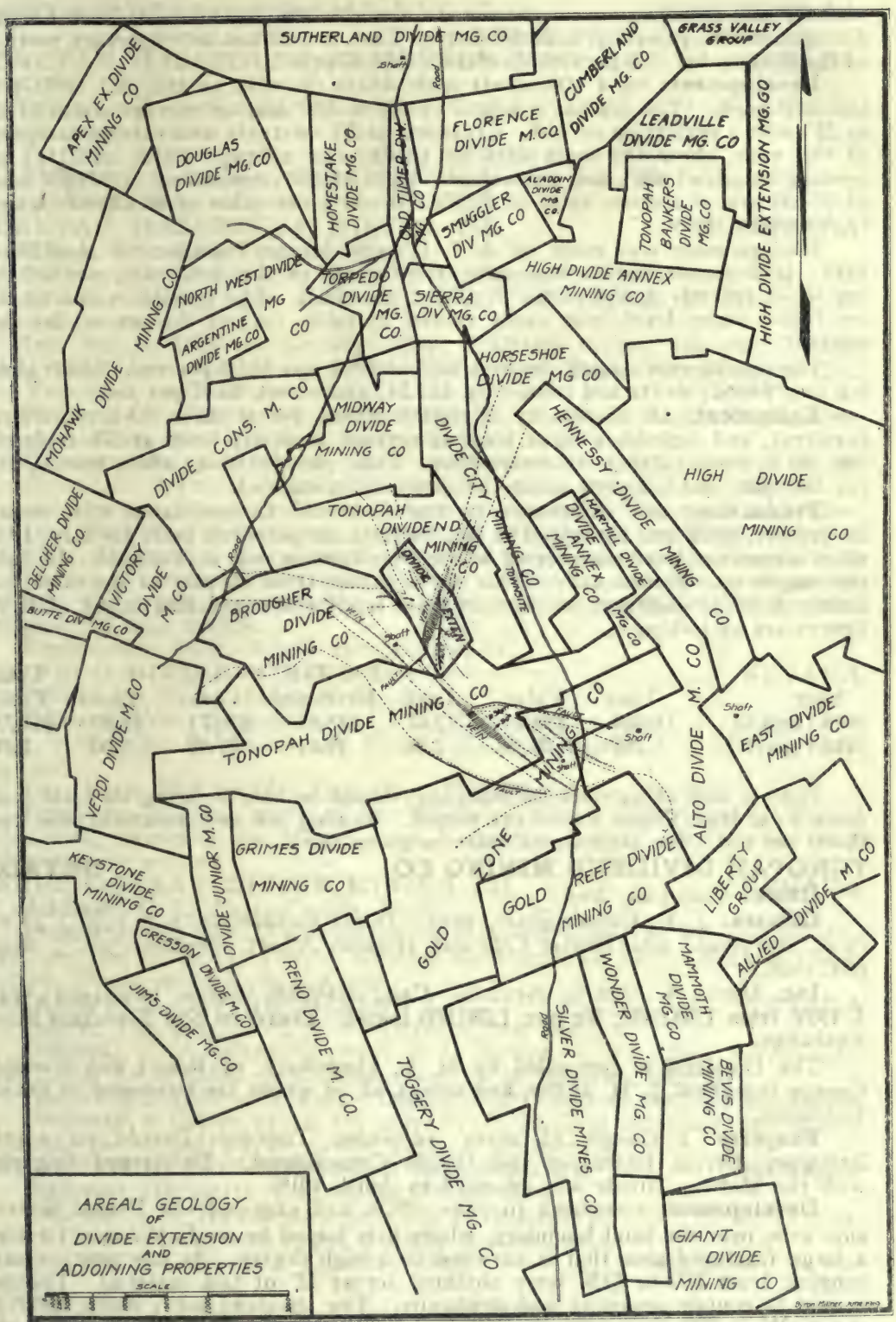
Balance sheet as of December 31, 1918, shows assets amounting to $1,035,335, of which mine property is placed at $956,367, and development at $58,503. Current assets were then $20,464, and liabilities $24,815. By June 30, 1919, these liabilities had been paid off and there was a cash balance of $4,842.

Property: 13 claims, patented, 150 acres, in the center of the Divide district, on the eastern slope of Gold Mountain.

Geology: the Divide vein, as the main ore fissure of the mine is called, is a shear-zone in the Divide breccia, a rock formed of rhyolite fragments. The vein is large, varying from 15 to 30′ across and has sharp walls. A vertical post-mineral slip runs with the vein, but crosses it, and is accompanied by many sympathetic minor slips with all sorts of strikes and dips. This fracture has been followed by the levels, which accounts for some apparent irregularities of the orebody. The ore shoot is often bounded by clay seams, but in places the values fade out into the wall rock. At one place the ore is 90′ across, though it averages 20 to 25′ in width. The outcrop is a soft altered rhyolitic breccia, stained with red and yellow iron oxides, without conspicuous quartz, and of rather unattractive appearance, although a red seam carries horn silver. A rhyolite dike intersects the vein at a small angle at the northwestern end of the 365′ level.

A second ledge, known as the Gold vein, outcrops on the property and was mined in former years. It runs E.-W. and would intersect the Brougher vein to south, if not faulted. A crosscut to the Gold vein shows two normal faults running north 75° west and with steep south dip, bringing down the overlying formation.

The gangue of the Divide ore is a kaolinized rhyolite breccia, in which



PROPERTY MAP OF CENTER OF DIVIDE DISTRICT, NEVADA.

scarcely any silicification can be noted. On the 165′ level an oxidized molybdenum mineral, powellite, a molybdate of lime, constitutes an important portion of the gangue, but this material decreases with depth.

Development: by a 600′ shaft with drifts on vein at 165, 265, 365, 470, and 585′ levels. The ore has a length of 300 to 510′ and an average width of 20 to 25′, with a maximum of 110′. Crosscuts at 50′ intervals with careful sampling of the mine, show the main orebody to have an average width of 21½′, an average length of 400′, and a developed depth of 500′, equivalent to 330,800 tons of $27.60 ore, at a gross value of $9,108,000 and a net value of $6,138,000, which is about $6 a share.

This estimate was made by A. I. D'Arcy, former manager, in November, 1919. It does not include any value for the ore of the Gold vein, nor of the ore shoot recently found to the N. E. of the shaft. The possible value of the ore below water level, may easily exceed in value, that of the ore so far developed.

The mining cost during the first half of 1919 was $6.93 per ton. Shaft sinking cost $40.62; drifts and cross-cuts, $12.54; and raises, $8.47 per foot.

Equipment: all machinery is motor-driven (with three 50-k. w. transformers), and includes a large hoist at surface, auxiliary hoist at 370 ft depth, one 350 and one 1,200 cu. ft. compressor. Plant includes assay office, houses, etc. for 100 men, and complete outfit for extensive operations.

Production: ore shipments to the Goldfield Consolidated mill began in October, 1918, and continued at rate of 220 tons per week until January, 1919, when shipments were transferred to the MacNamara mill at Tonopah. In July, the output was 60 tons daily. This ore is drawn from all part of the mine, but mainly from development on the four main levels and connecting raises. Official figures are as follows:

		Per Ton					Total
Year	Tons	Value	Loss	Extracted	Cost	Profit	Profit
1919 (half).....	6,464	$28.24	$2.67	$25.57	$16.71	$8.86	$57,757
1918 (quarter)...	788	20.89	2.28	18.61	17.98	0.63	1,245

With a mill of its own the company should be able to bring its total costs down to at least $9 per ton of ore mined. Hauling ore and treatment now cost $8.403 per ton. See estimate of reserves given above.

TONOPAH DIVIDEND MINING CO. NEVADA

Office: Tonopah, Nev.

Officers: J. R. Cunningham, pres.; Julius Goldsmith, v. p.; E. P. Cullinan, sec.-treas., with Ernest Cole and Herman Albert, directors. G. J. Murphy, supt.

Inc. March 4, 1918, in Nevada. **Cap.,** 2,000,000 shares; increased April 1, 1919, from 1,500,000; 10c par, 1,280,000 issued. Listed on San Francisco Stock Exchange.

The Dividend is controlled by H. G. Humphrey, of Reno; Zeb Kendall, George Wingfield, J. H. Miller, and others, all of whom are interested in Divide Extension.

Property: 6 claims, 85 acres, adjoining Tonopah Divide on south, Brougher, Divide Extension and Divide Consolidated. Threatened litigation with the Midway Divide was adjusted in April, 1919.

Development: trenching in June, 1919, had exposed the Divide Extension vein, near the joint boundary, where it is joined by an E.-W. vein forming a large fractured area that is enriched to a high degree. At one point, assays ranging from $50 to $150 were obtained across 12′ of this material. The ore is said to contain argentite and stephanite. The Dividend main shaft, 1,500′ to the N. W. is 500′ deep. On the 300′ and 500′ levels, crosscuts driven to cut the vein, had not yet reached it in January, 1920. The new shaft, close to the end-line of the Divide Extension, showed 6½′ of $60 ore at 50′ depth.

Equipment: electric hoist, compressor, drills, etc.

TONOPAH GOLD MOUNTAIN MNG. CO. **NEVADA**

Re-organized in May, 1912, as the Tonopah Divide Mining Co., which see.

TONOPAH HASBROUCK EXTENSION MNG. CO. **NEVADA**

Office: Tonopah, Nev., P. J. Somers, res. agt.

Officers: P. J. Somers, pres.; Jos. F. Ford, v. p.; B. J. Byrne, sec.; Geo. K. Ford, treas.

Inc. May 4, 1918, in Nevada. **Cap.,** 1,500,000 shares; 10c par.

Property: 4 claims adjoining the Hasbrouck mine on west. Sinking shaft and equipment ordered.

TONOPAH HASBROUCK MINING CO. **NEVADA**

Office: Box 1235, Tonopah, Nev.

Officers: G. A. Kernick, pres.; H. F. Bruce, v. p. and cons. engr.; B. L. Wilson, sec.-treas.; also directors. A. A. Codd, res. agt. at Reno; J. A. McLaughlin, supt.

Inc. Feb. 6, 1918, in Nevada. **Cap.,** 1,500,000 shares; 10c par; 750,000 issued. Listed on San Francisco Stock Exchange. Registration Security Co., San Francisco, transfer office.

Property: 6 claims, 130 acres, 3,000′ W. of the Tonopah Divide, between which are the Hasbrouck Annex, Kernick, and Verdi.

Development: a 200′ shaft, sunk about 16 years ago, opened 10 to 25′ of milling ore. A tunnel driven on the vein somewhat later yielded 1,000 tons of ore, and a recent extension of the tunnel cut another vein. The ore is in rhyolite. In May, 1919, the old shaft was deepened to 400′, the old workings re-opened and 50 to 100 tons of ore per week mined and shipped to the MacNamara mill at Tonopah. A substantial tonnage blocked out by old and new work on the 200′ and 400′ levels, the ore being 15′ wide and assaying $12 to $50 per ton. Shipping 100 tons weekly.

Equipment: hoist, 4-drill compressor, etc.

TORPEDO DIVIDE MINING CO. **NEVADA**

Office: 205 Nixon Bldg., Reno, Nev.

Officers: Wm. Watters, pres.; J. L. McCarthy, v. p.; J. F. Kunz, sec.-treas., with Roger Dougherty and Richard Finn, directors. A. I. D'Arcy, cons. engineer.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 50 acres north of the Divide City, and 3,000′ north of Tonopah Divide, adjoining the Midway and Homestake mines. Shaft being sunk and machinery erected.

TRADE DOLLAR DIVIDE MINING CO. **NEVADA**

Address: C. L. Farr, Ogden, Utah.

Property: the Rim Divide group of 7 claims in the N. W. part of district, near the Goldsmith Divide, acquired on August 14, 1919. Work has been started. Examined by Rolla E. Clapp.

TREADWELL DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev., J. K. Pittman, res. agt.

Officers: F. M. Manson, pres.; J. H. Miller, v. p.; Allen Rives, sec.-treas., with Zeb Kendall, J. E. Adams and A. G. Raycraft, directors.

Inc. April 2, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par; assessable.

Property: 8 claims, about 1¼ miles N. E. of Gold mountain and nearly adjoining the Mizpah Divide on the East. Is prospecting.

TREASURE DIVIDE MINING & LEASING CO. **NEVADA**

Address: 218 North Virginia St., Reno, Nev.

Officers: J. G. Huntington, pres.; S. H. Rosenthal, v. p.; H. F. McCray, sec.; P. R. Whytock, cons. engr.; Thomas Bosanco, supt.

Inc. 1919, in Nevada. Treasury shares were being sold at 15c in December.

Property: a 2-year lease on part of the Polo claim of the Revert Divide Mining Co. The leaseholder has 5 years after the lease expires in which to treat the ore.

Development: in December, 1919, shaft was down 30′ on the Revert, showing 14″ of 224 oz. silver ore. Machinery has been erected.

TRILBY DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: Henry Malloch, pres.; E. H. Bisson, v. p.; A. R. Miller, sec.-treas., with R. E. Connolly and Eleanor Sooy, directors.

Inc. March 28, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par; non-assessable. Listed on San Francisco Stock Exchange. Transfer office: 542 Mills Bldg., San Francisco, Cal.

Property: 4 claims, 50 acres, adjoining the Belmont Divide, the Rosetta and Argonne. Examined by A. H. Elftman. Surface exposures said to be good.

Development: sinking and erecting hoist in May, 1919. By August, shaft was down 100′, where samples yielded a few dollars per ton.

TRINITY DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev., and Lovelock, Nev.; H. H. Hunter, Jr., res. mgr.

Officers: F. E. Baker, pres.; H. E. Loufek, v. p.; V. M. Place,, sec.-treas.; with J. G. Huntington and H. H. Hunter, Jr., directors.

Inc. May, 1919, in Nevada. **Cap.,** $150,000; shares, 10c. par.

Property: 3 claims, one of the outsiders, 4 miles S. E. of Gold Mountain and 1½ miles S. of the Goldsmith Divide.

UNION DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. F. K. Pittman, res. agt.

Officers: J. B. Hutchinson pres.; A. S. Haskell, v. p.; J. T. Wall, sec.-treas.; above with Frank K. Pittman and Peter Halloran, directors.

Inc. April, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c. par; assessable, 750,000 in treasury.

Owns 4 claims adjoining the Signal and north of the Sutherland.

VERNAL DIVIDE MINING CO. **NEVADA**

Property: near Verdi Divide, west of Tonopah Divide.

VERDI DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev. and Reno, Nev. Paul Revert, agt.

Officers: A. Revert, pres.; G. E. Benham, v. p.; C. S. Stevens, sec.-treas., with C. C. Bridgeman, directors.

Inc. March 21, 1919, in Nevada. **Cap.,** 1,500,000 shares; 1c. par; non-assessable. Listed on San Francisco Stock Exchange.

Property: 6 claims, adjoining Tonopah Divide on its west end. This tract was located 18 years ago, and a 240′ shaft sunk.

Development: a new shaft was put down in 1919, and an electric hoist and compressor installed. Careful sampling of 100 tons of ore on the dump show it to average $25 per ton, indicating that the old shaft and workings are worth reopening.

VICTORY DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: A. I. D'Arcy, pres.; H. E. Clark, v. p.; Andrew Walz, 2nd v. p.; H. B. Ruhl, sec.-treas.; with C. A. Heller, directors; B. E. Garnett, asst. sec. treas.; S. M. Wilson, supt.

Inc. Jan. 11, 1919, in Nevada. **Cap.,** 2,000,000 shares; 10c par; 1,885,000 issued. Listed on San Francisco Stock Exchange. New York Trust Co., registrar.

Revenue in 1919 was $89,562, mostly from sale of shares; expenses were $44,464; cash on hand at end of year was $45,098.

Property: 3 claims and 3 fractions adjoining the Divide Consolidated, Verdi, Brougher, and Belcher.

Development: 2-compartment shaft was 220′ deep in January, 1920, and a crosscut at 200′ showed ore that assayed $5 to $24 per ton.

VINDICATOR DIVIDE MINING CO. **NEVADA**

Office: 155 Main St., Tonopah, Nev. F. T. Dunn, agt.

Officers: A. J. Rigali, pres.; D. W. Ryan, v. p.; P. E. Brown, sec.-treas., with W. H. Hart (supt.) and E. J. Robertson, directors.

Inc. in Nevada. **Cap.,** $150,000; shares, 10c. par.

Property: 5 claims, 60 acres west of the Hasbrouck groups and 1¾ miles west of Tonopah Divide. Also owns 4 claims in Lone mountain district.

Development: shaft sinking under way in a brecciated rhyolite. Equipment purchased in 1919 cost $12,575.

WEST DIVIDE EXTENSION MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. F. Good, pres.; R. C. McCarthy, v. p.; J. W. Dunfee, v. p.; W. A. Wright, sec.-treas., and H. C. Kane, directors.

Property: 2 claims adjoining those of the West Divide Mining Co.

WEST DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: L. L. Patrick, pres. and mgr.; H. B. Ruhl, v. p.; B. E. Garnett, sec.-treas., with K. M. Patrick and Al. McCoy, directors.

Inc. May, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c par; non-assessable. Listed on San Francisco Stock Exchange.

Property: 5 claims, in the West Divide district, 5 miles W. of Tonopah Divide on west slope of Lone mountain. The main vein trends N. E.-S. W., and dips E. It has been opened by trenching for a length of 2,000′ and shows a width of 2 to 7′. An east vein also opened by a surface trench, shows ore running 98.8 oz. silver per ton. An old 150′ tunnel, driven in 1906 and 1911, yielded 17 tons of 160-oz. ore. This tunnel is said to show 18″ of 8 to 12-oz. ore, and 5′ of rich ore.

Development: a shaft with a drift at 60′ depth shows ore assaying up to 127 oz. silver per ton, over 40 tons being available for shipment.

Equipment: includes a complete plant for sinking.

WESTERN DIVIDE MINING & MILLING CO. **NEVADA**

Office: 421 Clay Peters Bldg., Reno, Nev.

Officers: S. E. Meserve, pres.; A. H. Butler, Jr., v. p.; with G. A. Kernick, A. A. Codd, and H. F. Bruce, directors. E. E. Glass, sec.-treas.

Inc. February 12, 1919, in Nevada. **Cap.,** $150,000; 10c par. Listed on San Francisco Stock Exchange.

Property: 8 claims, 150 acres E. of the Hasbrouck Annex and 1,500′ S. W. of Tonopah Divide.

Development: includes an old 900′ tunnel, which cut a vein at a point 700′ in. This is to be further prospected. Sinking shaft. Well equipped.

WILSON DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Officers: J. R. Cunningham, pres.; J. M. Fenwick, v. p.; E. P. Cullinan, sec.-treas., with M. J. Fitzgerald and T. M. Sheets, directors. Homer O'Connell, supt.

Inc. April 2, 1919, in Nevada. **Cap.,** $150,000 shares; 10c par. Listed on San Francisco Stock Exchange.

Property: 4 claims, 75 acres, over 1 mile from Tonopah Divide and adjoining the Mohawk Divide. Equipped and sinking shaft.

WONDER DIVIDE MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: D. S. Ward, pres.; Joseph Bruder, v. p.; F. E. O'Neal, sec. and supt.; E. Marks, treas.; L. F. Detweiler, directors.

Inc. March 21, 1919, in Nevada. **Cap.,** 1,500,000 shares; 10c. par; non-assessable. Listed on San Francisco Stock Exchange.

Property: 2 claims, adjoining the Mammoth Gold Reef and Silver Divide, developed by 50′ shaft. Sinking, 1919.

Equipment: electric hoist and compressor installed.

YANKEE DIVIDE MINING CO. **NEVADA**

Office: Divide, Nev.

Officers: Hon. C. R. Evans, pres.; G. H. Howard, v. p.; C. P. Johnson, sec.-treas., with J. W. Crane and J. T. Murphy, directors.

Inc. April, 1919, in Nevada. **Cap.,** $150,000; shares, 10c par.

Property: 1 claim, 3 fractions in the S. E. section of the district ad-

joining the Liberty, Bingo, Champion and Gold Seam. Said to show veins carrying good ore.

Equipment: includes hoist and electric compressor.

YELLOW ASTER DIVIDE MINING CO. **NEVADA**

Property: over 3 miles S. E. of Gold Mountain.

YUKON DIVIDE MINING CO. **NEVADA**

Office: Tonopah, Nev.

Inc. 1919, in Nevada.

Property: 90 acres in Klondyke section of the Divide district, 6 miles south of Divide mine.

ELY DISTRICT.

BOSTON & ELY CONS. MINING CO. **NEVADA**

A consolidation of the Boston-Ely Mining Co., Smokey Development Co., and Ely Northern Copper Co

Address: Room 821, 25 Broad St., New York City.

Officers: L. E. Whicher, pres.; C. C. Burger, v. p.; R. M. Atwater, Jr., treas., with W. W. Cohen, W. F. Bartholomew, Geo. R. Presby, H. W. Barrett, W. N. McGill and A. L. Kingsbury, directors. L. J. Corwin, sec. Raymond Guyer, gen mgr.; S. H. Williams, mgr. at Ely.

Inc. 1919, in Delaware. **Cap.,** $1,000,000; $1 par; 897,210 outstanding. N. Y. Trust Co., transfer agent. Stock traded in on Boston Curb.

Property: 572 acres in Robinson mining district, White Pine county, about 140 miles from Cobre on the Southern Pacific R. R.

The Boston-Ely ground is 4½ miles from that of the Smokey group, the Nevada Consolidated and Consolidated Copper mines lying between. The Smokey and Ely Northern are 1/3 mile apart. All have rail connection nearby.

The mines have been idle for many years and are fully described in former volumes of this book: Ely No. C. Co., Vol. VIII; Boston-Ely, Vol. XI; Smokey Development, Vol. XI.

Company also owns an interest in the Colonial Silver Mines at Oaxaca, Mex., and in some oil-lands.

Geology: the copper-bearing ores occur in contact deposits between limestone and porphyry, as well as in the porphyry itself.

Development: by 1,230′ shaft in the Boston-Ely, which, with drifts and machinery, cost $180,000; this shaft is 3,000′ from the Alpha shaft of Consolidated Coppermines; by 1,800′ tunnel in the Smokey, costing $60,000; by 300′ tunnel in the Ely Northern costing $15,000.

Work in 1919 included clearing out the Smokey tunnel, in which a shaft is to be sunk at a point 1,665′ from the portal to explore the sulphide vein and porphyry areas below the tunnel.

Outlook for company is considered favorable, as indications on the Ely Northern, possibilities in the Smokey, and proximity (3,000′) of the Boston-Ely to the Consolidated Coppermines Alpha mine, give it several chances to make a producer.

BOSTON-ELY MINING CO. **NEVADA**

Consolidated with Smokey Development and Ely No. Copper as Boston Ely Cons. Mining Co., which see. Fully described in Volumes XI and XIII.

BUTTE & ELY COPPER CO. **NEVADA**

General office: 1500 Alworth Bldg., Duluth, Minn. **Principal office:** Room 302, O'Rourke Estate Bldg., Butte, Mont. Mine P. O.; Kimberly, White Pine county, Nev.

Officers: Jos. B. Cotton, pres.; John D. Pope, v. p.; John W. Neukom, sec. and asst. treas.; Thos. B. Adams, treas.; H. A. Holp, asst. sec.; also directors.

Inc. July 27, 1905, in Montana. **Cap.,** $500,000; shares $1 par; stock was made assessable, 1907. Is a subsidiary of the Consolidated Coppermines Co., which owns 422,625 shares. On December 31, 1918, had $295,772 in cash and cash assets in treasury. Net income for 1918 was $3,845. Stock is listed on the Butte Mining Exchange. Annual meeting, first Monday in June.

Property: 12 claims, patented, 210 acres, in the Robinson district adjoining the Nevada Consolidated, White Pine county, includes a valuable water right, 20 miles distant, said to be capable of supplying 2,000,000 gal. daily; also 80 acres irrigable land near water rights.

Development: 3 shafts, 1 with steam hoist, 310′ deep, showing disseminated ore. Mining was suspended late in 1907, but churn-drilling was carried on in succeeding years intermittently, developing several bodies of low-grade disseminated ore, said to show an average of 1½% copper.

In 1916 the Nevada Consolidated Copper Co. mined for account of Butte & Ely 2,218 tons of ore from the Liberty Bell and Westphalia claims. This ore assayed 1.375% copper and yielded 39,777 pounds of electrolytic copper. As the Liberty Pit is extended westward, the above and several other Butte & Ely claims will be stripped and mined on the same terms as apply to mining of Coppermines ore under its contract with the Nevada company.

CENTENNIAL DEVELOPMENT CO. NEVADA

Ely, White Pine Co., Nev. Probably dead. See Vol. XII.

CONSOLIDATED COPPERMINES CO. NEVADA

Office: 120 Broadway, New York. **Mine office:** Kimberly, White Pine county, Nevada.

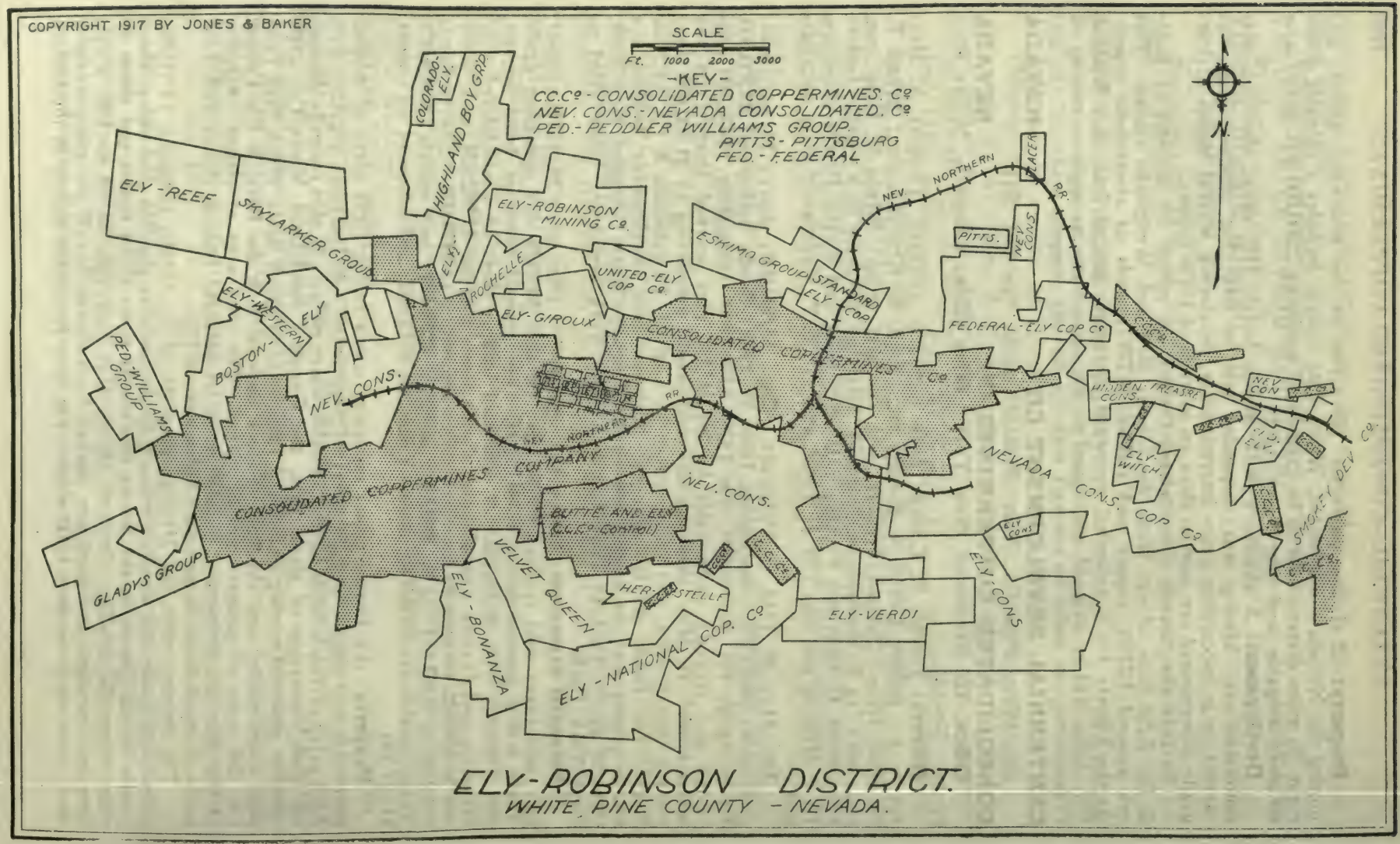
Officers: Joseph B. Cotton, pres. and gen. counsel; Thomas A. Merritt, v. p.; Robert Linton, v. p.-mgr. dir.; Fred. R. Kennedy, sec.; Ernest R. Grochau, treas.; Samuel Brenner, asst. sec.-asst. treas.; Edwin F. Gray, con. eng., with Ira B. Humphreys, Arthur J. Selfridge, Frederic R. Kennedy, Isidore Hernsheim, C. Lawrence Perkins, I. W. Bernheim, and Martin Pascus, directors. H. S. Munroe, gen mgr.; H. B. Paull, auditor; E. P. Mathewson, cons. metallurgist.

Inc. May 20, 1913, in Delaware. **Cap.**, $8,000,000; shares $5 par; non-assessable; $4,802,795 outstanding June 30, 1919. Bonds authorized $3,500,000, 1st mortgage 7% convertible, due 1928; $3,063,700 outstanding ($436,300 converted and retired), redeemable by lot at 110 plus accrued interest on any interest day. In May, 1919, the unissued bonds, amounting to $1,000,000 were offered shareholders, and underwritten by Carl H. Pforzheimer & Co. of New York. The funds are to carry out intensive mine development, holding the unsold copper until the market improved. Guaranty Trust Company, New York, transfer agent; Bankers Trust Company, New York, registrar. Stock listed on New York Curb.

Financial Statement: during the year ended December 30, 1918, copper, gold and silver sold realized $3,786,658. Of this, $45,429 was operating profit. There was a general deficit of $111,995, when general expenses, bond interest, and discount were deducted. A combined balance-sheet of Consolidated Coppermines and Giroux Consolidated shows assets totaling $1,992,924, and liabilities $1,538,922, making an excess of assets amounting to $454,002. Liberty Bonds amount to $297,554; cash, $99,520; supplies, $278,473; and metals, $1,029,079. Notes payable are $200,000; accounts payable, $311,392; and advances on copper, $1,027,530.

Property: the Coppermines company owns in fee 1,151 acres of mining properties and claims, and 120 acres of unpatented lode locations, together with 2,565 acres of ranch lands having valuable water-rights. It also controls through its stock ownership of about 99%, the Giroux Consolidated Mines Co., 2,000 acres of patented mining claims and 1,800 acres of ranch lands, which have valuable water-rights; and through its stock ownership in the Butte & Ely Copper Co., 209 acres of patented mining claims. The total area of claims, exclusive of the Mexican properties, is 3,480 acres of patented mining claims and 4,365 acres of ranch lands, beginning 2 miles west of Ely.

The Sultana mine, the Mexican property of the Giroux company, 11 claims comprising about 459 acres of mineral lands, includes the San Jose mine, about 1 mile W. of Copete, in the Sierra de Oro, 25 miles E. of Carbo and about 35 miles from Hermosillo. Property shows a contact vein of 50 to 100′ width, between limestone and porphyry, opened by 3 shafts, No. 2, the main working shaft, sunk on an incline, 1,200′ deep. The San Jose mine shows, in the bottom



ELY-ROBINSON DISTRICT.

WHITE PINE COUNTY - NEVADA.

level, a vein of about 40′ width, carrying oxidized ores to shallow depth, succeeded by sulphides. The Mexican property as a whole shows low-grade copper ore with fair gold value. Total production to January, 1908, was $542,000. Mines have not been in operation for several years, owing to unsettled political conditions in Mexico.

Geology: there are three classes of ore deposits occurring on the Nevada properties (1) chalcocite disseminated in porphyry forming concentrating ore similar to that of the Nevada Consolidated Co., lying in large continuous masses that can be mined at low cost, some by open-pit steam-shovel methods, others by underground methods; and (2) heavy sulphide ore, high in iron and higher in copper than the disseminated ore; and (3) direct smelting ore in fissure and replacement deposits in limestone at or near limestone-porphyry contacts.

The porphyry ore is very friable and readily amenable to concentration. The Morris and Brooks orebody has a proven length of over 2,000′, a width of 400′ and depth of 100′ to 175′, but drilling has not yet been extended downward to the bottom of the orebody, along the south side. Another large orebody has been proved on the west end of the Liberty Eureka pit on the Ora and adjacent claims. Drilling has disclosed considerable ore in the ground between these two orebodies, and farther east on the Minnesota and adjoining claims drilling and underground work has exposed sulphide ore in the Old Glory mine. However, the lands are so extensive that only a small part of the property has been thoroughly drilled. During 1918, there was 6,980′ of drilling done, 360′ for ventilation and 1,470′ for re-checking old holes. The other work was of a preliminary nature in areas more or less isolated from the proven orebodies.

Contact and limestone replacement orebodies have been developed only on the Alpha. The ore-bearing zone has been developed in this mine for a length of 650′ and width of 200′ and opened on the 850′ to 1,600′ level and the shaft, 1,640′ deep is still in this material. The Alpha mine has the only deep exploration work so far done to explore this limestone-porphyry contact. It is considered that the Coppermines Co. has several thousand feet along the south contact and a similar length along the north contact, much of which is favorably regarded. Regular shipments of this direct smelting ore were commenced in the spring of 1917, since when 82,917 tons of 7.67% ore has been shipped. It is estimated that over 100,000 tons of 8% ore is exposed.

Development: porphyry ores have been developed by over 100 drill-holes, totaling 66,936′; also by extensive underground work on the Morris-Brooks, Minnesota, Old Glory, and other claims. The Morris-Brooks mine was opened in 1917, and worked until January, 1919, to test the adaptability of the branch-raise caving system, and to provide ore for the Kimberly mill, wherein experiments were made to determine the best treatment. During this period, 408,590 tons were mined and milled. Future extraction will be by stripping and steam-shoveling. Reserves in this mine have been estimated at over 2,000,000 tons. New work in this mine during 1918 totaled 17,146 ft., being done solely to open the property for economical extraction of ore. The total is 63,377 feet.

The Alpha mine has extensive lateral work on the 770, 1,000, 1,200 and 1,500′ levels. The Alpha No. 1 shaft is 1,200′ deep, and No. 2 is 1,440′ deep, connects with the same workings, and is to be sunk 200′ deeper. During 1918, development in the Alpha totalled 8,487′. New work up to April 30, 1919, was 4,940′; the total is 20,546′. Exploration has proved definitely the existence of a series of N. W.-S. E. slip-planes in the altered zone (probably due to faulting), along which commercial bodies of ore are found. These slips have been followed vertically for a distance of 450′. On the 1,000′ level new ore has been cut 300′ west of any other known ore on this level; larger bodies exist at 1,100′ than at 1,000′. On the 1,200′ level continuous ore from a few feet to 50′ wide has been followed for a length of over 400′ and averages 8% copper; while on the 1,300′ level equally rich ore has been found. A diamond drill hole at the extreme western end of the 1,300′ level, passed through 20′ of ore averaging 7.28 per cent. copper lying between the 1,300 and 1,400′ levels. At greater depth the drill cut through 65′ of ore that averaged 7.1 per cent. copper, extending down to a

depth of 1,555′. This orebody lies about 400′ east of the first hole drilled, showing 33′ of 7.65 per cent. ore.

In January, 1920, active development was in progress at the Taylor mine on the north contact. On the 150′ level a crosscut passed through 50′ of sulphide ore reported to average about 2% copper and $1.50 gold and silver, with 10% sulphur. A crosscut is also being run on the 250′ level.

Ore reserves (May 1, 1919):

Class of ore	Tons	Copper, %
Fully developed disseminated sulphide porphyry....	9,957,700	1.41
Partly developed disseminated sulphide porphyry....	9,695,000	1.25
Total	19,653,034	1.33
Heavy sulphide	156,000	3.21
Alpha oxide	100,000	8.00

Mine equipment: at No. 2 Alpha shaft includes a 26x48″ Allis-Chalmers double-cylinder hoist capable of handling 5-ton skips in counter-balance to depth of 1,800′, at a hoisting speed of 1,500′ per minute; also a 20x48″ Allis-Chalmers hoist for the cage.

Pumping equipment consists of two pumps of 600 gallons and one of 1,200 gallons capacity per minute at the main pumping station on the 1,200′ level. There is also an 800-gal. pump on the 1,400′ level.

A three-mile private railway connecting the principal shafts with the Nevada Northern Railway, has grades averaging about 1.5%. Equipment includes several Porter locomotives of 600 tons tractive power, and sufficient ore-cars for present requirements.

Ore treatment: careful concentration tests were made on the porphyry ores by J. M. Callow, of Salt Lake, whose results were used in re-modeling the old mill at Kimberly. Concentration is principally by flotation. The remodeled concentrator having a capacity up to 1,000 tons per day, was worked until January, 1919.

During the last four months of operation, the mill recovered 82.31% from 1.336% ore. Concentrate carried 18.33% copper and 9.39% moisture.

The company employed Frederick Laist, of the Anaconda Copper Mining Co., to design reduction works. His conclusions are based on (1) the concentration of 2,000 tons daily of 1.4% porphyry ore; (2) the concentration of 150 tons daily of 2.9% sulphide ore; and (3) the smelting of 150 tons daily of Alpha 7.5% oxide ore. Assuming that these ores can be delivered at reduction works at $1.10 per ton for the first, $5 for the second, and $10 for the third, for a period of not less than 10 years, Mr. Laist recommends building a concentrator to handle 2,000 tons daily of porphyry and 150 tons of sulphide; also a 3,000-k. w. powerplant, and a 500-ton reverberatory smelting plant for concentrates and oxide ore. The equipment will include waste-heat boilers, turbo-generators, coal-dust fired reverberatories, and Great Falls converters. These works will be at Kimberly, thus saving the 28 cents a ton freight to Ely. The total estimated cost of producing copper is given as 12.35 cents per pound. The cost of the works would be $2,500,000. In November, 1919, E. P. Mathewson was engaged to erect the new works.

Direct smelting ores as well as the concentrates from the Kimberly concentrator have been treated at the Steptoe plant of the Nevada Consolidated Copper Co. under a five-year contract made in 1917.

Nevada Consolidated agrees to mine and treat for account of the Cons. Coppermines, from properties at the west end of Liberty Pit, 415,000 tons of ore during the period ending August 15, 1918, and after that date at least 75,000 tons per year. Coppermines company, reserved the right to cancel the contract any time after August 15, 1918, upon giving three months' notice.

Production: during 1918, the company and its lessees extracted from the 3 mines 496,793 tons of ore, yielding 15,768,481 lb. of copper, 4,338 oz. of gold, 17,415 oz. of silver, 768,101 lb. of zinc, 178,451 lb. of lead, and 323,170 lb.

of manganese. During the first four months of 1919 the respective totals were 32,816 tons ore, 1,516,296 lb. copper, 362 oz. gold, 1,259 oz. silver, 653,804 lb. zinc, 15,144 lb. lead, and no manganese.

Management of the company is now in strong and able hands, and a progressive operating policy is practiced.

ELY AMALGAMATED COPPER CO. **NEVADA**

Company controlled since 1911 by Jesse Knight, pres., Provo, Utah, who owns 51% interest.

Inc. 1907, in Utah. **Cap.**, $100,000; shares 10c. par.

Property: 6 claims, and a townsite, about 1 mile from the Steptoe smelter, of the Nevada Consolidated Copper Co., at McGill, White Pine county, carries silver-lead ores. Several carloads of ore shipped in 1917. No recent work reported.

ELY BELL MINING CO. **NEVADA**

Company probably dead. Stock worthless. Fully described Vol. XI, Copper Handbook.

ELY CONSOLIDATED COPPER CO. **NEVADA**

Company inactive. **Office:** 414 Judge Bldg., Salt Lake City, Utah. **Mines:** Ruth, via Ely, Nev.

Officers: at last accounts, S. M. Levy, pres.; D. B. Shields, v. p.; Gideon Snyder, sec.; John Pingree, treas., with Grant Snyder, directors. C. W. Geddes, cons. engr. and mgr.

Inc. October 2, 1906, in Utah. **Cap.**, $1,500,000; $1 par; changed January, 1917, from $1,000,000, shares $10 par, assessable, of which 300,000 shares were donated to treasury by incorporators; 887,765 shares listed on Boston Curb. Stricken from New York Curb June, 1918. Registrar and transfer agent, United States Corporation Co., 65 Cedar St., New York.

Property: 3 groups, 20 claims, 370 acres, in the Ely district, White Pine county.

The Ely property, 15 claims, about 300 acres is on the south side of the mineral belt, near the Ruth and Jupiter groups of the Nevada Consolidated. Developed by 3 vertical shafts. The 625′ Brilliant shaft has silver-lead ore on the 400′ level, and near the bottom is said to show a 100′ bed of disseminated copper ore, below commercial grade. The American shaft is 500′ deep. No work done in recent years, but property held intact.

ELY COPPER CO. **NEVADA**

Office: 815 Ernest & Cranmer Bldg., Denver, Colo. No representative at Ely, Nev. Idle since 1907. Fully described Vol. XI, Copper Handbook. Unfavorably regarded.

ELY GIROUX COPPER CO. **NEVADA**

Idle. **Office:** R. S. Nichols, sec., 111 Broadway, New York City. **Mine address:** Kimberly, White Pine county, Nev. Windsor Trust Co., New York, trustee.

Inc. 1909, by B. W. Coleman, Graham F. Putnam, and Roswell S. Nichols. **Cap.**, $5,000,000; shares $5 par. Stock listed on New York Curb as a prospect. In November, 1912, majority holdings were pooled, and $75,000 shares treasury stock offered public, proceeds to be handled by Windsor Trust Co. as trustee, exclusively for payment of contractors sinking shaft on company's property at Ely, Nev.

Property: in Robinson mining district. No returns secured, and company advertised delinquent for $91 taxes in January, 1916.

ELY-MIZPAH COPPER CO. **NEVADA**

Property: the Modoc group, near Ely, Nev. Assessment work neglected and property probably forfeited. See Vol. XI, Copper Handbook.

Principal promoter was A. M. Kearns, 1st Natl. Bank Bldg., Denver, Colo.

ELY NORTHERN COPPER CO. **NEVADA**

Merged in 1919 into the Boston & Ely Consolidated Mining Co., which see.

ELY REVENUE COPPER CO. **NEVADA**

Office: 830 Equitable Bldg., Denver, Colo.

Officers: F. C. Goudy, pres.; L. F. Twitchell, v. p.; J. P. M. Humphrey, sec.-treas.; above, with R. E. Sloan and A. E. Reynolds, directors.

Inc. 1907, in Colorado. **Cap.,** $1,000,000; shares $1 par. International Trust Co., Denver, registrar. Annual meeting first Tuesday in March.

Property: 132 acres, known as the Revenue group, at Ely, White Pine county, near the Chainman and Altman mines. Idle for several years.

ELY VALLEY MINING & MILLING CO. **NEVADA**

Dead. Fully described in Vol. XIII. Property now owned by the Silgoled Mining Co. of Nevada, which see.

ELY VERDI COPPER CO. **NEVADA**

Address: Geo. Wingfield, pres., Goldfield, Nev. Mine near Ruth, via Ely.

Directors: S. R. Roberts, John Berry, of Ely; A. P. Sawyer, and Leslie L. Savage, of Goldfield; M. R. Brown and H. S. Anderson, of Pierre, S. D.

Inc. May, 1912, in South Dakota. **Cap.,** $5,000,000; shares $5 par. Is a reorganization of company of same name that was listed on New York Curb in 1909.

Property: a large group of claims south of the Copper Flat steam-shovel pit of the Nevada Consolidated, in White Pine county. Only assessment work being done.

ELY WITCH COPPER CO. **NEVADA**

Officers: J. E. Bamberger, pres., 163 So. Main St., Salt Lake City, Utah; D. M. Hyman, v. p.-treas; H. Cohen, sec.; Ernest Bamberger, gen. mgr.; preceding with H. G. McMillan and W. W. Armstrong, directors, at last accounts.

Inc. November 22, 1906, in Maine. **Cap.,** $5,000,000; shares $5 par. Stock listed on Boston Curb, but inactive at last accounts.

Property: 7 claims, 1 fractional, 54 acres, patented, bought for $275,000, lying in the porphyry zone between the Ruth and Cumberland-Ely mines of the Nevada Consolidated, White Pine county, shows large blowouts of iron-stained porphyry.

Development: by 300′ shaft, with levels at 100′ intervals, and by tunnels of 1,200′, 600′ and 1,050′, with 3,500′ of workings. Development was disappointing, for, while claims cover the main monzonite belt of the district, the underground work on 300′ level showed values too low to work. Drilling by Nevada Consolidated Co. is the logical thing to do and that company can probably work this property since it is now handling 1.6% ore at a profit. Company was a speculative promotion at time Nevada Consolidated was floated, and proving lean on development, has been idle since.

FEDERAL ELY COPPER CO. **NEVADA**

Idle. **Office:** 26 Mining Exchange Bldg., Salt Lake City, Utah. **Mine office:** Ely, Nev.

Officers: J. A. Cunningham, pres., at last accounts.

Inc. 1914, in Utah. **Cap.,** $150,000; shares, 15c. par; reduced 1916 from $5,000,000; shares $5 par; assessable; 12 assessments levied to March, 1915.

Property: 21 claims, 3 fractional, 400 acres, also the Huesser ranch of 600 acres, 15 miles north of Ely, in the Steptoe valley, White Pine county, bought 1906, and a millsite. Mining lands are the Panama claim, bought 1909, for $10,000, lying about one-half mile north of the Star Pointer shaft of the Nevada Consolidated; 8 claims north of the Nevada Consolidated; 3 claims between the Cumberland-Ely and Turner-Ely, and the Queen of the West group, in Robinson Cañon. Company is said to have paid $225,000 for its lands.

Geology: property north of the Nevada Consolidated shows limestone beds dipping to the east, said to be underlaid by cupriferous monzonite, and to carry 3 parallel shear zones, each about 400′ in width, 600′ apart, showing a little copper and lead ore. The limestone capping on the Savage claim is said to carry lead ore. Churn-drill borings are said to have given a satisfactory showing of ore, and there also was some test-pitting and surface trenching.

Development: by tunnels aggregating about 1,600′ and 4 shallow shafts, 3 said to show copper sulphides at depth of 100′, the main shaft said to be near

the contact of 3 ore zones, which seems peculiar, if the ore zones are parallel, as claimed.

The Queen of the West shaft shows, at depth of 110′, a sulphide orebody of considerable size, averaging 3% copper, 1 to 2 oz. silver and 40 to 50 cts. gold per ton. The Kessler shaft, about 100′ deep, near the tunnel, shows lead carbonates of fair tenor. Mine has a small steam plant.

Company has done little save levy assessments for several years, doing barely enough work on the claims to meet annual assessment requirements. Their claims were surveyed for patent in 1912 and reported partly patented in 1914. Operated by lessees at last accounts.

GIROUX CONSOLIDATED MINES CO. NEVADA & MEXICO

General office: suite 3300, 120 Broadway, New York City. **Mine offices:** Kimberly, Nevada, and Carbo, Sonora, Mexico.

Officers: Albert C. Hubbell, pres.; Henry B. Paull, 1st v. p.; Ernest R. Grochau, 2nd v. p.; Joseph B. Cotton, general counsel; Frederic R. Kennedy, sec.; Thomas B. Adams, treas; foregoing with Samuel Brenner, Albert E. Humphreys, Jr., John D. Clarke, directors. H. T. Munroe, gen. mgr. and Nevada agent. Samuel L. Heslet, Mexican mine agent.

Inc. April 14, 1903, in Delaware. **Cap.,** $7,500,000; shares $5 par; issued $7,207,100. American Trust Co., Boston, registrar. Boston Safe Deposit & Trust Co., transfer agents.

The Giroux is now controlled absolutely by the Consolidated Coppermines Co., through exchange of Giroux stock for that of the Coppermines company. The latter company now owns about 98% of the total Giroux stock outstanding. For description of properties and operations see Consolidated Coppermines Co.

McDONALD-ELY COPPER CO. NEVADA

Office: Boston Bldg., Salt Lake City, Utah. **Mine address:** J. P. Turner, supt., Ely, White Pine county, Nev.

Officers: D. C. McDonald, pres. and gen. mgr.; Col. Enos A. Wall, v. p.; Geo. W. Parks, sec., Boston Bldg., Salt Lake City, Utah; Frank Knox, treas., with Frank J. Westcott, Geo. W. Lamb and Hon. Thos. Kearns, directors; E. P. Jennings, cons. engr. and mgr.

Inc. November, 1906, in Utah. **Cap.,** $1,000,000; $5 par: issued, $790,000. Debentures, $100,000, at 6%, maturing November 15, 1915. Shares were listed on the Salt Lake Stock Exchange, but withdrawn.

Property: 28 claims, patented, 325 acres. 19 claims held under bond and lease. Property, on the lime belt, in the N. E. part of the Ely district, carries 4 contact deposits, between porphyry and limestone, showing prominent iron outcrops. Management estimated veins as 20′ wide carrying oxidized ores, assaying 1 to 40% copper, and about 80 cts. gold per ton.

Development: is by the 415′ Wall tunnel, showing 21′ of heavy iron. The mine as a whole has about 3,000′ of workings.

Equipment: includes a 25-h. p. gasoline hoist, 40-h. p. steam hoist, and a 6-drill air compressor. There are 6 buildings, including necessary shops. A pumping plant and pipe line supply water from a spring at nearby ranch.

An old 50-ton mill, with rolls and cyanide plant, remains from a former ownership. The 100-ton concentrator has a gyratory crusher and 3 sets of rolls. In May, 1914, drifting was in progress. Idle for several years.

NEVADA CONSOLIDATED COPPER CO. NEVADA

Controlled by Utah Copper Co.

Office: 120 Broadway, New York. **Operating office:** McGill, White Pine county, Nev. Mine near Ruth, White Pine county, Nev.

Officers: Daniel C. Jackling, pres.; Chas. Hayden, v. p.; with Stephen Birch, E. A. Guggenheim, Wm. Pierson Hamilton, H. O. Havemeyer, W. E. Bennett, Wm. B. Thompson, Chas. M. MacNeill, W. Hinckle Smith, W. C. Potter and C. B. Lakenan, directors; C. K. Lipman, treas.

Operating officials: C. B. Lakenan, gen. mgr.; C. V. Jenkins, sec.; W. S. Larsh, underground supt.; F. E. Grant, shovel-pit supt.; Geo. C. Riser, mill supt.; D. D. Moffatt, cons. eng for mills; R. E. H. Pomeroy, smelter supt.

Inc. November 7, 1904, in Maine, as a merger of the Boston & Nevada

Copper Co. and White Pine Copper Co. **Cap.**, $10,000,000; $5 par; $9.997,285 issued; original cap., $5,000,000 increased February 5, 1908, to $8,000,000, and again increased November, 1909, to present figure. A former issue of $3,000,000 first-mortgage 6% convertible gold bonds, due April, 1918, has been retired. Old Colony Trust Co., Boston, and Guaranty Trust Co., New York, registrars; Boston Safe Deposit & Trust Co., Boston, and D. A. Crockett, 120 Broadway, New York, transfer agents. Shares listed on the New York and Boston stock exchanges. Annual meeting, third Friday in April.

Comparative General Balance Sheet: Nevada Cons. Copper Co. and Nevada Northern Ry. Co.—

Assets:

	Net Property and Equip.	Def'd Chgs. to Oper's	Metals on Hand	Other Current	Total
1918.....	$10,566,087	$5,450,974	$6,809,668	$8,802,466	$31,629,195
1917.....	10,986,337	5,454,520	6,533,188	11,044,595	34,018,640
1916.....	11,634,365	4,935,838	9,265,014	6,473,648	32,308,865
1915.....	12,198,977	4,136,970	4,998,829	2,512,439	23,847,215
1914.....	13,361,672	3,739,988	3,114,863	1,229,737	21,446,260

Liabilities:

			Surplus		
Year	Capital	Current	Stock and Secur. Sold	Earned	Total
1918.....	$9,997,285	$3,569,630	$7,071,850	$10,990,429	$31,629,195
1917.....	9,997,285	3,074,677	7,071,850	13,874,828	34,018,640
1916.....	9,997,285	2,300,219	7,071,850	12,939,511	32,308,865
1915.....	9,997,285	1,576,544	7,071,850	5,201,536	23,847,215
1914.....	9,997,285	1,756,982	7,071,850	2,620,143	21,446,260

Comparative Income Account: Nevada Cons. Copper Co.:

Year	Operating Revenue	Operating Expenses	Net Op'r'g Profit	Total Income	Total Deduct's	Balance* Dec. 31
1919.....	.....	.....	$8,345	$1,225,357	$2,999,185	$1,773,828**
1918.....	$16,787,657	$14,437,281	2,350,376	3,402,071	6,648,235	9,934,361
1917.....	20,279,723	11,635,375	8,644,347	9,937,599	9,110,716	13,180,526
1916.....	24,366,292	9,996,023	14,370,269	15,435,359	7,931,272	12,353,643
1915.....	11,685,276	6,544,593	5,140,683	5,905,602	3,346,672	4,849,556
1914.....	7,052,499	6,335,522	716,977	1,763,021	2,542,037	2,290,626

* Includes balance from previous year. ** Deficit.

Dividends: Begun October, 1909, rate 37½c. per share quarterly; paid $1.50 in 1910 and 1911; $2 in 1912; $1.50 in 1913; $1.12½ in 1914; $1.50 in 1915; $6.75 in 1916; $4.15 in 1917; $3.25 in 1918; $1.50 in 1919 to December 31; a grand total of $43,019,634. Last distribution, 25 cents on March 31, 1920.

Company absorbed the Cumberland-Ely Copper Co., paying $7,554,084 cash therefor, August 30, 1910. Shareholders of the Cumberland-Ely were given the opportunity of exchanging stock on the basis of 3¼ shares for 1 share Nevada Consolidated. The Nevada Consolidated is controlled by the Utah Copper Co., through ownership of 1,000,500 shares. The Nevada Cons. Copper Co. controls through stock ownership the Nevada Northern Railway Co.; also owns, through

NEVADA CONSOLIDATED COPPER CO.
Our Statistical Department will furnish complete information on application.
HAYDEN, STONE & CO.
Members New York, Boston and Philadelphia Stock Exchanges.
25 Broad Street, NEW YORK 87 Milk Street, BOSTON

purchase and absorption, the physical assets of the Steptoe Valley S. & M. Co., which was dissolved October, 1914.

Property: 106 claims patented, 27 unpatented. Distributed as follows: Copper Flat Group—33 patented claims, covering about 355 acres; 23 unpatented, Ruth Group—57 patented, 705 acres; and 4 unpatented. Veteran Group—14 patented; and 2 outlying patents; also 40 acres for water supply and railroad siding, and 182 acres for dumping overburden.

Geology: The geologic features of the property are somewhat similar to those of Morenci, Arizona, and Bingham, Utah. An area of Paleozoic limestones and shales is intruded by a great mass of monzonite porphyry, tilting and breaking the sedimentaries and forcing its way into them in dykes and sills. Alteration of both sedimentaries and monzonite is extensive, and inclusions of great masses of country rock in the intrusive are common.

The main orebodies are found in monzonite porphyry; all of the porphyry area however is not ore bearing. Small bodies of high-grade copper ore are encountered in the sedimentaries near the contact, and occasional occurrences of silver-lead ore are met at some distance from it. These latter are of small importance. In the porphyry, commercial ore occurs at depths varying from 20 to 700′ below the surface, and up to 450′ thick. Copper occurs as chalcocite, chalcocite coating pyrite, and some chalcopyrite, in seams and disseminated through the mass of porphyry. As the copper-content fades out gradually in depth, the bottom limits of pay ore are determined largely by commercial factors. The capping of leached porphyry, is for the most part barren, though there are occasional occurrences of copper carbonates, silicates, oxides, etc., in it. Sufficient carbonate ore was found in the capping of the Copper Flat orebody to supply the smelter with flux. A considerable part of the property is covered with rhyolite, the remains of an extensive lava flow occurring long after the monzonite intrusions. Todate, no orebodies have been found in the rhyolite. To the end of 1918, a total of 27,280,088 yards of capping had been removed, leaving 39,704,385 yards in place.

Development: has so far proved the existence of three main orebodies, namely: the Copper Flat, Ruth, and Veteran, and several of lesser importance—the Kimberly, Ingersoll, Wedge, and Jupiter.

The Copper Flat orebody, which is the largest and most important, is mined by steam-shovels, and was disclosed in three places known as the Eureka, Liberty, and Hecla pits. These three pits have been consolidated into one. The big pit has roughly the shape of a dumbbell, with the former Eureka and Liberty pits on the east and west end respectively, and the Hecla in the middle. Its longest dimension E.-W. is 4,100′ and N.-S. 2,500′. It covers an area of 124 acres and is at its deepest point 250′ below the surrounding country. Entrance for trains is had in the northerly part of the Eureka and Liberty ends. These entrances are made from an assembly yard, where ore trains are made up for the Nevada Northern R. R., which handles them from this point to the smelter, 26 miles distant.

In mining, benches are maintained at about 50′ intervals. To loosen up the material ahead of the shovels, 6″ holes, placed at proper intervals in the benches, are put down by churn-drills. Nine drills of the No. 5 Keystone type are kept on this work; 1½ in ore, 3½ in waste, and 4 as extras are kept in the pit to minimize the amount of moving. Holes are spaced about 35′ apart, 10 or 12′ back from the edge of the bank and average 50 to 55′ in depth. They are sprung or chambered by light charges before they receive the blasting charge.

After blasting, the material, ore or waste as the case may be, is loaded into railroad cars by steam-shovels. In this work nine 95-ton Bucyrus shovels, having Vanderhoef 4-cu. yd. dippers, are used. A good general average is 1,200 cu. yd. per steam shovel shift of 10 hours.

Transportation of ore from the pits to the assembly yard, and of waste to the various dumps, is taken care of by 15 saddle-back locomotives, 2 being of 85 tons, 2 of 81 tons, 5 of 65 tons, 7 of 45 tons, and one of 35 tons weight. In addition one 56-ton, 6 wheel yard or switch engine is employed in general service. Cars for the transportation of ore from the mines to the mill are furnished by

the Nevada Northern R. R. and are of 55 ton, all steel Ingolsby type. There are about 200 of these in service. Overburden is handled with 70 wood and steel dump cars of 18 and 20 yard capacity.

Normally, over 10,000 tons of ore and 14,000 yards of overburden are handled daily.

Other pit equipment consists of one 30-ton locomotive type crane, one employes' car used to transport men to and from work; a repair car equipped with tools, compressor, and boiler; ten coaling cars of special design for the shovels; 4 flat cars for transporting drills, casing, etc.; and two powder cars, one a refrigerator used to preserve explosives at the right tempertature. Adequate machine, blacksmith, carpenter, engine and car shops with full equipment are maintained.

The Ruth orebody lies about 1¼ miles east of the Copper Flat deposit. Here the capping is too deep, from 110 to 540′ thick to mine it economically by steam-shovels, hence it is mined by underground methods.

The Ruth mine is served by two shafts, the Star Pointer—the main working shaft, a 4-compartment vertical, 25′-6″x5′-6″ inside dimensions; and the Ingersoll, an incline, 5′x8′-6″ inside dimensions. The two shafts are about 2,600′ apart, 600′ and 550′ deep, respectively, and connected on the 500 and 600′ levels. To date about 14½ miles of underground workings have been driven, also several thousand feet of churn-drilling.

Ore is mined by the branch-raise caving system, which consists in driving raise series at 25′ intervals at right angles to motor haulage-ways. From the branch-raises, finger-raises are put up to open the orebody at 12½′ intervals, both parallel and normal to the direction of the haulage ways. The orebody is undercut at the tops of the finger-raises, caved, and ore drawn off through the fingers and branches to the haulage ways. This method was described by W. S. Larsh in a paper read before the A. I. M. E. of New York, in February, 1918. The advantage of all caving systems is primarily one of cost, but not always of complete extraction of orebodies. In the Ruth mine, certain blocks on the 300 to the 600′ level, inclusive, were expected to produce 1,741,374 tons of 2.15% ore, but actually yielded 1,776,183 tons, averaging 2%.

Material is moved underground by twelve 10-ton electric mine locomotives of 60 h. p. and 90 h. p., of 250 volt d. c. trolley type. Fifty 88 cu. ft. saddle-back steel cars, holding about 4 tons each are used.

In the Star Pointer shaft, ore is hoisted by a 400 h. p. 550 volt a. c. Nordberg hoist in 6 ton self-dumping skips running in balance. The shaft is also equipped with a 200 h. p. geared hoist handling a double deck cage capable of holding 30 men. From the tipple ore is distributed in a 3,000 ton bin by means of chutes, and loaded from the bin into Nevada Northern R. R. 55-ton cars, which pass beneath it. A heavy duty hoist and 3,200 cu. ft. compressor were added in 1917. The Ruth mine produced 591,545 tons of 2.195% ore in 1916; 991,164 tons of 2.013% in 1917; 1,316,144 tons of 1.87% in 1918. The mine can produce a daily output of 5,000 tons, and the new hoist can handle 6,000 tons from a depth of 600′.

The Ruth is further equipped with 2 Ingersoll-Rand, P. R. E.-2, 3,000 cu. ft. air compressors direct connected to 550 h. p. synchronous motors, 3 phase, 600 cycle, 600 volts. About 80 air drills are in use. Direct current at 250 volts for the underground trolley system is furnished by three 150 h. p. Allis-Chalmers motor-generator sets of the Bullock type. A saw-mill, equipped with timber framing machinery, and handling about a half-million foot, board measure, of timber per month; a blacksmith shop and a small machine-shop are maintained.

Nearly all of the waste, and some of the material for mining is handled through the Ingersoll shaft in a 2-ton capacity skip. Equipment here consists of a 112 h. p., 550 volt a. c. Wellman-Seaver-Morgan electric hoist.

The Kimberly orebody has been developed only by churn-drills. No underground workings and no mining. Drilling has proved the existence of 664,439 tons of 2.02% ore.

The Wedge and Jupiter orebodies are small, the former containing 43,960 tons of 3.12% material. They were developed by underground workings. No mining is being done in either place at present.

The **Veteran** mine, taken over from the Cumberland-Ely, west of and adjoining the Consolidated Coppermines Giroux holdings, is not producing, operations at this property having been discontinued indefinitely. Mine contained 155,800 tons of ore, averaging 3.89% copper.

Ore reserves: extensive churn-drill borings on the Copper Flat, Liberty, Veteran, Ruth and other properties, have proven a tonnage estimated January 1, 1917, as 67,993,117 tons of ore, averaging 1.59% copper and representing an ore supply of about 17 years. A revision of reserves was made in 1916, the new estimate being an increase of over 17,000,000 tons. Of this, 22% is in the Ruth mine, remainder at Copper Flat.

Comparative Table of Recoverable Developed Ore:

Year ended	Tons	Copper, %	Year ended	Tons	Copper, %
Sept. 30, 1907.....	14,432,962	1.97	Dec. 31, 1913.....	39,108,590	1.65
Sept. 30, 1908.....	20,000,000	1.94	Dec. 31, 1914.....	41,020,296	1.68
Sept. 30, 1909.....	29,000,000	1.94	Dec. 31, 1915.....	50,525,289	1.65
Sept. 30, 1910.....	40,360,823	1.70	Dec. 31, 1916.....	67,993,117	1.59
Dec. 31, 1911.....	40,853,371	1.66	Dec. 30, 1917.....	70,025,322	1.58
Dec. 31, 1912.....	38,853,551	1.67	Dec. 30, 1918.....	68,549,644	1.57

Churn-drill prospecting from the beginning of operations to end of 1918 totaled 564 holes averaging 362½'. In the Ruth the cost of drilling was $3.52 per foot, an increase of $1.14.

Electric power is used throughout, current being brought from the Steptoe smelter, at 40,000 volts, and stepped down to 600 volts by seven 200-k. w. transformers in a concrete station at the Ruth mine.

Ore is shipped to the Steptoe smelter, at McGill, separately described below, over a 27-mile standard-gauge railway, equipment including 400 self-dumping ore cars. This line is a part of the Nevada Northern railway, having a standard-gauge line of 165 miles in length, running from the mines and Ely to a junction with the Southern Pacific railway at Cobre station. The Nevada Northern Railway Co., controlled through stock ownership by the Nevada Consolidated, is capitalized at $2,000,000, with a $1,000,000 bond issue, at 5%, the line doing a general business in addition to handling the traffic of the Nevada Consolidated Copper Co. In 1918, it carried 4,661,943 tons of ore from all mines in the district, 750,685 tons of commercial freight, and 380,937 passengers.

Mining costs:

Year	Moving overburden, cents per yard	Steam-shovel mining, cents per ton	Ruth mine, per ton
1918.....	41.20	41.69	$1.2855
1917.....	34.43	31.32	1.0251
1916.....	30.09	23.70	1.2021
1915.....	28.85	15.24	.....

General taxes represent a considerable proportion of mining charges, being equal to 46% in 1916.

Reduction works: The concentrating mill and smelter owned by the company are at McGill, White Pine county, Nev. Lands cover 8 square miles, with water rights. The property is on the eastern side of Steptoe valley, on the slope at the foot of the Schell Creek range, 14 miles N. E. of Ely and 22 miles from the mines, on the line of the Nevada Northern railway. The smelter site proper comprises 320 acres, 1 mile long and ½ mile wide, on a hillside with 10% grade, permitting the works to be terraced, and handling material by gravity throughout. Lands carry water-rights to Duck creek, and to the McGill ranch, estimated as capable, jointly, of furnishing water for a 15,000-ton plant.

The mill is one of the largest and best in existence. Late in 1917 its capacity was increased from 12,000 to 14,000 tons daily. All main buildings are of steel frame and the plant is built on the unit system. It is nearly a mile from the smelter, and treats a moderately hard silicified, altered porphyry ore,

containing tiny specks of chalcocite, pyrite, and some chalcopyrite, averaging 1.5% copper. In 1918 the ratio of concentration was 8.22 to 1, the concentrate assaying 8.33% copper and recovery 67.28%.

The coarse ore bins are of timber, 15′ deep, 20′ wide and 288′ long with a capacity of 5,000 tons. They are built about the center line of the mill and 400′ behind the center line of the fine ore-bins. The ore is dumped on grizzlies of railroad iron with openings of 13.5″.

From the coarse ore-bins the ore goes through chutes at the bottom, to twenty-four 60″ steel apron-feeders driven at a speed of 2.2′ per minute. The full capacity of each feeder is 75 tons per hour. The two feeders in each unit adjoining the center line of the plant can be run at 9′ per minute, delivering 700 tons per hour. The feeders, with the exception of these two, deliver to two 60″ steel pan conveyors, each 118′ long, traveling at a speed of 28′ per minute, and with a total capacity for the two of 1,700 tons per hour. The high-speed feeders and pan conveyors deliver to two 60″ traveling grizzlies of 3.5″ openings and having a speed of 40′ per minute. The oversize from the grizzlies is delivered to two No. 8 McCully crushers. The discharge from the McCully crushers and the undersize from the grizzlies is elevated by two 42″ belt conveyors to two screens 6′x14′ of ⅜″ wire, 1″x1½ mesh, inclined at an angle of 36 to 48°. The oversize of these screens is re-ground by two Garfield rolls, 72″x20″, set for a ⅞″ opening. Four ball-mills were added to the re-grinding plant during 1918. Discharge from the rolls and undersize from the screens is elevated to two horizontal conveyors which distribute to the fine ore-bins by means of two trippers. The new coarse crushing plant was put into commission about mid-1917.

In order to avoid sliming, the flow-sheet is arranged for step grinding. From the fine bins the ore passes by belt feeders over automatic scales to a set of 36″x15″ rolls set for an opening of ⅝″ and run at 85 r. p. m. with water introduced beneath washing to a pair of bucket elevators. The buckets on these elevators are 8″x8 x18″ and the elevators deliver to two trommels, 42″ diam. by 8′ long, having one section of 3/16″ and one of 5/16″ perforations. The oversize goes to another set of rolls 36″x14″ set for a 5/16″ opening and driven at 105 r. p. m. The undersize of 5/16″ goes to a set of rolls 30″x14″, set for a ⅛″ opening and run at 122 r. p. m. The undersize of 3/16″ goes to eight 2 m. m. trommels 36″ diam. by 8′ long. The oversize of the 2 m. m. screens goes to a fourth set of rolls 36″x15″ with an opening of 1/16″ and driven at 160 r. p. m. All of the above rolls deliver to the same elevators so that everything must finally pass 2 m. m.

The undersize of 2 m. m. passes to 10 double deck Wilfleys making final concentrates, and middlings to five Wilfleys. The five Wilfleys make final concentrates and send tailings to the regrinding system. The tailings from the ten double deck tables pass to four Steptoe classifiers, having four spigots and an overflow. The overflow is sent to a 50′ Dorr thickener, delivering underflow to the slime department and overflow to the reclaimed water system. The first spigot product goes to the regrinding system after being dewatered. The second spigot delivers to four Wilfleys which make final concentrates and send tailings to the regrinding system. The third spigot delivers to eight Wilfleys, making final concentrates, middlings to the regrinding system and tails to waste after being dewatered in Steptoe tanks. The fourth spigot delivers to Callow tanks, delivering underflow to four Wilfleys and overflow to slime department. These four Wilfleys produce final concentrates and send tailings to Callow tanks delivering underflow to Johnson vanners.

Each unit is equipped with two Hardinge mills 8′x30″ direct driven through herringbone gears. The feed to these is delivered at 65 to 75% solid by means of a shovel wheel. The product is delivered by two bucket elevators to four Steptoe classifiers making four spigot products and an overflow. The overflow goes to two 17′ Dorrs delivering underflow to the slime department and overflow to 75′ Dorr thickeners. The first spigot delivers to two Wilfleys, making final concentrates, and sending tailings to the regrinding system. The second spigot delivers to seven Wilfleys making tailings to waste and sending middlings to six

more Wilfleys, making tailings to waste. The third spigot delivers to seven Wilfleys, making tailings to waste and sending middlings to the above mentioned six Wilfleys. The fourth spigot delivers to Callow tanks whose overflow goes to the slime department and underflow to ten Wilfleys, delivering tailings to Callow tanks which in turn deliver underflow to 26 Johnson vanners and overflow to the slime department.

All concentrates except those of the real slime department are delivered to 16 steel tanks of 225 ton capacity, and having filter bottoms for suction drying. These tanks are unloaded by a Blaisdell disc excavator into cars running on a track beneath.

All overflows of Callow tanks, Steptoe tanks, and Blaisdell concentrates tanks are delivered to a series of settling ponds from which the underflow is delivered to the slime department (flotation process) and the overflow is pumped to the mill to be re-used.

In September, 1919, Minerals Separation brought suit against Nevada Consolidated alleging infringement of its flotation patents.

Water is secured from Duck creek, which has an average flow of 8,000 gal. per minute, water being collected in the hills in reservoirs and brought by gravity for 9 miles through a 32″ iron-banded wooden pipe line and delivered at the highest point of the works under a pressure of 10 to 20 lbs. per sq. in. An electrically-driven pumping plant in Steptoe valley, immediately below the works, has a capacity of about 5,000 gal. per minute. By means of a system of settling tanks, ponds and pumps, approximately 8,000 gal. of water per minute is recovered from mill tailings for re-use. Approximately 4½ tons of fresh water to 1 of ore are used in the process.

The smelter is about one mile from the concentrator, and is connected therewith by a standard-gauge railway line. The works have about 12 miles of railway track, equipped with 9 small locomotives, a switch engine and 100 cars, and 2 loco cranes. It includes separate buildings for calcining, reverberatory smelting, blast-furnace smelting and conversion, all of steel frame, with corrugated iron sheathing. Each department has independent flues and chimneys.

The roaster building, 328′ in length, has 4 floors, with twenty-four modified McDougal roasters, set in 2 rows. Coal is now used for fuel in place of oil. Concentrates are delivered to the calcining building in 10-ton standard-gauge cars, entering over a trestle built of timbers, the feed floor being on a level with the railway trestle. All the roasters have air-cooled rabbling arms, and center columns supplied with air under a pressure of about 3″ of water by a National Blower Co.'s fan of about 120,000 cu. ft. capacity. The roasters are driven by 10 h. p. electric motors. Hot calcines, carrying 6.5 to 9% sulphur, are discharged into hoppers beneath the roasters and trammed directly to the reverberatories, or to nine 150-ton calcine storage bins, built of brick and steel, which serve as a balance-wheel between the roasting and smelting departments. Each roaster discharges gases through a 54″ elbow to a brick flue running between the 2 rows. This flue discharges fumes into the main flue, which is in 2 parts, each of 312′ square cross-section, permitting either to be cut out for cleaning. The flue is 1,070′ long, including the dust chamber, which is 150x50x30′, and leads to a brick stack 250′ high and of 18′ internal diameter at the top. Dust from the flue in the roaster building is piped to the ground floor, for loading into cars, and for about 500′ the flue has tracks underneath, permitting the collection of dust from steel hoppers in cars, which are hauled by small locomotives. The copper-bearing feed per roaster-day in 1918 was 67.2 tons, against 72.5 tons in 1917.

The reverberatory building has five 600-ton furnaces, each 19′ wide by 111′ to 130′ long. They were fired with California crude oil, atomized by air at 40-oz. pressure from a Connersville blower and fed through 5 burners per furnace. From 250 to 350 bbl. of oil per day were used by each furnace, varying with the nature of the charge smelted. The use of oil as fuel was superseded in May, 1918, by pulverized coal. The plant has a capacity of 600 tons of slack coal daily, ground to pass 200-mesh, and is giving complete satisfaction. A full

description of this plant by R. E. H. Pomeroy, was published in Bull. 158 (Feb., 1920) of the A. I. M. & M. E.

The reverberatory furnaces are charged with calcines mixed with limestone, dumped through slide-gates, from hoppers, suspended from the charge-floor. Each furnace has 2 tap-holes on one side, from one of which matte is drawn off into matte cars of about 30-ton capacity. These cars are tilted and contents poured into the converters by an electrically-driven mechanism mounted on the car frame. Slag is skimmed twice every shift, the skimmings going to a cast-iron box leading to a lined launder, in which a jet of water granulates the slag and washes it to the dump. Slags carry 50 to 45% silica, 6 to 12% calcium oxide, 25 to 35% iron oxide and 8 to 14% alumina. The reverberatory building has a dust chamber of 1,000′ square section, 155′ long, leading to a 300′ brick chimney, 15′ in diameter at top. The total charge reduced in these furnaces in 1918 was 654,650, a decrease of 86,774 tons.

The blast-furnace building, between the reverberatory and converter departments, has a single blast-furnace, 42x240″ at the tuyeres, and 84x240″ at the shaft, with a capacity of 300 to 500 tons of charge per day, the furnace being so planned that it can be enlarged if desired to 80′ in length. The furnace is 13′ above the ground level, with a height of 16′ from the tuyeres to the charging floor, operating with a 10′ column charge and 40-oz. blast pressure. There are 4 steel water jackets on each side, and 1 at each end, and each side has 24 four-inch tuyeres, 10″ apart, receiving blast from a 30″ bustle pipe. The water jackets each have separate blast boxes and independent air and water connections, so that any jacket may be removed by breaking 3 simple connections. Charging is done by cars dumped pneumatically, matte is tapped into ladles on cars and slags granulated and sluiced, as in the reverberatory building. Fumes discharge through a 108″ downtake to a 12x15x250′ brick flue, terminating in the main roaster flue. The blast-furnace is not in operation.

The converter building is about 600′ from the reverberatory furnaces, and receives molten matte from cars, behind and above the converters, the contents being poured into a launder, while the shells remain in position for blast. The building has two 5-motor Shaw electric cranes, each with a hoist capacity of 60 tons besides 2 auxiliaries of 25 tons each. There are 2 of the old stalls with 96x150″ shells of the barrel type built for acid linings, but now used with magnesite brick linings. There are also 2 Peirce-Smith barrel-type converters, both originally 25′ 10″ long by 10′ diameter shell. One of these was lengthened at the smelter to 33′ 11″. They originally had 30 tuyeres each but these have been increased to 35 and 46, respectively. The blast pressure used is nominally 10-lb. gauge at an altitude of 6,327′. The Peirce-Smith converters produce about 50 and 60 tons of copper per day on 40% matte.

Blister copper is poured into ladles and transferred into a brick-lined steel cylindrical receiver. This is mounted on rollers and rotated on its own axis by an electrical motor, so that the molten blister copper is poured through a tilting pouring spoon into moulds on a horizontal straight-line chain and sprocket conveyor. These moulds discharge on a submerged apron conveyor which after traveling in the water horizontally for a few feet turns on an incline and raises the copper ingots out of the water and lands them on the loading platform. They contain 99.5% copper, weigh about 400 lbs., and after trimming and being weighed on accurate scales, they are shipped in box cars.

The converter's slag is taken back to the reverberatory furnaces in 10-ton side-tilting pots operated by compressed air. Flux for the converters consists of concentrator slimes and silicious carbonate ore from the Copper Flat pit, mixed and dried in 2 oil-fired rotary driers at the converter building and handled and charged by boats. The hoods from the converters lead to a balloon flue running along over the charge floor for the extent of the converter building covered by stalls. It is then connected by a circular flue 10′ diam. to a brick dust chamber which in turn connects to a brick stack 100′ from the ground, 10′ diameter at top.

The power plant has 4 batteries of two 400-h. p. Babcock & Wilcox water-tube boilers each and one battery of two 600-h. p. Stirling water-tube boilers.

Two batteries have Foster and 3 others have Babcock & Wilcox internal superheaters, and there is a separate Foster super-heater for the steam supplied by the reverberatory waste-heat boiler plant of ten 400-h. p. boilers. Steam is generated at 160-lb. pressure, and can be super-heated 100° F. All boilers are fired by Green chain-grate stokers, coal being fed from overhead bins by chutes direct to the stoker hoppers. Each double battery of boilers has a 9x40′ steel stack with induced draught, furnished by 5 Sturtevant fans, each connected with a 30-h. p. Sturtevant slide-valve engine, running at 150 to 175 r. p. m.

Each battery of boilers is equipped with fuel economizers of about 3,360 sq. ft. heating surface, set between the boilers and the induced draught fan; they are dampered so that they can be cut out for cleaning while the boilers are in service. A 3,000-gal. capacity Kennicott water purifier supplies make-up water for all boilers.

The engine-room, main floor, contains the generating engines, blowers, 3 exciters and a switchboard, and the basement contains condensers, air pumps and oil filters. The electrical equipment consists of two 1,100-h. p. 22x48x48″ Allis-Chalmers Corliss cross-compound engines, with 800 k. w. Bullock a. c. generators mounted on the shafts; two 2,000-h. p. 31x66x48″ Nordberg Corliss cross-compound engines with 1,500-k. w. Bullock a. c. generator mounted on the shafts, and one 2,500-k. w. steam-driven Westinghouse turbo generator. Current is generated at 600 volts and carried to a concrete transformer station, equipped with seven 200-k. w. Bullock water-cooled transformers, stepping the current up to 40,000 volts, for transmission to the mines; four 750-k. w. water-cooled transformers, and four 1,000-k. w. water-cooled transformers, stepping current up to 13,200 volts for transmission to the mills; 13,000 and 40,000-volt choke coils and lightning arresters.

A 3,000-k. w. turbo-generator was added during 1917, to take care of increased power consumption at the mill, and one of 600-k. w. was to be ordered in 1919.

The smelter blowing plant, in the engine-house, includes a 350-h. p. 14x28x36″ tandem-compound engine direct-connected to a No. 10 Connersville blower with capacity of 300 cu. ft. of air per revolution, making 120 r. p. m. This is for the blast-furnace. For the converters air is supplied at 10-lb. gauge pressure by one Allis-Chalmers blowing engine, 16″ and 24″ diam. steam, 34″ and 34″ diam. air by 48″ stroke of 6,000 cu. ft. capacity; one Nordberg 25″ and 54″ diam. steam 52″ and 52″ diam. air by 48″ stroke of 12,000 cu. ft. capacity, and one Nordberg 26″ and 56″ diam. steam, 54″ and 54″ diam. air by 48″ stroke of 18,000 cu. ft. capacity. These are all of the cross-compound steam, tandem, air and steam type. A 20,000 cu. ft. steam-driven turbo-blower was added in 1916 to supplement the blowing engine in supplying air for converters, etc.

A cross-compound air-compressor with steam cylinders 11″ and 21″ diam. and air 21″ and 12″ diam. and 18″ stroke of 1,080 cu. ft. displacement, compresses air to 100-lb. This was originally for tamping converter linings, but is now used for pneumatic tools of various kinds at the shops and the mill, and a second one of similar capacity was ordered during 1917, but delayed by abnormal conditions. A 2,000 cu. ft. 2-stage, steam-driven compressor was added in 1916.

In connection with the works are a number of thoroughly appointed shops, including a boiler, machine and carpenter shop, foundry, warehouse and roundhouse.

The Steptoe works were started in April and the finished copper shipped in August, 1908. Nearly 1,500 men are normally employed at the plant.

Production:

	Tons Treated	Cu. %	% Rec.	Ratio Conc.	% Cu. in Cncts.	Net Prod. Lb. Cu.	Cost per Lb. Cts.	Sell. Price Cts.
1919.....	2,135,425	1.58	.....	.....	....	43,971,892	16.19	18.67
1918.....	3,999,526	1.51	67.28	8.22:1	8.33	81,037,777	16.60	21.049
1917.....	4,064,095	1.46	73.08	7.-8:1	7.67	86,834,271	11.68	23.750
1916.....	3,922,634	1.63	73.87	7.45:1	8.98	90,735,287	8.13	25.83
1915.....	3,081,520	1.54	70.18	7.18:1	7.77	62,726,651	8.23	17.65
1914.....	2,640,294	1.48	68.48	6.05:1	6.14	49,244,056	9.82	13.39

Gold and silver extracted during 1918 was sold for $661,429, compared with $767,760 in 1917, and $801,818 in 1916.

The property has been splendidly developed, and is being managed with ability and success. Operations during 1919 were reduced to 50% of capacity, and were stopped for a month through a strike.

NEVADA UNITED MINES CO. **NEVADA**

Address: 441 Equitable Bldg., Denver, Colo.

Officers: W. J. Chamberlain, pres.; H. F. Crocker, v. p.; R. J. Pitkin, sec.; E. S. Kassler, treas, with H. B. Northrop, F. N. Bancroft, W. G. Boyle, A. G. Bowen and A. G. Burton, directors.

Inc. February 6, 1906, in Arizona. **Cap.**, $3,500,000; $1 par; 2,962,952 issued.

Property: 50 claims, 38 patented, about 600 acres, 18 miles from Ely, White Pine county, said to show "chamber" deposits of lead ore in limestone. Ore contains lead, silver, and iron.

Development: by tunnels totaling 2,400′ to 350′ depth. Mining is by caving system, and output was about 2,800 tons monthly in 1917.

Property is now worked by Nevada United Mines Leasing Co.

NEVADA UNITED MINES LEASING CO. **NEVADA**

Operating under lease the property of the Nevada United Mines Co. (q. v.), at Ely, White Pine Co.

NEW ELY CENTRAL COPPER CO. **NEVADA**

At a special meeting of the stockholders held December 20, 1913, it was voted to deed to the Consolidated Coppermines Co. the entire property of the New Ely Co., and in pursuance of this vote a deed was executed and delivered, the Cons. Coppermines Co. thereupon taking possession of all the property of the former company. The stock and bondholders deposited for exchange 475,464 shares of the 500,000 outstanding shares and $167,550 of the $175,000 outstanding bonds up to Dec. 31, 1915. The new Ely Central Copper Co. is to be dissolved when all stock and bonds have been exchanged. Fully described in Vol. XIII.

PRINCESS COPPER CO. **NEVADA**

Idle. **Address:** C. W. Freed, pres., 1007 First Ave., Salt Lake City, Utah.

Mine office: Ely, White Pine county, Nev. F. J. Austin, sec.; H. P. Clark, treas.

Inc. 1911. **Cap.**, $1,000,000; shares $1 par.

Property: 30 claims, about 550 acres, acquired of the Ely Resurrection Copper Co., in the Robinson district, lying a little north and east of Ely.

Mine has 2 short tunnels and a 140′ shaft, said to show 18′ of ore assaying up to 5% copper, with gold and silver values, and some high-grade ore assaying up to 46% lead and 110 oz. silver per ton, with gold values. Management plans resumption of development work.

SMOKEY DEVELOPMENT CO. **NEVADA**

Consolidated 1919, with Boston Ely Mng. Co. and Ely Northern Copper Co. as Boston Ely Cons. Mng. Co., which see.

EUREKA DISTRICT.

ALKALI MINES CO. **NEVADA**

Mine address: Eureka, Eureka county, Nev. W. E. Sanders, supt.

Property: the Windfall mine, developed by a 500′ shaft. **Ore:** contains gold, silver and lead.

Equipment: includes a crushing plant and 150-ton cyanide plant. No returns available since 1916.

BULLWACKER CONSOLIDATED MINES CO. **NEVADA**

Address: W. A. Barnes, Eureka, Nev.

Officers: W. A. Barnes, pres.-treas.; B. F. Shepherd, Jr., v. p.; J. B. Cottle, sec., with E. S. McCurdy and A. Toriggino, directors.

Inc. 1919, in Nevada. **Cap.**, $600,000; $1 par.

Property: the Bullwacker and Silver West claims, 80 acres, on Adams hill adjoining the Eureka-Holly mine on the west. The claims were located in 1869, and have produced $500,000 from above the 300′ level. The 400′ vertical shaft is to be repaired and sunk another 100′.

CROESUS-EUREKA MINING CO. **NEVADA**

Property sold to Eureka-Croesus Mining Co. q. v.

CROESUS EXTENSION MINING CO. **NEVADA**

Address: R. M. Bradley, Austin, Nev.

Company being organized in December, 1919.

Property: 4 claims on Prospect mountain, W. of the Eureka-Croesus.

EUREKA-CLIMAX MINING CO. **NEVADA**

Address: Box 8021, Reno, Nev.

Officers: Tasker L. Oddie, pres.; M. D. Fairchild, v. p.; Ed. Malley, and Al Revert, directors. J. L. Jose, sec.-treas.

Inc. 1919, in Nevada. **Cap.,** $150,000; 15c. par.

Property: 3 claims, 70 acres, which have produced $100,000 worth of rich ore, on Prospect Mtn., said to be the high-grade section of the Eureka district, Eureka county. The Deadbroke mine opened by a long tunnel from which some rich ore was produced in the 70's, has been reopened.

In the "Nevada Mining Press" of November 25, 1919, it was advertised that "while the Eureka-Croesus Mining Co. as such owns no interest in the Eureka-Climax Mining Co., those who own the Eureka-Climax, and all of its mining operations will be conducted by the technical staff of the Eureka-Croesus. The secretary and treasurer of the Eureka-Climax Mining Co. is assistant secretary and treasurer of the Eureka-Croesus, under whose supervision the accounts and books of the company will be kept, in the office of the Eureka-Croesus Mining Co. at Eureka.

Eugene Davis of the Eureka-Croesus Mining Co., has taken a large interest in the Eureka-Climax and will give it the same energy and push that has made possible the rapid development of the Eureka-Croesus properties."

EUREKA-CROESUS MINING CO. **NEVADA**

Offices: 20 Broad St., New York City, and Eureka, Nev.

Officers: Frank L. Torress, pres.; Chas. N. Sigison, v. p.; with H. Carleton Slack, Henry O. Evans and Walter W. Slack, directors. John D. Peckner, sec.-treas.; G. O. Bradley, cons. metallurgist; James Huebner, supt.

Inc. in Delaware. **Cap.,** $1,500,000; shares $1 par; fully paid. U. S. Corporation Co., registrar and transfer agents. Stock listed on New York Curb.

Property: 17 patented and 5 unpatented claims, at Eureka, Eureka county, includes the Ruby-Dunderberg, Connelly, and a number of old mines formerly owned by various companies.

Geology: the orebodies are replacements of fractured Paleozoic limestones, and include stocks, lodes, and bedding plane deposits, largely as irregular lenticular masses, from a few feet up to 100′ in thickness, and twice as much in horizontal extent. In the workings above the 400′ level practically all the ore material is oxidized, and it was left in the mine because there was no known method of treating it at a profit. The galena ores found in the deeper levels are quite different, and if a substantial tonnage of such ore is opened up by further work, as seems quite possible, the company has a definite source of income.

Development: the Catlin or main working shaft, is but 425′ deep, with extensive workings on the 200 and 400′ levels and a winze 300′ deep, sunk below the 400′ level.

Numerous oreshoots were cut at various geologic horizons on these 2 levels, and the bottom of the winze is reported to be in $90 ore. More or less high grade ore is being found in new work, a small shoot cut on 200′ level in December, 1919, assaying 362 oz. silver per ton with 60% lead and $6 gold.

Both levels connect with the workings of the old Dunderberg mine.

The present workings are said to total 2 miles, with 8 miles more of old workings that can be reopened. New work for last half of 1919, totals 2,500.′

Ore reserves: estimated by R. W. Foster at 2,368,635 tons of ore of an average value of $31 per ton, including 100,000 tons on dumps and 40,000 tons of slag, all of a gross value of $73,483,800, or $59,271,990 net. This estimate is not

regarded as a safe one, because the estimated cost of $6 per ton for recovering the values in the oxidized material is as yet purely a matter of opinion.

Equipment: includes an electric power plant, 150-h. p. engine, ventilating blowers, hoist, 680 cu. ft. compressor, surface tram, orebins, and 1,000-ton mill to be erected in units of 250 tons each. Transportation to the main line of Southern Pacific is over the Eureka to Palisade line (the Eureka & Nevada) controlled by Eugene Davis, who, while not on the Eureka-Croesus directorate, is in control of the company and dominates its policy.

Costs at present are given at about $17 per ton, so that ore assaying under $20 per ton can not be utilized. As ore is oxidized, no milling method other than sulphidization and flotation has so far been found applicable, but this process is not yet beyond the experimental stage. The management states that with the formation of a synthetic sulphide an excellent extraction can be made by oil flotation, so that the proposition is "a simple manufacturing enterprise for years to come." A smelter will probably be erected as a power-plant can be erected near Eureka to utilize the oil shales so abundant nearby.

EUREKA-HOLLY MINING CO. **NEVADA**

Address: W. A. Barnes, v. p.-mgr., 576 Mills Bldg., San Francisco, Calif. L. W. Hope, supt., Eureka, Nev.

Cap., $500,000; issued $245,000.

Property: 11 claims, 296 acres, on Adams hill, Eureka, contains deposits of lead-silver ore in limestone. There are also 320 acres of ranch and water-rights. Property was the old Idaho mine, acquired in 1917, and reputed to have yielded $150,000 from surface workings. Shipped $50,000 worth of high-grade silver-lead ore in 1918, and management reported 60,000 tons of milling ore blocked out in the mine, March, 1919. About 20 men employed.

Development: by 500′ shaft, being deepened to 700′. Two orebodies—the east and west—are being opened. The former is the largest, and has yielded $68,000 so far. Dimensions of the shoots are said to be 5 by 15′ on 100′; 8 by 500′ on 200′; 18 by 70′ on 300′; and 30 by 150′ on 400′ level. Reserves in both veins are estimated to be 60,000 tons of $17 ore.

Equipment: includes two 75-h. p. semi-Diesel engines, hoists, (surface and underground), 8-drill compressor, and plans for a 100-ton mill.

Is a promising property sponsored by reputable people.

EUREKA-NEVADA MINING CO. **NEVADA**

Office: 625 Dooly Block, Salt Lake City, Utah. **Mine office:** Eureka, Nevada.

Officers and directors: W. J. Robinson, pres.-mgr.; L. Holbrook, v. p.; W. C. Albertson, sec.-treas.; A. G. Burritt, cons. engr. D. States, supt.

Inc. July 17, 1917. **Cap.,** $10,000; shares 1c. par; 800,000 issued. Stock assessable when treasury stock is exhausted. Annual meeting, second Monday in July.

Property: Lucidtuffa group of 3 patented claims, 60 acres, on Prospect mountain, at Eureka, Eureka county. Ore occurs in shoots in fissure veins and as a chamber deposit in limestone. Shipping ore said to average $50 per ton in gold, silver, and lead.

Development: by 1,200′ tunnel to depth of 450′. A small force employed by company and 5 lessees reported extracting shipping ore in 1919.

HOLLY MINING CO. **NEVADA**

See Eureka-Holly Mng. Co.

HOPE CONS. MINING CO. **NEVADA**

Address: Eureka, Nev. J. H. Rogers, pres.-mgr.

Inc. 1918. **Cap.,** $500,000; shares $1 par.

Property: on Ruby hill, Eureka, Eureka county, developed by tunnel. Prospecting in 1919.

RICHMOND-EUREKA MINING CO. **NEVADA**

Controlled by U. S. S. R. & M. Co.; property under lease and bond to Mining & Development Corporation, q. v.

Address: P. O. Box 385, Boston, Mass.

Officers: C. G. Rice, v. p.; F. W. Batchelder, sec.-treas.; with Albert Fries, A. J. Seligman, C. A. Wimpfheimer, C. A. Hight, N. W. Rice, F. Y. Robertson, and Sidney J. Jennings, directors. A. P. Mayberry, supt.

Inc. September 28, 1905, in Maine. **Cap.,** $3,600,000; $10 par. Annual meeting, fourth Wednesday in September.

Property: several patented and unpatented claims (about 200 acres) at Eureka, Nevada. Geology of the district described in U. S. Geological Survey, Mon. 7, 1884. Mine was first worked in 1869, and produced up to 200 tons daily up to 1910, when the Eureka-Palisade railway was washed away. When this railway was repaired, the increased rate demanded made the extraction of the available low-grade ore unprofitable and regular mining operations have not yet been resumed. Speiss from the dumps has been shipped to the U. S. Smelting, Refining & Mining Co.'s plants for experimental treatment.

Development: by shafts and extensive openings. Reserves have been estimated as equal to 500 tons daily for 8 years. Mine has never been prospected below water-level, and there remains a large section of ground above that level also unexplored. Whenever circumstances warrant, work can be resumed.

Equipment: 1,400-h. p. steam boiler plant, 1,500 cu. ft. compressor, hoist of 2,200′ capacity, steam pumps of 650 gal. capacity from 1,350′ depth, machine-shop, 500-ton orebin, etc.

The Mining & Development Corporation of Maine, controlled by E. O. Holter and H. P. Henderson of 60 Broadway, took a lease and bond on the property in October, 1919, agreeing to spend $200,000, or $10 per share in development, etc.

RUBY HILL DEVELOPMENT CO. **NEVADA**

Address: E. O. Holter, or H. P. Henderson, Mining & Development Corp'n, 60 Broadway, New York City.

Inc. 1920, in Delaware.

Company operates the Richmond Eureka and Eureka Cons. mines under lease and bond given the Mining & Development Co. The Ruby Hill also has an option until 1922 on 254,000 shares of Mng. & Dev. Co. stock, giving 100,000 shares of its own stock for the option and mine control.

Property: the two bonanza silver-lead mines which made the camp of Eureka famous in the early eighties and which produced silver bearing lead ore to the value of 34 million dollars before the demonetization of silver in 1896.

The main or Locan shaft, 1,200′ deep is to be unwatered, and the deep ground beyond the Ruby Hill fault is to be explored. The chance of finding a displaced section of the orebodies or new orebodies is a legitimate venture based on geological inference, but flotation and other new methods of concentration, together with the restoration of the old price of silver will enable company to work the low-grade ores known to exist in the old workings.

GOLDFIELD DISTRICT.

ADAMS GOLDFIELD MINING CO. **NEVADA**

Property purchased, January, 1916, by the Reorganized Cracker Jack Mining Co., which see. Stockholders of the Adams Co., were permitted to exchange their stock for stock of the Reorganized Cracker Jack Co., remaining outstanding at that time.

ATLANTA MINES CO. **NEVADA**

Reorganized 1918, and name changed to Reorganized Atlanta Mines Co., which see.

C. O. D. CONSOLIDATED MINING CO. **NEVADA**

Address: Goldfield, Nev. L. K. Koontz, pres.

Inc. May, 1908, in South Dakota. **Cap.,** $3,000,000; shares $1 par. Treasury, 1,000,000 shares. Listed on San Francisco Exchange. Shares varied from 2 to 4 cts. in 1918, and 2 to 7 cts. in 1919. Organized as a merger of the Goldfield C. O. D. and the Gold Bar Mining companies, taking over the C. O. D., Golden Eagle and Zoe from the C. O. D. Co.; the Gold Bar from the Gold

Bar Co., and the Victor and Victor fraction from the Goldfield Cons. Last two claims were obtained by purchase, others by exchange of stock.

Property: claims form a compact group, 90 acres, at Goldfield. Controlled by Goldfield Cons.

Development: 500′ shaft and several thousand feet of workings. Was operated under 5-year lease by Nevada Co-Operative Company, and was under option in 1915 to Tonopah Mng. Co. and Tonopah Belmont Dev. Co. Said to have a total production of $75,000.

The Gold Bar and Victor groups were operated by lessees in 1918 who reported opening a new vein, 35′ wide, assaying from $7 to $15 per ton in free-milling gold ore.

DESERT CHIEF CONSOLIDATED MINING CO. **NEVADA**

Merged December, 1919, with the Yellow Tiger Consolidated Mining Co., which see.

DIAMONDFIELD BLACK BUTTE REORGANIZED MNG. CO.

Office: Goldfield, Nev.

Officers: C. S. Sprague, pres.; Harry B. Ruhl, sec.; Ben Gill, treas., with L. L. Dellinger, directors. J. K. Turner, cons. engr.

Inc. 1905, in Nevada, reinc. April, 1910. **Cap.,** $2.000,000; $1 par assessable; 1,300,000 outstanding. Transfer office, U. S. Corp. Co., New York, and home office. Annual meeting, July. Listed on Salt Lake and San Francisco Stock Exchange. Shares sold for 1 to 4c in 1918-19. Two assessments, ½c in April and 1c in August, 1914, have been called. Controls the Orizaba Mining & Dev. Co., which see.

The Sprague interests acquired control in 1918 and planned extensive development work, but to end of 1919 no actual work has been done.

Property: the Black Butte mine, 60 acres, in the Goldfield district, Esmeralda county. **Ore:** gold, in numerous veins in fine grained andesite. Up to the present time the main producers have been the Quartzite and the Flat veins. The former is said to have produced $500,000 under early lease operations, but values ended within 150′ from surface. The Quartzite orebody was cut off by a fault and its downward extension has not been found. The "Flat" vein apparently ends at the tunnel level.

See Geol. Survey Prof. Paper No. 66, by Ransome.

Development: tunnels and shafts; the main shaft is 300′ deep and the old Dortch shaft, 350′ south of the main shaft, is 200′ deep, but little work has been done below the 110′ level.

Equipment: included two 15 h. p. gasoline hoists and a 3-drill air compressor.

DIAMONDFIELD DAISY GOLD MINING CO. **NEVADA**

Idle. **Address:** 61 Broadway, New York City.

Officers: Albert J. Seligman, pres.-treas.; C. R. Woodin, v. p.; W. M. Hoagland, sec., with F. E. Horton, directors.

Inc. 1910, in Nevada, as reorganization of the Goldfield Daisy Mng. Co., of Goldfield, Nev. **Cap.,** $1,000,000; shares $1 par; 850,000 issued. Listed on New York Curb and San Francisco Exchange. Shares quoted at 2c throughout 1918-19.

Property: 3 patented claims, 60 acres, at Goldfield, was under lease to the Justice Gold Mines Co.

DIAMONDFIELD MINING & MILLING CO. **NEVADA**

Merged into the Goldfield Great Bend Co., in 1915.

DIAMONDFIELD TRIANGLE MINING CO. **NEVADA**

See reorganized Diamondfield Triangle Mng. Co.

FLORENCE GOLDFIELD MINING CO. **NEVADA**

Offices: 25 Broad St., New York City, and Goldfield, Nev.

Officers: L. E. Whicher, pres.; F. Sommer Schmidt, v. p.-gen. mgr.; C. C. Burger, treas.; C. Brown, sec., and W. W. Cohen, H. G. McMahon, H. Pelz, H. C. Quackenbush and Raymond Guyer, directors.

Inc. April 28, 1905, in South Dakota. **Cap.,** $1,250,000; $1 par, outstanding 1,050,000. New York Trust Co., New York, transfer agents.

Share prices: 10 cents low, 19 high in 1918; 12 cents, Feb., 1919; 70 cents, March, 1919.

This company paid large dividends during the years 1908, 1909, 1910 and 1911. Operations, excepting those by lessees, were suspended at that time.

In June, 1919, the control of the company was bought by the L. E. Whicher Syndicate, and the board of directors reorganized as above.

On January 1, 1920, the operating leases were increased and it is expected that the income from these leases will contribute substantially to the treasury of the company. The Florence Divide Mining Co. is the principal lessee. The output in 1919 was 3,140 tons of $85.60 ore, yielding $217,142 net from smelter, of which Florence Goldfield gets 25% as royalty.

The company, on its own account, inaugurated important development plans several months ago, and this development work is being carried on out of the earnings from the leases.

Income from leases since the new management took possession (July 1) up to December 31, 1919, amounted to $43,006. Development and incidental expenses amount to $17,224. The cash resources at this time are about $25,000.

Property: the property consists of 67.7 acres at Goldfield, Nevada, adjoining the Goldfield Consolidated Company.

Development: the main shaft has been sunk to a depth of 1,200 feet and there are several miles of drifts, levels and crosscuts. There is still a large unexplored territory which is now being developed by the new management.

GENERAL WASHINGTON DEVELOPMENT CO. NEVADA

Office: Goldfield, Nev.

Officers: E. P. Junor, pres.; O. L. Becker; v. p.; H. S. McMahon, sec.-treas.-mgr.

Inc. March 3, 1917, in Nevada. **Cap.,** $20,000; 10c par; assessable; 720,000 issued.

Property: 2 acres, unpatented. Company reports a 10′ quartz vein in andesite with gold, silver and copper values. Course N. 20° E., dip 30°.

Development: 320′ shaft. Arrangements have been made to operate the mine through the Cracker Jack Co. workings and for the use of the latter company's equipment.

The G. W. Development Co. is a re-organization of the George Washington Mining Co., old stock being exchanged for new upon payment of 1 cent a share. Developing and prospecting.

GOLDFIELD BLUE BELL MINING CO. NEVADA

Address: Austin, Nev.

Officers: D. S. Johnson, pres.; B. W. Ward, treas.; J. M. Hiskey, sec.

Annual statement for 1918 shows: Receipts, $4,875; expenditures, $4,922.

Property: 3 fractional claims at Goldfield, under lease to Spearhead Gold Mining Co., Reorganized; Cotter mines (10 unpatentel claims) at Golden Arrow, 50 miles E. of Tonopah, Nev.; Berlin mine (16 patented claims), Berlin, Nev.; Richmond mine (3 patented claims) 1 mile S. of Berlin; Shamrock mine (10 patented claims), 6 miles N. of Berlin; Downeyville and Sullivan mines (6 patented claims), 5 miles S. of Lodi, Nev.

Development: Cotter 450′ deep; Berlin (gold), 364′; Downeyville (silver-lead), 250′; Richmond (gold, silver, copper), 75′; Shamrock (gold, silver), 350′; Sullivan (gold), 100′. The Goldfield (950′) is the only mine worked.

Equipment: Berlin has 2 steam hoists, 2 compressors, assay-office, store, machine-shop, complete 30-stamp mill, etc.

A group of mines like these ought to develop something.

GOLDFIELD BULL DOG MINING CO. NEVADA

Office: 351 Bullitt Bldg., Philadelphia, Pa. **Mine office:** Goldfield, Nev.

Officers: N. S. Keith, pres.; A. W. Ott, sec.

Inc. in Wyoming. **Cap.,** $1,500,000; shares $1 par.

Property: 4 claims, in Diamondfield district, Goldfield, Esmeralda county, adjoins holdings of the Vernal Mining Co. and is controlled by same interests. Developed by company and lessees. Small shipments made.

GOLDFIELD COMBINATION FRACTION MINING CO. NEVADA

Address: Reno, Nev.

Officers: Geo. Wingfield, pres.; W. E. Zobel, v. p.

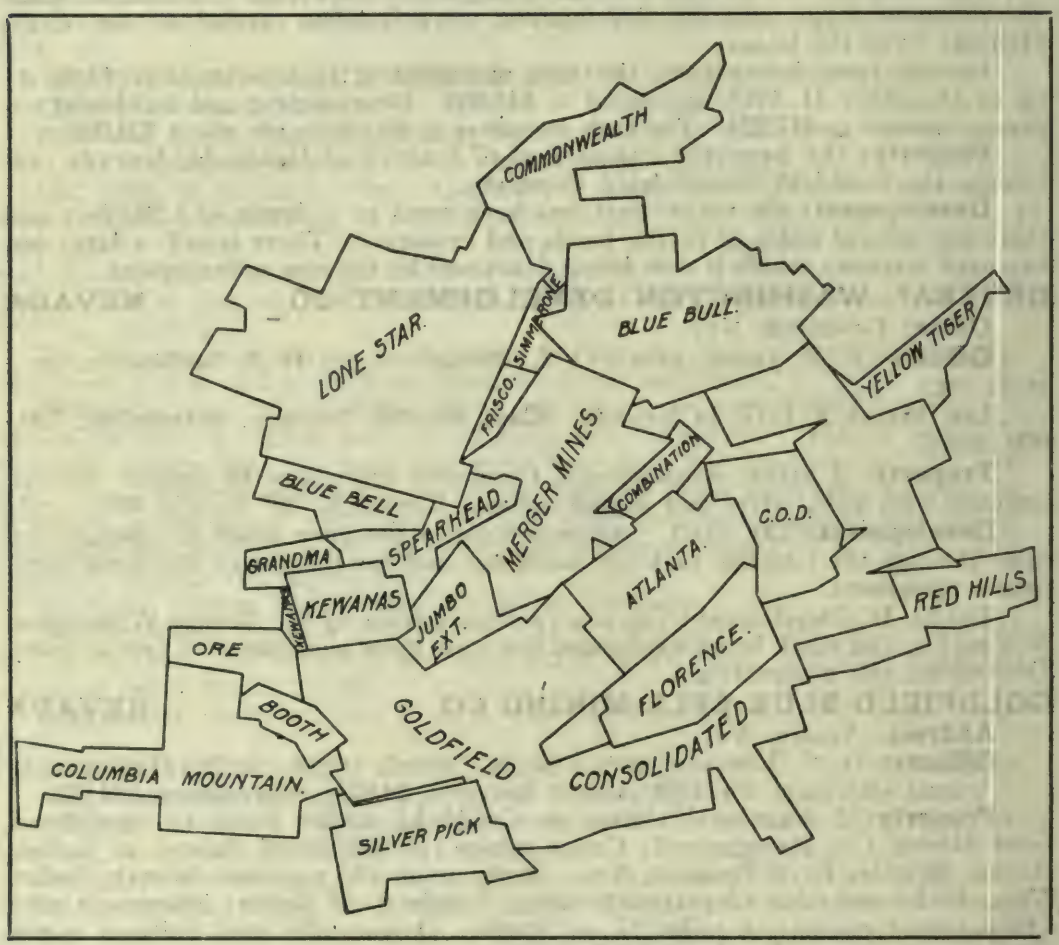
Inc. June 10, 1905, in South Dakota. **Cap.**, $1,000,000; shares $1 par; 936,617 issued. Listed on N. Y. Curb and San Francisco Exchange.

Property: at Goldfield, Esmeralda county.

GOLDFIELD CONSOLIDATED EXPLORATION CO. NEVADA

Office: Crocker Bldg., San Francisco, Calif. E. A. Julian, gen. mgr. Is a subsidiary of Goldfield Cons. Mines Co., formed in 1916 to examine and develop properties submitted for sale.

The balance sheet of the Goldfield Cons. for year ending December 31, 1918, shows $284,073 invested in the Exploration Co.



PROPERTY MAP OF GOLDFIELD, NEVADA.

Properties: a mine in Arizona and one in California both extensively developed. During 1918, 277 properties were submitted and 7 examined. No new options have been taken up and all work on the mines held was discontinued early in 1918 owing to labor conditions and high costs.

GOLDFIELD CONSOLIDATED MINES CO. NEVADA

Office: Reno National Bank Bldg., Reno, Nev.

Officers: Geo. Wingfield, pres.; J. D. Hubbard, v. p.; C. F. Burton, sec.-treas.; E. A. Julian, gen. mgr., with J. H. Carstairs, L. A. Gibbons and H. M. Hoyt, directors. A. H. Lawry, cons. eng.

Inc. November 13, 1906, in Wyoming. **Cap.**, $50,000,000; shares $10 par; issued, 3,559,148 shares. Stock listed on San Francisco and Salt Lake Exchanges and New York and Boston Curbs. John S. Cook & Co., Goldfield, Nev., regis-

trar. Company office, Reno, transfer agt. Annual meeting, third Monday in March.

Company is a merger of Goldfield-Mohawk, Red Top, Jumbo, Laguna Goldfield, Goldfield and Combination mining companies. In 1911, company acquired Vinegerone Fraction and the Bull Dog and Jumbo Fractions. Company owns entire stock of the Goldfield Cons. Milling and Transportation Co. and the Goldfield Cons. Expl'n. Co. (q. v.); a 25% stock interest in the C. O. D. Cons. Mining Co., and 87% stock interest in the Aurora Cons. Mines Co., Mineral county, Nev., and an interest in the Dolly Varden Mines Co., B. C. All of these companies are described under their own titles.

Annual report for 1918 shows: Total earnings, $796,409; operating expenses, $804,211; operating loss, $7,802. Assets include: Property, $28,396,844; loans to subsidiaries, $904,865; cash, $136,062; undivided profits, $1,880,816.

At the end of 1919, company had, cash, $268,935; accounts, etc., receivable, $196,965; supplies, $106,197; securities, etc., $35,336; junking value of plants at Goldfield and Aurora, $230,000.

Dividends: 20c. in 1907; 90c in 1909; $2 in 1910; $2 in 1911; $1.60 in 1912; 70c in 1913; 30c in 1914; 45c in 1915; 5c in 1919, on December 31, a total of $29,176,788, or $8.20 per share.

Property: 26 patented lode claims, and 1 unpatented claim, 390 acres, at Goldfield, Nev., with 6 working shafts, Combination, Mohawk, Red Top, Jumbo-Clermont, Jumbo No. 2 and Laguna. Output is from several mines working fissure veins whose stoping width varies from a few feet to as much as 20 or even 30'. Veins show orebodies with variations in which the commercial limit is not dependent upon structural planes, the shoots swelling out and pitching with but slight relation to the vein walls.

Geology: development has shown that (1) most of the orebodies have first appeared as oxidized masses under silicified outcrops, invariably turning to sulphide ore; (2) silicification always accompanies mineralization, but many zones of breccia are barren; (3) whenever ore is found in latite, it has always been first exploited in the overlying dacite, and is a continuation downward of the one ore-shoot; there is marked falling-off in value as the latite is reached, and practically all ores thus far mined in the latite are sulphides; (4) the bonanzas have been confined to the dacite, with the exception of the Engineers' lease and a few isolated shoots in the similar Milltown andesite; and (5) no pockets have as yet been proved under the Siebert lake beds, all known orebodies being indicated by surface exposure.

Development: during 1918, 4,848' of work was done at an average cost of $6.72 per foot. **Ore reserves:** estimated January 1, 1918, at 30,000 tons averaging $10 to $12 per ton. A system of leasing outlying parts of the property on a royalty basis was decided upon in 1916. Several lessees mined good ore.

Equipment: is excellent and complete for daily output of over 1,000 tons of ore.

Production, Costs, and Profits Since Completion of Mill:

	Ore, Tons	Av. Rec. per Ton	Total Av. Cost per Ton	Operating Profit, Net per Ton Av.	Total	Dividends
1919	.....	....	....	....	.....	$177,957
1918	92,309	$11.25	$10.14	$0.12(d)	$3,434	.....
1917	249,791	8.10	6.67	0.54(d)	170,384	.....
1916	338,423	6.53	5.17	1.34	452,734	.....
1915	389,643	9.01 (c)	5.02	3.99	1,558,308	$1,601,617
1914	338,192	11.61	6.19	5.42	1,835,224	1,067,744
1913	349,465	14.14	6.32	7.82	2,731,945	2,491,403
1912(a)	415,786	18.40	6.65	11.75	4,886,399	5,694,637
1911(b)	330,549	30.74	7.97	22.77	7,526,846	7,118,296
1910(b)	266,868	38.50	10.97	27.53	7,347,692	7,118,271
1909(b)	194,480	34.72	8.88	25.84	5,026,620	3,201,239

(a) 14 months ending December 31, 1912. (b) Year ending October 31. (c) Average value per ton. (d) Loss.

In February, 1919, the entire holdings of the company were leased for a period of 5 years to the Goldfield Development Co., which see.

Goldfield Consolidated ranked as one of the greatest gold mines in the world, producing over $50,000,000 and disbursing over $29,000,000 in dividends.

GOLDFIELD DEVELOPMENT CO. NEVADA

Address: P. O. Drawer 119, Goldfield, Nev.

Officers: Corrin Barnes, pres.; A. I. D'Arcy, v. p.; H. G. McMahon, sec.-treas., with A. H. Howe and Benj. J. Henley, directors. F. D. Bradley, metallurgist; Elmer Burt, mine supt.

Inc. February 13, 1919, in Nevada. **Cap.**, $125,000; increased to $200,000 in December, 1919; shares 5c. par; assessable; 200,000 shares in treasury. John S. Cook & Co., registrar. Annual meeting, third Monday in February.

The Development Company was organized to operate the holdings of the Goldfield Cons. Mines Co., including the mining property, 1,000-ton mill and railroad in the Goldfield district, Esmeralda county. Part of the ground has been purchased and the balance taken under lease for a period of five years from February 1, 1919, with the privilege of sub-leasing any part or all of the ground. Thirty-six sets of lessees were at work December, 1919, and more leases will be granted. Little ore was in sight when work was started, but most of the lessors have found and shipped ore.

The four main shafts, the Laguna-Redtop, Grizzly Bear, Clermont and Combination, are all kept open, and a new shaft was sunk on the Combination Fraction (also held under lease), which will be the main haulage way for all the ore caved in the Combination mine. Management plans to mine Combination hill by caving and thus obtain an output of 1,200 tons daily of low-grade ore for the mill. The ore will be drawn from a strip of ground that extends from the north boundary of the Florence mine to the January shaft located on the January claim, a distance of about 1,000′. The ore is 40′ wide and extends from the surface to the 380′ level. Management estimates 1,500,000 tons of ore, averaging $5.60 gold per ton, and a total operating cost of $3.15 per ton. During a detailed examination of the property, made prior to this company's taking it over, more than 1,000 samples were cut and assayed. As a result of this examination it was concluded that the reserves will actually yield $5.50 per ton, at a cost of $4, giving a net profit of $2,225,000 for the ore already blocked out. Recent work, both in old ground and virgin territory has shown that the resources of this acreage are not yet exhausted as rich ore has been found, which may "sweeten" the average given above.

Shipments by company and lessees from February 15 to April 1, amounted to 1,090 tons, valued at $21,246.

Company will start milling 500 tons of $15 to $20 ore daily about April, 1920, this to be increased to 2,000 tons of $6 ore when mill is completed.

With its competent management and ample ore supply company should earn handsome profits.

GOLDFIELD GREAT BEND MINING CO. NEVADA

Office: 302 News Bldg., Goldfield, Nev.

Officers: C. S. Sprague, pres.; J. K. Turner, v. p.; Ben Gill, sec.-treas., with L. L. Dellinger and B. W. Ward, directors.

Inc. May 8, 1915, in Nevada. **Cap.**, $1,500,000; shares $1 par; assessable; all outstanding. Assessment No. 5, of 10c. per share, levied January, 1919. Stock listed on San Francisco Exchange.

Financial statement for period February, 1916, April, 1918, shows: total receipts, $90,214, including sale of 30,040 treasury shares, $1,502; assessment No. 2, $14,498; assessment No. 3, $14,575; ore sales, $59,346. Expenditures for same period amounted to $84,875. Report for 9 months ending January 1, 1919, shows: receipts, $24,731, including $14,781 from assessment No. 4, and $3,293 from ore sales. From January to July, inclusive, income was $16,880, and expenses, $13,610; accounts and bills payable were $4,901.

Property: 7 patented claims, 112 acres, in Diamondfield section of Goldfield, Esmeralda county. Claims show a quartz vein in andesite, with 28° dip and E.-W. course. Oxide and sulphide ores occur in shoots said to average $60 per ton. **Development:** by shafts to 500′. The mine was unwatered and

underground work begun in 1915. A drift is being driven E. from the 375′ level of the main shaft toward the Lockhart shaft to intersect the downward extension of oreshoots exposed on the 236′ level. From February, 1916, to April, 1918, 4,633′ of new work was done at a cost of $54,579 or $11.78 per foot; 931′ of new work done in 1918 cost $19 per foot, and 655′ of new work in 1919 cost $14.11 per foot.

Equipment: 75-h. p. hoist, compressor, pump and an old mill which will probably be re-built.

Production: (net) in 1916 (4 months), 106 tons, yielding $3,168; in 1917, 1,800 tons, yielding $46,533; in 1918, 715 tons, yielding $12,937, a total production of 2,621 dry tons. Operations to April, 1918, showed an operating loss of $25,529. First seven months of 1919 yielded 85 tons of $21.48 ore.

GOLDFIELD MERGER MINES CO. **NEVADA**

Address: Reno, Nev.

Officers: Elmer H. Cox, pres.; J. Ross Clark, v. p.; C. F. Burton, sec.-treas. Trustees: Geo. Wingfield, John Erikson, Edgar Ames and E. A. Mizner.

Inc. 1908 in Washington. **Cap.,** $5,000,000; shares $1 par. Stock listed on San Francisco Exchange.

Property: St. Ives and Velvet claims, the latter causing considerable litigation with the Jumbo Extension during 1915, for which see Vol. XII.

Development: by shaft to 1,750′ and winze 150′ below, opening veins with shoots of copper-gold-silver ore. Work on the 1,350′ level developed 2% copper ore, but no gold. In 1917-18 work was started on the 1,750′ level in an attempt to find the extension of the Atlanta orebodies. Owing to excessive water, deep work was abandoned in September, 1919, and transferred to the 910′ level where bunches of high-grade ore had been found.

Judging by results at other mines in the district, depth holds little promise.

GOLDFIELD ORO MINING CO. **NEVADA**

Idle several years. Controlled by New York Oro Corporation.

Address: Goldfield, Esmeralda county, Nev. Ben Gill, sec.

Inc. 1912 in Arizona. **Cap.,** 3,000,000 shares; $1 par; 2,500,000 outstanding.

Property: 33 acres at Goldfield, Nev., developed to 800′ depth, where $40 assays were reported. Company also developed Vulture mine in Wonder district.

GOLDFIELD SHALE MINING CO. **NEVADA**

Out of business. Property worked by Spearhead Gold Mining Co., which see.

GOLDFIELD SUNRISE GOLD MNG. CO. **NEVADA**

Holdings purchased 1918 by Grandma Cons. Mines Co., which see.

GOLDFIELD-TULE CANYON PLACER CO. **NEVADA**

Directors: F. M. Field, A. B. Harms, Harry B. Ruhl and F. J. Harms.

Inc. April, 1919. **Cap.,** $150,000; shares 10c par; 750,000 in treasury.

Property: 5 placer claims in Tule canyon, Esmeralda county, 30 miles S. W. of Goldfield. By October, $5,000 had been spent in development and water supply; 6 men were working, and gravel washing was under way.

GRANDMA CONSOLIDATED MINES CO. **NEVADA**

Address: Goldfield, Nev.

Officers: C. S. Sprague, pres.; J. K. Turner, v. p.; Ben Gill, sec.-treas., with P. T. Somers, Jr., and S. A. McCandless, directors.

Inc. 1905, in Arizona. **Cap.,** $2,500,000; shares $1 par; 1,262,493 issued. Assessment of 1c. per share levied February and July, 1917; January and July, 1918; May, 1919. Listed on San Francisco Exchange.

Statement of accounts for 9 months ending March 1, 1919, shows: receipts, $17,272, including $12,256 from assessment No. 4; $1,600 bills payable; treasury stock sales, $1,940. Expenditures include: mine development, $11,353.

Organized to acquire and develop the Grandma claim of the Grandma Mining Co. In 1916 company acquired stock control of the adjoining Goldfield Sunrise Gold Mining Co., and in 1918 final payment was made on the Sunrise property.

Property: at Goldfield, Esmeralda county, shows a quartz lode in dacite

with 60° dip and N. W.-S. E. course. Sulphide ore contains gold, silver, and copper.

Development: by 827′ vertical shaft. During 9 months to March 1, 443′ of work was done. A northwest crosscut on the 815′ level at 95′ entered a quartz vein 20′ wide, which is to be explored, before resuming sinking of the shaft to the true shale-latite contact.

Equipment: includes newly-installed compressor and pump.

Future of the company depends on results in the contact area.

GRANDMA MINING CO. **NEVADA**

Shareholders could exchange their stock for equal amount in the Grandma Cons. Mines Co. which now owns practically all the stock of the original Grandma company.

JUMBO EXTENSION MINING CO. **NEVADA**

Office: Ben Gill, sec., Goldfield, Nev.

Idle, save for work in progress at the Jumbo Copper Mountain Mining Co., which see. Full details of the Goldfield property in Vol. XIII.

JUMBO JUNIOR MINING CO. **NEVADA**

Address: Goldfield, Nev.

Officers: J. L. McCarthy, pres.; A. I. D'Arcy, v. p.; Floyd Cable, sec.-treas., with Joseph Bruder and H. E. Clark, directors.

Cap., $1,500,000; shares $1 par; non-assessable. Stock listed on San Francisco Exchange.

Property: the Spearhead Fraction claim, 6 acres, located between the Jumbo, Kewanas and Spearhead properties at Goldfield, Esmeralda county, purchased of the Spearhead Fraction Mining Company.

Development: was centered on ground below the 880′ level and ore was opened a few inches to 24″ in width, from which better than $100 per ton of gold-silver-copper ore was shipped in 1917 and 1918.

KEWANAS EXTENSION MINING CO. **NEVADA**

Inc. 1915, in Goldfield, Nev. **Cap.,** $1,000,000. Is a small well located property, 18 acres, adjoining Kewanas on the north and in direct line with its ore zone, as developed on its north drift. It adjoins the Booth mine at Goldfield. Is controlled by the Sprague interests and other California men who have underwritten the stock at 5c. a share. Gave the Booth company 25,000 shares of stock for a sideline agreement, thus avoiding litigation.

KEWANAS MINING CO. **NEVADA**

See Reorganized Kewanas Gold Mining Co.

LONE STAR CONS. MINING CO. **NEVADA**

Office: 10 E. 43rd St., New York City.

Officers: N. H. Wheeler, pres.-gen. mgr.; G. B. Hartley, v. p.-supt.; W. D. Miller, sec.; W. H. Vesey, treas., above with J. I. Wheeler, directors. A. H. Elftman, cons. engr.

Inc. April 17, 1912, in Nevada. **Cap.,** $2,500,000; $1 par; assessable; all issued. Security Transfer & Registrar Co., New York, transfer agents and registrar. Stock listed on Salt Lake and San Francisco Exchanges. Stricken from New York Curb, October 1, 1918, after a stock-rigging scandal alleged to have been instigated by an officer of the company and a bankrupt brokerage concern. Three assessments, totaling 5 cents called to date. Annual meeting last Wednesday in April. Company reports a total of $50,000 expended in development work. Shares have varied from 1c. in 1918, and 6c. in January, 1919, to 29c. in each year.

Property: 24 claims, 450 acres, 17 patented, in Goldfield mining district, Esmeralda county, Nevada; and 7 unpatented claims in Indian mining district, Mono county, California, on which no work has been done.

Development: the Goldfield property is developed by 252′ vertical shaft and 500′ of drifts and crosscuts on the 250′ level of the Nelligan shaft, which was unwatered in February, 1919, and the east and west crosscuts advanced. No commercial ore developed as yet. Not favorably regarded.

Reported on by Emory J. Arnold, A. H. Elftman and M. Duvall.

MAYFLOWER BULLFROG MINING CO. **NEVADA**

Reorganized, 1917, as Cons. Mayflower Mines Co., which see.

MILLTOWN EXTENSION GOLD MINING CO. **NEVADA**

Address: Goldfield, Nev.

Inc. 1915 in Nevada. **Cap.,** $1,500,000; $1 par; 800,000 shares in treasury at last accounts.

Company was organized to secure title to the Louis Fraction and Milltown Extension claims at Goldfield, which were explored on the 700′ level by a crosscut run from the Yellow Tiger Co.'s shaft to the property of the Red Lion Cons. Mng. Co., which lies on the opposite side of Milltown Ext.

The Milltown Extension and the Jerry Johnson Mng. Co. each owned a half interest in the Cripple Creek Deep Leasing Co., operating a lease on the Jerry Johnson mine at Cripple Creek, Colo. During the war it was impossible to operate the lease at a profit and it was forfeited after the expenditure of all treasury funds.

Property holdings of the company are not favorably regarded.

NEW EMPIRE GOLDFIELD MINES CO. **NEVADA**

Address: Goldfield, Nev. **Officers:** C. D. Terwilliger, pres.; Chas. Wittenberg, v. p.; F. M. Manson, treas., with E. Marks, directors.

Inc. 1915, in Nevada. **Cap.,** $1,500,000; shares $1 par.

Property: 3 claims and a fraction, 50 acres, adjoining the Lone Star on the E. and Commonwealth property on the N. at Goldfield, formerly owned by the Empire Gold Mining Co.

Development: by an old 150′ shaft and 150′ crosscut said to have disclosed a 16″ streak of $20 ore. Shaft to be sunk to 500′ to reach the latite-shale contact.

Equipment: includes electric power and 40-h. p. electric hoist. Company is still in existence, but presumably idle.

NEW GOLDFIELD SIERRA MINING CO. **NEVADA**

Described in Volume XIII. Merged December, 1919, with the Yellow Tiger Consolidated Mining Co., which see.

NEW GOLDFIELD SIMMERONE MINING CO. **NEVADA**

Inc. 1915, in Nevada.

Property: the Simmerone Fraction at Goldfield, Esmeralda county and a 3-year lease and bond on the adjoining Blue Bull group, worked through the Simmerone workings. The Simmerone, acquired 1914 at sheriff's sale, is developed to 250′.

Funds exhausted in 1917 and company presumably dead.

PIONEER CONS. MINES CO. **NEVADA**

Fully described in Volume XIII. Reorganized as Reorganized Pioneer Mines Co., which see.

RED HILL FLORENCE MINING CO. **NEVADA**

Office: Reno, Nev. **Officers:** Murdo MacKenzie, pres.; H. G. McMahon, v. p.-gen. mgr.; A. H. Howe, sec.-treas., with Corrin Barnes and Dave Ward, directors.

Inc. November 20, 1916, in Nevada. **Cap.,** 2,500,000 shares; 10c par; all outstanding; assessable. Stock listed on San Francisco Exchange. Assessment No. 4, of 1c. per share levied May, 1919. Company is a consolidation of the Red Hill Mining, Florence American Mining and Florence Extension Mining companies.

Property: 5 claims, 70 acres, owned outright, and 10 acres held under lease, at Goldfield, adjoining the Florence Goldfield on the S. and W. Ore contains gold, silver, and copper, occurring in a quartz vein in andesite. The property carries the extension of the Florence vein.

Development: by 800′ vertical shaft. During 1918 a total of 1,700 linear feet of new ground was opened up by drifts, crosscuts and winzes on the 500′ and 600′ levels. Developments on the 600′ proved disappointing and management is concentrating all work on the S. drift of the 500′ level to reach the Florence Goldfield vein. By September a 4′ vein had been cut 450′ S. of the

E.-W. fault on the Florence Goldfield. The vein was opened for 70′, showing an 18″ shoot of $40 ore.

Company has a lease on a block of ground at depth of 430′ to 650′ in the Florence Goldfield mine, immediately beneath the rich ore mined by the Reorganized Cracker Jack.

Equipment: includes double drum electric hoist, compressor and electric power.

Company has an excellent speculative chance of finding bonanza ore.

RED LION CONSOLIDATED MINES CO. **NEVADA**

Described in Volume XIII. Merged December, 1919, with Yellow Tiger Consolidated Mining Co., which see.

REORGANIZED ATLANTA MINES CO. **NEVADA**

Is a reorganization of the Atlanta Mines Co., fully described in Volume XIII.

Address: Reno, Nev., and Goldfield, Nev.

Officers: Geo. Wingfield, pres.; W. E. Zoebel, v. p.; C. F. Burton, sec.; treas., with B. J. Henley and L. N. French, directors. A. I. D'Arcy, mgr.

Inc. 1918, in Nevada. **Cap.,** $1,000,000; 20c par; 4,250,000 outstanding assessable. Assessment No. 2, of 1c. per share levied March, 1919. Listed on San Francisco Exchange.

Property was conveyed to the new company in consideration of assumption by the new company of all indebtedness of the Atlanta. Stock was exchanged share for share upon payment of 1c. assessment, stockholders having a 45-day exchange privilege.

Property: 74 acres, patented, at Goldfield, Esmeralda county, Nev., includes the Atlanta, Black Bear and Union Jack mines, adjoining the Florence on the east and the Goldfield Cons. on the north.

Geology: ground contains extension of the Goldfield Cons. orebodies on the shale-latite contact. Exploratory work carried on through the St. Ives shaft of the Goldfield Cons. cut the Atlanta vein on the 1,750′ level. This vein is 40′ to 100′ wide, runs N. S. and dips at 45°. The ore is pyritic with tetrahedrite, and varies from gold ore, free from copper, to ore carrying 9% to 14% copper. The great ore-shoot thus far shows bands of medium grade shipping ore, but was as a whole, a low-grade concentrating ore that may average $8 per ton, besides a shoot of shipping ore 6′-15′ thick that averaged $20 per ton. The orebody extended 110′ upward and for 380′ on the strike, and was opened by a winze below the 1,750′ level.

Development: by 1,750′ Merger shaft. During 1918 the winze was sunk from the main or 1,750′ level to depth of 1,900′, and in March, 1919, $59 gold-copper ore was encountered in an east crosscut driven to cut the Atlanta vein.

Production: began April, 1915. Total shipments to April, 1916, from the 1,750′ level, 239 tons, netting $1,347.

The geology of the district is described in Prof. Paper No. 66 of the U. S. Geological Survey, 1909, by Ransome, and by J. E. Spurr, in Econ. Geology, February, 1916. Property promises to be a producer of low-grade concentrating ore from which it should be able to make profits.

REORGANIZED BLUE BULL MINING CO. **NEVADA**

Office: P. O. Box, 2012, Reno, Nev.

Officers: Geo. Wingfield, pres.; W. E. Zoebel, v. p. and asst. sec.; C. F. Burton, sec.-treas.; preceding, with L. N. French, directors.

Inc. 1912, in Nevada. **Cap.,** $1,500,000; shares $1 par; all outstanding; assessments totaling 8c. called to end of 1918. Listed on San Francisco Exchange. Share prices, 1c. low, 5c. high, 1918-19. Annual meeting, third Monday in December. Company was organized to acquire title to the property of the Blue Bull Mining Co., sold at sheriff's sale June 14, 1912. Latter company's stock was exchanged share for share for new stock on payment of 1c. per share.

Property: 8 claims, 148 acres, in the Goldfield district, Esmeralda county, Nev.

Development: by a 730′ shaft with workings on the 500 and 700′ levels opening up the Victor and Blue Bull veins. Crosscuts have been run into the C. O. D. Consolidated Mining Co. ground under a leasing agreement. Com-

mercial ore was found on the 500′ level, but not on the 700. Work on the 100 and 250′ levels during 1918 disclosed a vein 50′ long, from 6 to 18″ wide, averaging $100 per ton in gold, silver and copper.

Property is a prospect.

REORGANIZED BOOTH MNG. CO. OF GOLDFIELD NEVADA

Address: Goldfield, Nev.

Officers: Geo. Wingfield, pres.; W. E. Zoebel, v. p.; C. F Burton, sec.-treas.

Inc. 1912, in Nevada, as a reorganization of the Booth Mng. Co. Stock was exchanged, share for share, on payment of 1c. **Cap.,** $1,000,000; share $1 par; assessable; 999,957 outstanding. Annual meeting, third Monday in December. Listed on San Francisco and Salt Lake City Exchanges; traded in on New York Curb. Stock transferred at company's office. Five assessments, aggregating 7c. have been levied; the fifth, 2c. per share, was in January, 1915. Share prices, 2c. low, 22 high, 1918; 9c. low, 40c. high, 1919.

Dividends: No. 1, 5c per share, paid March 6, 1916; No. 2, 15c. on April 6; No. 3, 10c., on April 26; No. 4, 5c., on June 6, making a total of $349,984 for that year. On May 15, 1919, a cash dividend of 5c. per share and a stock dividend of 1 share of Tonopah Divide stock for each 50 shares of Booth stock held was declared payable from proceeds of sale of stock of the Reorganized Kewanas Mining Co., 250,000 shares of Spearhead Gold Mining Co. Reorganized, and 2,000 shares of Tonopah Divide Mining Co.

For an account of litigation, etc., see Vol. XIII.

Property: formerly owned by the old Booth Mining Co., consists of one claim adjoining the Red Top and Laguna mines of the Goldfield Cons. In September, 1915, all development work was suspended, and it was reported the management would endeavor to purchase another property.

The company is said to have the distinction of being the only non-producing mine that receives an income without incurring the slightest expense for operating.

REORGANIZED CRACKER JACK MINING CO. NEVADA

Address: Goldfield, Nev.

Officers: E. P. Junor, pres.; Geo. K. Cremer, v. p.; H. G. McMahon, sec.-treas. and mgr., with C. H. Shirtz and J. A. Erickson, directors.

Inc. December 18, 1915, in Nevada, as a reorganization of the Cracker Jack Mining Co. **Cap.,** $150,000; shares 10c. par; assessable; all outstanding. Company being financed by assessments. On December 21, 1915, a call of 1c. per share was made, each stockholder in the old company being required to pay the assessment before receiving share for share of the new company. Listed on San Francisco Exchange. Share prices, 1c. low and 6c. high in 1918; 2c. low and 10c. high, 1919.

Property: 5 claims, 2 patented, 140 acres, at Goldfield, adjoining the Sandstorm-Kendall on the east; said to have had $50,000 expended on it for development. In January, 1916, the company purchased the adjoining 3 claims, 60 acres, formerly owned by the Adams Gold Mining Co., which had been sold for taxes. Adams group has a vertical shaft 320′ deep with levels at 115′ and 300′ depth, said to show gold-silver ore in a 20′ vein in rhyolite. Work on the 320′ level has been carried to a point 1,150′ E. of the shaft, and drifts are being extended N. and S. on the Cracker Jack and East veins. A winze sunk on the east vein at 50′ from the 320′ level is reported to have intersected the Cracker Jack vein in April, 1919. By November there was exposed 8′ of $25 ore. Reserves above 120′ were estimated at 50,000 tons of $8 ore. At 440′ ten feet of $18 ore was cut.

Equipment: includes electric hoist, compressors and drills. Property is a prospect.

In addition to the work being carried on in the main property, the company holds a 5-year lease on part of the ground of the Goldfield Consolidated Mines Co. and the Florence Goldfield Mng. Co., where extensive developments are being carried on at a depth of 400′. This work is being prosecuted through the shaft of the Red Hill company. The lease secured from the Florence Goldfield is a block 220 by 150′ from surface to 530′ and another from surface to 430′.

REORGANIZED DIAMONDFIELD TRIANGLE MNG. CO. NEVADA

Address: Ben Gill, treas., Goldfield, Nev.; J. K. Turner, cons. engr.

Inc. 1917, in Nevada. **Cap.,** $2,000,000; shares $1 par. Is a reorganization of the Diamondfield Triangle Mng. Co.

Property: 7 claims in Diamond district, developed by vertical shaft said to show a promising quartz vein.

Idle since 1917, pending re-financing of company. Stockholders invited to exchange their stock, share for share and payment of 1c. assessment.

REORGANIZED KEWANAS GOLD MINING CO. NEVADA

Address: Reno, and Goldfield, Nev.; Geo. Wingfield, pres., W. E. Zoebel, v. p.; C. F. Burton, sec.-treas.; A. I. D'Arcy, mgr.

Inc. July, 1913, in Nevada. **Cap.,** $1,500,000; shares $1 par; all outstanding; assessable. Last assessment levied August, 1919. Listed in Salt Lake City and San Francisco; traded on New York Curb. Share prices, 1c. to 10 cts. 1918; 3 c. to 8c. in 1919.

Company is a reorganization of the Goldfield Kewanas Mining Co., which became bankrupt in 1913. As a result of the apex suit filed in 1915 by Reorganized Booth Mining Co., which see, the latter company received 250,000 shares Kewanas stock which was disposed of during 1918.

Property: 2 claims and a fraction, about 40 acres, east of the Laguna group of the Goldfield Cons. at Goldfield.

Development: by means of the winze on the Kewanas ground below an east crosscut into it from the 700′ level of the Laguna shaft of the Goldfield Cons. Work up to July, 1918, consisted of exploration of the vein exposed on the 840′ level; 550′ N. of the winze the vein split, one branch strikes N. W., the other N. E., with shale between. Both branches have been explored; so far no large bodies of pay-ore have been exposed, but development is to be continued on this prospect.

SANDSTORM-KENDALL CONSOLIDATED MINES CO. NEVADA

Address: Reno, Nev.

Officers: Geo. Wingfield, pres.; W. E. Zoebel, v. p.; A. I. D'Arcy, mgr.

Inc. in Nevada. **Cap.,** $1,500,000; shares $1 par; assessable; outstanding 1,326,724. Listed in San Francisco.

Property: 70 acres at Goldfield, developed by shaft to 500′ with a winze to the 700′ level. Ore carries gold and is a contact deposit between andesite and rhyolite. At last accounts the company was doing development work on and above the 350′ level, and prospecting at 260′ to find ore that yielded well years ago.

The mine is a prospect.

SILVER PICK CONSOLIDATED MINES CO. NEVADA

Offices: 262 Russ Bldg., San Francisco, Calif., and Goldfield, Nev.

Officers: Herman Zadig, pres.; A. S. Wollberg, v. p.; E. S. Van Dyck, gen. mgr.; C. D. Olney, sec.-treas., with M. Grothyohn, J. J. McCarthy and O. A. Newcomer, directors. G. F. Dyer, supt.

Inc. September, 1911, in Nevada. **Cap.,** $1,500,000; $1 par; assessable; all outstanding. Shares listed on San Francisco Exchange. Share prices, 2c. to 10c., 1918; 5c. to 15c. in 1919.

Property: 5 patented claims, 60 acres at Goldfield, Esmeralda county, being developed by 1,300′ shaft on the Deserted claim and a 280′ shaft on North End claim. A large body of low-grade sulphide ore is exposed in the Deserted, but there is no quantity of commercial ore yet. Company has taken a 5-year lease from 1919, on south end of Mohawk No. 1 claim, north end of Mohawk No. 2 claim, and north end of Combination No. 1 claim of Goldfield Cons. Mines Co., comprising about 20 acres. Work being advanced towards leased ground from 1,300 and 700′ levels of Silver Pick shaft in September, 1919.

SPEARHEAD GOLD MINING CO. (REORGANIZED) NEVADA

Office: 421 Clay Peters Bldg., Reno, Nev.

Officers: Geo. A. Kernick, pres.; H. Berg, v. p.; A. A. Codd, sec.-treas.; H. F. Bruce, supt., with A. A. Busey, directors.

Reorganized March 25, 1916, in Nevada. **Cap.,** $1,500,000; increased from

$1,000,000; shares $1 par; assessable; 10 assessments levied to date; 1,500,000 issued. Listed on San Francisco Exchange. Annual report for year ending December 31, 1918, shows: receipts, $50,343; expenditures, $26,382; cash on hand, $21,113.

Property: 2 claims, 27 acres, at Goldfield, adjoins the Kewanas, Jumbo Extension and Merger Mines Co. on the east. Several years ago lessees sank 4 shafts, 80′ to 100′ in depth. Mine was worked intermittently until October, 1915, with the idea of continuing the 240′ shaft to the shale-latite contact. This formation was cut at 880′ and the shaft bottomed at 910′. In sinking, 3 wide quartz veins of no value were passed through. At 910′ depth stringers containing chalcocite and chalcopyrite were cut, some said to assay $30 per ton. During 1918, a total of 2,127′ of work was done on the 250, 285′ and 910′ levels. High-grade ore was encountered in a zone of silicified shale on the 910′ level and several raises were driven towards the shale-latite contact, which was reached at 150. No ore was found.

During 1919 new work, mostly on the 910′ level totaled 2,049′, but only a few seams of rich ore were cut.

Company had a lease on the Never Sweat claim of the Blue Bell Mining Co. adjoining. Spearhead 450 and 910′ levels are headed toward this claim.

Equipment: 60 h. p., hoist, compressor, drills, etc.

VERNAL MINING CO. OF GOLDFIELD **NEVADA**

Main and transfer office: 351 Bullitt Bldg., Philadelphia, Pa. **Mine office:** Goldfield, Nev.

Officers: Meyer Schamberg, pres.; N. S. Keith, sec.-treas.

Inc. 1904, in Arizona. **Cap.,** $1,500,000; $1 par; increased, 1915, from $1,000,000.

Property: 2 claims, in Diamondfield district, Goldfield, adjoins Goldfield Bull Dog Mng. Co. and is controlled by same interests. Developed for a few hundred feet, partly by lessees. Has shipped in a small way.

YELLOW TIGER CONSOLIDATED MINING CO. **NEVADA**

Office: Goldfield, Nev.

Officers: H. A. Riedel, pres.; with H. G. McMahon and A. I. D'Arcy, directors. G. B. Bettles, mgr.

Cap., $450,000; shares 10c par; assessable; 1,764,176 shares in treasury. Assessments are limited to 2c. per share per annum. No. 1 of 1c., was due January 10, 1920. Stock is listed on San Francisco Exchange. Shares quoted at 1c., 1918 and 1919.

Cash at end of 1919 amounted to $20,000.

Property: 350 acres, next south of the Goldfield Consolidated and E. of the Columbia Mountain fault, including ground of the Red Lion Consolidated Mines Co., Desert Chief Consolidated Mining Co., and the New Goldfield Sierra Mining Co., absorbed in December, 1919. Ore carries gold and copper.

The Yellow Tiger has a 750′ shaft. The first work to be done by the consolidated interests will be intensive surface prospecting and geologic investigation.

The new life put into these long dormant properties may result in discovery of ore.

YELLOW TIGER MINING CO. **NEVADA**

Reorganized as Yellow Tiger Consolidated Mining Co., which see.

ROCHESTER DISTRICT.

ASSOCIATED MINES DEVELOPMENT CO. **NEVADA**

Office: 617 Pacific Bldg., San Francisco, Cal. C. N. Miller, pres.; E. N. Bannon, sec.

Inc. in Nevada. **Cap.,** $500,000; shares $500 par.

Property: at Rochester, Pershing county, includes the Wild-Cat and Tiger patented claims, the Taylor Hill, Colorado and the Plainview-Plainsite group; also a stock interest in the Tohoqua mine, Gerlach, Nev. Claimed to have $200,000 worth of silver and gold ore in sight and no debts at last accounts, 1917.

company is reported to have developed 55,000 tons of ore in the Castle Dome, assaying 12½% lead, and 2½ oz. silver per ton.

A 75-ton concentrator was installed early in 1919, and the Arizona property was producing 5 tons of concentrates daily in April. The Nevada holdings are not being operated.

ROCHESTER BUCK & CHARLEY MINES CO. NEVADA

Office: C. T. Stevenson agt., Nelson Bldg., Reno, Nev.

Officers: C. H. Moyer, pres.; Frank L. Reber, v. p., sec. and treas., with John Fant, C. E. Bugg and Wm. Lane, directors; F. L. Reber, mgr.

Inc. in Nevada. **Cap.,** $1,000,000; outstanding, $750,000; shares $1 par. Annual meeting, first Wednesday in April.

Property: 8 claims, 150 acres, in Rochester mining district, Pershing county, shows contact deposits 6-16′ wide between rhyolite and limestone, said to carry gold, silver and some lead ore. Was discovered in 1913.

Development: 220′ tunnel, with 600′ of workings.

Equipment: includes electric hoist. Property worked by lessees and shipments made to Kennett smelter, at last accounts.

ROCHESTER COMBINED MINES CO. NEVADA

Described in Vol. XIII. Was to be merged with Rochester Nevada Silver Mines Co., which see.

ROCHESTER ELDA FINA MINING CO. NEVADA

Described in Vol. XIII. Merged into Rochester Nevada Silver Mines Co., which see.

ROCHESTER HOME TRAIL MINES CO. NEVADA

Address: 716 Phelan Bldg., San Francisco, Calif.

Officers: G. S. Johnson, pres.; C. C. Higgins, v. p. and mgr.; A. J. Wright, sec.-treas.

Inc. 1916, in Nevada. **Cap.,** $1,000,000; shares $1 par; 575,000 issued.

Property: in Rochester district, Pershing county, adjoining the Buck & Charley, a small producer. Home Trail is said to have all the "earmarks" and geologic characteristics of the district. Ore opened assays from $15 to $75 per ton in silver and gold. Other rich ore is reported to have been developed. Closed down on account of war conditions.

ROCHESTER LINCOLN HILL MINING CO. NEVADA

Address: W. H. Scott, sec., Rochester, Nev.

Property: the Abe Lincoln mine on Gold hill, Rochester district, Pershing county.

Development: by tunnel, which has followed 4 to 8′ of ore, assaying high in silver and gold.

ROCHESTER MERGER MINES CO. NEVADA

Described in Vol. XIII. Merged into the Rochester Nevada Silver Mines Co., which see.

ROCHESTER MINES CO. NEVADA

Fully described in Vol. XIII. Merged into the Rochester Nevada Silver Mines Co., which see.

ROCHESTER NEVADA SILVER MINES CO. NEVADA

Offices: Reno and Rochester, Nev.

Officers: O. W. Jones, pres.; F. M. Manson, v. p.; Wm. Adams, v. p.; with J. W. Snyder, J. W. Davey, E. M. Lyon and R. W. Street, directors. R. Nenzel, sec.-treas.; C. D. Kaeding, cons. engr-mgr.; C. A. Bennett, supt.; Jay A. Carpenter, cons. metallurgist. Management of the new company is vested in an executive committee composed of F. M. Manson, J. W. Davey, and Jay Clemmons.

Inc. 1919, in Nevada. Was planned as a consolidation of the Nenzel Crown Point Mining, Rochester Mines, Rochester Combined Mines, Rochester Elda Fina Mines, and Rochester Merger Mines company, which are fully described in Vol. XIII.

This plan was modified in February, 1920, owing to the unwillingness, or procrastination of Nenzel Crown Point and Rochester Combined shareholders

and these companies were excluded from the merger. This necessitated a change in capitalization.

The three companies received 3,750,000 shares in exchange for their stock, in the following ratio; Rochester Mines, 1.750,000; Elda Fina, and Merger, 1,000,000 shares each. This consolidation settled serious litigation over apex rights, the most important suit being that of the Rochester Elda Fina vs. the Rochester Mines for $1,056,000. The scheme of consolidation dealt directly with individual shareholders, all of whom had the privilege of exchanging their shares for those in the new company. This exchange privilege was accepted by 65% of holders of Rochester Mines; 90% of Combined; 80% of Elda Fina, and 60% of Nenzel Crown Point. The Rochester Mines has paid $90,000 in dividends, the last one in October, 1918.

Property: 41 claims in the Rochester district, Pershing county. **Geology:** in the Combined property—a fault-contact between rhyolite and rhyolite-tuff; in the Elda Fina—a contact deposit between rhyolite and felsite; in the Merger—quartz veins in rhyolite, carrying oxide and sulphide ore; in the Rochester Mines—replacement veins along fissures and shear-zones in sheeted rhyolite; and in the Nenzel Crown Point—ore occurs as a contact deposit and in fissures traversing rhyolite and felsite formation.

Development: the total amount of workings and surface exploration is extensive. In the Combined, tunnels have opened ore to a depth of 400′ but reserves are said to be small; in the Elda Fina, by shaft, also by drifts; in the Merger, by two tunnels—the Friedman of the Rochester Mines and the Pitt—which cut several veins; in the Rochester Mines, mostly by tunnels, total workings covering several miles and reserves said to be good for several years at the mills; a shaft and drift-tunnels opened well-defined veins, reserves being estimated in 1916 as $4,000,000. About 1,000′ of new work done monthly in the Merger and Mines properties.

Equipment: all of the mines have hoists, compressors, and other machinery for underground operations, including an electric locomotive in the main tunnel. The Rochester Mines has a 180-ton cyanide mill in regular operation, extracting silver and gold worth over $60,000 a month. Rochester Mines ore is carried to the mill by a 12,000′ aerial tram. Electric power is available for all operations in the district, which is connected with the main line of the Southern Pacific by a narrow-gauge railway.

Production: no figures available for this group, three of which have produced ore, principally the Rochester Mines, which, during the year ended April 30, 1918, yielded $606,541 from 63,541 tons of ore. The operating profit for this period was $133,777, and costs $7.44 per ton. This mine has produced over $3,000,000 since 1913.

Consolidation of this group is the best thing that could have been done, settling litigation, centralizing management, operations and treatment of ore, and the company should eventually enter the list of dividend-payers. By 1920 a report should show what has been done and future possibilities.

ROCHESTER OCTOPUS MINES CO. NEVADA

Address: Lovelocks, Nev.

Office: Sam O'Connell, pres.-mgr.; W. E. Wright, v. p.-supt., R. J. Pierson, sec.-treas.

Inc. 1916 in Nevada. **Cap.,** $1,000,000; $1 par.

Property: 65 acres at Lower Rochester, Pershing county, ¼ mile from a railroad, developed by tunnels. Ore is reported to assay 20 to 25 oz. silver and $2 to $5 gold per ton. Reported making regular shipments in 1919.

ROCHESTER RAVEN MINES CO. NEVADA

Probably idle. **Address:** Lower Rochester, Humboldt county, Nev.

Officers: J. J. Morely, pres.; Frank L. Reber, v. p.; T. J. D. Galter, sec.-treas. and res. agt., with E. S. Howard, Frank Towelly and C. F. Hardley, directors.

Cap., 1,000,000 shares, 25c par.

Property: 3 claims, in Lower Rochester district, operated at last accounts by lessees who are reported shipping ore with values of $34 per ton in

company is reported to have developed 55,000 tons of ore in the Castle Dome, assaying 12½% lead, and 2½ oz. silver per ton.

A 75-ton concentrator was installed early in 1919, and the Arizona property was producing 5 tons of concentrates daily in April. The Nevada holdings are not being operated.

ROCHESTER BUCK & CHARLEY MINES CO. **NEVADA**

Office: C. T. Stevenson agt., Nelson Bldg., Reno, Nev.

Officers: C. H. Moyer, pres.; Frank L. Reber, v. p., sec. and treas., with John Fant, C. E. Bugg and Wm. Lane, directors; F. L. Reber, mgr.

Inc. in Nevada. **Cap.**, $1,000,000; outstanding, $750,000; shares $1 par. Annual meeting, first Wednesday in April.

Property: 8 claims, 150 acres, in Rochester mining district, Pershing county, shows contact deposits 6-16′ wide between rhyolite and limestone, said to carry gold, silver and some lead ore. Was discovered in 1913.

Development: 220′ tunnel, with 600′ of workings.

Equipment: includes electric hoist. Property worked by lessees and shipments made to Kennett smelter, at last accounts.

ROCHESTER COMBINED MINES CO. **NEVADA**

Described in Vol. XIII. Was to be merged with Rochester Nevada Silver Mines Co., which see.

ROCHESTER ELDA FINA MINING CO. **NEVADA**

Described in Vol. XIII. Merged into Rochester Nevada Silver Mines Co., which see.

ROCHESTER HOME TRAIL MINES CO. **NEVADA**

Address: 716 Phelan Bldg., San Francisco, Calif.

Officers: G. S. Johnson, pres.; C. C. Higgins, v. p. and mgr.; A. J. Wright, sec.-treas.

Inc. 1916, in Nevada. **Cap.**, $1,000,000; shares $1 par; 575,000 issued.

Property: in Rochester district, Pershing county, adjoining the Buck & Charley, a small producer. Home Trail is said to have all the "earmarks" and geologic characteristics of the district. Ore opened assays from $15 to $75 per ton in silver and gold. Other rich ore is reported to have been developed. Closed down on account of war conditions.

ROCHESTER LINCOLN HILL MINING CO. **NEVADA**

Address: W. H. Scott, sec., Rochester, Nev.

Property: the Abe Lincoln mine on Gold hill, Rochester district, Pershing county.

Development: by tunnel, which has followed 4 to 8′ of ore, assaying high in silver and gold.

ROCHESTER MERGER MINES CO. **NEVADA**

Described in Vol. XIII. Merged into the Rochester Nevada Silver Mines Co., which see.

ROCHESTER MINES CO. **NEVADA**

Fully described in Vol. XIII. Merged into the Rochester Nevada Silver Mines Co., which see.

ROCHESTER NEVADA SILVER MINES CO. **NEVADA**

Offices: Reno and Rochester, Nev.

Officers: O. W. Jones, pres.; F. M. Manson, v. p.; Wm. Adams, v. p.; with J. W. Snyder, J. W. Davey, E. M. Lyon and R. W. Street, directors. R. Nenzel, sec.-treas.; C. D. Kaeding, cons. engr-mgr.; C. A. Bennett, supt.; Jay A. Carpenter, cons. metallurgist. Management of the new company is vested in an executive committee composed of F. M. Manson, J. W. Davey, and Jay Clemmons.

Inc. 1919, in Nevada. Was planned as a consolidation of the Nenzel Crown Point Mining, Rochester Mines, Rochester Combined Mines, Rochester Elda Fina Mines, and Rochester Merger Mines company, which are fully described in Vol. XIII.

This plan was modified in February, 1920, owing to the unwillingness, or procrastination of Nenzel Crown Point and Rochester Combined shareholders

and these companies were excluded from the merger. This necessitated a change in capitalization.

The three companies received 3,750,000 shares in exchange for their stock, in the following ratio; Rochester Mines, 1.750,000; Elda Fina, and Merger, 1,000,000 shares each. This consolidation settled serious litigation over apex rights, the most important suit being that of the Rochester Elda Fina vs. the Rochester Mines for $1,056,000. The scheme of consolidation dealt directly with individual shareholders, all of whom had the privilege of exchanging their shares for those in the new company. This exchange privilege was accepted by 65% of holders of Rochester Mines; 90% of Combined; 80% of Elda Fina, and 60% of Nenzel Crown Point. The Rochester Mines has paid $90,000 in dividends, the last one in October, 1918.

Property: 41 claims in the Rochester district, Pershing county. **Geology:** in the Combined property—a fault-contact between rhyolite and rhyolite-tuff; in the Elda Fina—a contact deposit between rhyolite and felsite; in the Merger—quartz veins in rhyolite, carrying oxide and sulphide ore; in the Rochester Mines—replacement veins along fissures and shear-zones in sheeted rhyolite; and in the Nenzel Crown Point—ore occurs as a contact deposit and in fissures traversing rhyolite and felsite formation.

Development: the total amount of workings and surface exploration is extensive. In the Combined, tunnels have opened ore to a depth of 400′ but reserves are said to be small; in the Elda Fina, by shaft, also by drifts; in the Merger, by two tunnels—the Friedman of the Rochester Mines and the Pitt—which cut several veins; in the Rochester Mines, mostly by tunnels, total workings covering several miles and reserves said to be good for several years at the mills; a shaft and drift-tunnels opened well-defined veins, reserves being estimated in 1916 as $4,000,000. About 1,000′ of new work done monthly in the Merger and Mines properties.

Equipment: all of the mines have hoists, compressors, and other machinery for underground operations, including an electric locomotive in the main tunnel. The Rochester Mines has a 180-ton cyanide mill in regular operation, extracting silver and gold worth over $60,000 a month. Rochester Mines ore is carried to the mill by a 12,000′ aerial tram. Electric power is available for all operations in the district, which is connected with the main line of the Southern Pacific by a narrow-gauge railway.

Production: no figures available for this group, three of which have produced ore, principally the Rochester Mines, which, during the year ended April 30, 1918, yielded $606,541 from 63.541 tons of ore. The operating profit for this period was $133,777, and costs $7.44 per ton. This mine has produced over $3,000,000 since 1913.

Consolidation of this group is the best thing that could have been done, settling litigation, centralizing management, operations and treatment of ore, and the company should eventually enter the list of dividend-payers. By 1920 a report should show what has been done and future possibilities.

ROCHESTER OCTOPUS MINES CO. NEVADA

Address: Lovelocks, Nev.

Office: Sam O'Connell, pres.-mgr.; W. E. Wright, v. p.-supt., R. J. Pierson, sec.-treas.

Inc. 1916 in Nevada. **Cap.,** $1,000,000; $1 par.

Property: 65 acres at Lower Rochester, Pershing county, ¼ mile from a railroad, developed by tunnels. Ore is reported to assay 20 to 25 oz. silver and $2 to $5 gold per ton. Reported making regular shipments in 1919.

ROCHESTER RAVEN MINES CO. NEVADA

Probably idle. **Address:** Lower Rochester, Humboldt county, Nev.

Officers: J. J. Morely, pres.; Frank L. Reber, v. p.; T. J. D. Galter, sec.-treas. and res. agt., with E. S. Howard, Frank Towelly and C. F. Hardley, directors.

Cap., 1,000,000 shares, 25c par.

Property: 3 claims, in Lower Rochester district, operated at last accounts by lessees who are reported shipping ore with values of $34 per ton in

gold and silver. Said to have shipped $10,000 gross worth of ore in first few months of 1916. Geologic conditions are similar to those of district in general. See U. S. G. S. Bull. 580, p. 325.

ROCHESTER TREASURE MINING CO. **NEVADA**

Officers at last accounts: J. C. Colligan, pres.; J. W. Kromer, v. p.; John Golden and Harry J. Murrish, directors. J. E. McGovern, sec.-treas.

Inc. April 14, 1913, in Nevada. **Cap.**, $1,500,000; $1 par; 500.750 issued.

Property: the Old Relief mine, 5 claims, 100 acres in Relief canyon in Rochester district, Pershing county.

Geology: a silver-bearing quartz vein 12 to 25′ wide, cutting limestone and running S. E., dipping 55° west with a pay shoot 10 by 25′.

Development: by tunnels 75 to 450′ long. Workings to depth of 300′ total 1,000′.

A small mine, examined by J. C. Bray. Presumably idle.

ROCHESTER UNITED MINES CO. **NEVADA**

Fully described in Vol. XIII. Reorganized 1918, as Reorganized United Mines Co., which see.

SIMON DISTRICT.

The section in which the Simon Silver Lead mine and its simonized neighbors are located, is part of the old Bell mining district, in which the Olympic or Royal George mine discovered in 1915, has been a gold producer for four years. The Simon mine itself was worked desultorily for thirty years or more for its lead carbonate ores.

In 1919, the opening up of the big orebody of the Simon mine, coming as it did during the extraordinary "boom" at Divide, gave the place a sudden prominence, and started active prospecting operations over an extensive area.

The district covers the foot slope and middle portion of the southern flank of the Cedar mountains, an east-west range, 14 miles long and about 6 miles wide, that reaches an elevation of 8,000′ above sea level. This range is formed of a granite or grano-diorite core flanked by upturned limestone, of Paleozoic, and later age, cut by dikes and intrusive bodies of quartz porphyry and andesite, the whole capped in part by extrusive lava flows of rhyolite and andesite rocks. Faulting has brought old and new rocks together (see G. R. Stevens, M. & S. Press, Jan. 27, 1917).

In the area covered by mining claims, the feature of chief commercial interest is the contact belt of limestone, baked and altered by the heat of igneous intrusions and more or less mineralized throughout this area of contact metamorphism. The lower foot hill slopes which include the southerly claims of the district are covered by flat lake beds which conceal the rock structure.

At the Simon Silver Lead mine the contact between limestone and quartz porphyry is an irregular one as is that with granite which occurs a short distance east. The claims cover the igneous contacts, as well as various dikes and cross faults. In the underground workings the big deposit of concentrating ore is partly in limestone, partly in rhyolite, the richest or hanging wall streak being on the hanging wall side. Post mineral faulting, cuts off the ore to the west, the surface displacement being 300′ horizontally. So far as known the ore occurrence on the various other properties nearby is quite similar. In August, 1919, over 25 companies had been organized and about 10 or more were starting work in the district.

At the Olympic mine, the ore developed in prospecting ran $50 to $200 per ton across a width of 20′; and further work developed 60,000 tons of $23 ore, which has kept a mill operating since 1917.

COALITION DIVIDE MNG. & DEV. CO. **NEVADA**

See same under Divide district.

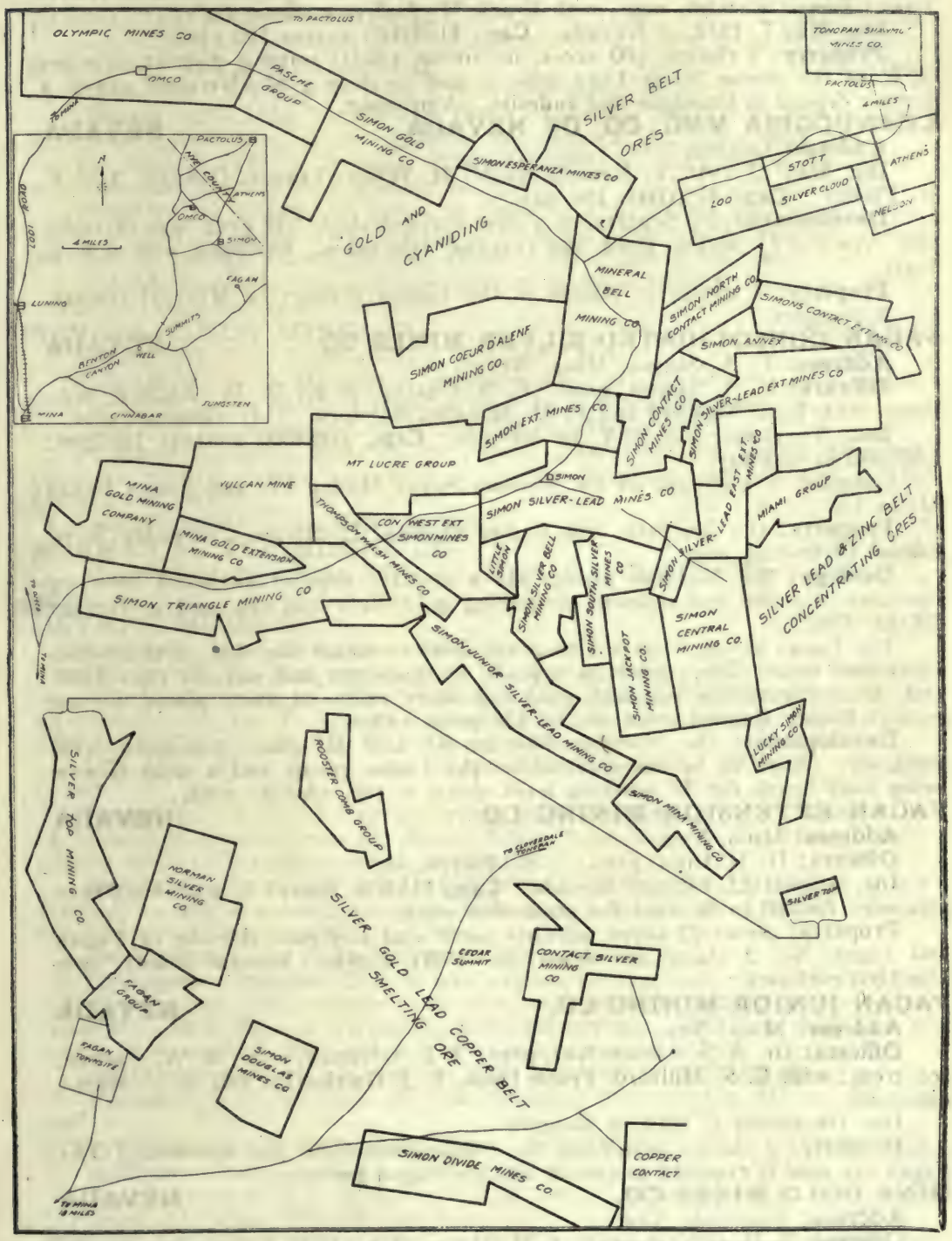
CONSOLIDATED WEST EXT. SIMON MINES CO. **NEVADA**

Address: Mina, Nev.

Officers: F. J. Solinsky, pres.; J. H. Walsh, v. p.; G. W. Dwight, sec.-treas.; Geo. F. Thompson, mgr., directors. A. H. Elftman, cons. engr.

Inc. May, 1919, in Nev. Cap., $150,000; shares 10c par; 955,816 outstanding.

Property: Thompson & Walsh group, S. W. of the Simon Silver-Lead reported to show an outcrop 70′ across and to carry extension of the Simon contact, and also the Harvey & Taylor gold vein.



PROPERTY MAP OF SIMON DISTRICT NEAR MINA, MINERAL COUNTY, NEVADA.

Development: a 200′ shaft cut ore at 100′ below surface, that assayed 2% lead and 2 oz. silver per ton.

Equipment: gasoline hoist, etc.

CONTACT SILVER MINING CO. **NEVADA**

Address: Mina, Nev.

Officers: Fred W. Fall, pres.; Robt. W. Faron, v. p.; R. R. Gamble, sec. treas.; Ernest Rackliff, mgr., with Frank M. Andrews, directors.

Inc. May 7, 1919, in Nevada. **Cap.,** $150,000; shares 10c par.

Property: 5 claims, 100 acres, in Simon (Bell) mining district, 6 miles S. E. of the Simon Silver Lead mine is said to show gold-silver-lead ore in a contact deposit in limestone and andesite. A prospect.

CORNUCOPIA MNG. CO. OF NEVADA **NEVADA**

Address: Luning, Nev.

Inc. May 23, 1919, in Nevada, by N. M. Wiley, Francis O'Boyle, and T. R. Pledge. **Cap.,** $150,000; 10c par.

Development: by September a new vertical shaft 100′ deep was in andesite. An old 75′ incline shaft had revealed fair value. Equipped with 6 h. p. hoist.

Property: a group of claims in the Simon district of Mineral county. A prospect.

FAGAN CONSOLIDATED SILVER MINES CO. **NEVADA**

Address: P. A. Simon, Mina, Nev.

Officers: P. A. Simon, pres.; E. S. Chafey, v. p.; B. W. Zachau, sec.-treas., with E. S. Mulford and F. M. Manson, directors. J. O. Greenan, supt.

Inc. November 20, 1919, in Nevada. **Cap.,** 3,000,000 shares; 10c par; 1,500,000 in treasury.

Company is a merger of the Norman Silver Mining Co. and Simon Fagan Mines Co.

Property: the Norman and Fagan groups, 12 claims, 2½ miles S. of Simon silver-lead mine.

Geology: the Norman group has a contact deposit enclosed between limestone, rhyolite and andesite, containing gold-silver-lead ore, said to average $50 per ton.

The Fagan group is on a lime-grano-diorite contact like that of the Simon silver-lead mine. The contact is exposed by open-cuts and pits for over 1,000′ and shows commercial ore with gold and silver values at many places, former owners having shipped some ore of $50 gross value.

Development: the Norman has an 80′ and 35′ shaft, equipped with hoist, etc. Work to be concentrated on the Fagan group, and a shaft is now being sunk below the 35′ working level, down to the sulphide zone.

FAGAN EXTENSION MINING CO. **NEVADA**

Address: Mina, Nev.

Officers: H. B. Lind, pres.; I. L. Pierce, sec.

Inc. August 22, 1919, in Nevada. **Cap.,** $15,000; shares 1c par; 750,000 in treasury; 750,000 to be used for promotion stock.

Property: about 22 acres, adjoins north end and east sideline of Fagan and Fagan No. 2 claims in Simon (or Bell) district, Mineral county, only slightly developed.

FAGAN JUNIOR MINING CO. **NEVADA**

Address: Mina, Nev.

Officers: Dr. A. S. Abdun-Nur, pres.; J. E. Greenan, v. p.; B. W. Zachau, sec.-treas., with E. S. Mulford, Frank Dunn, F. J. Guirhovicn and E. N. Marks, directors.

Inc. December 6, 1919, in Nevada.

Property: 2 claims adjoining the Simon-Fagan on the southeast. The Fagan ore zone is expected to extend into the Fagan Junior.

MINA GOLD MINES CO. **NEVADA**

Address: Tonopah, Nev.

Officers: P. H. O'Neil, pres.; J. H. Miller, v. p.; J. E. Adams, sec.-treas.; Allen Rives, asst. sec.-treas., and Wm. Watters, directors.

Inc. May, 1919, as a reorganization of the Mineral County Gold Mines & Milling Co. **Cap.,** $150,000; 10c par.

Property: 1½ miles S. W. of the Simon mine said to show high-grade

free-milling gold ore in a vein 4 to 30′ wide. Some ore was mined and cyanided several years ago.

Development: by 200′ tunnel and 100′ incline shaft. A 500′ two-compartment shaft, with stations at 100′ intervals was being sunk in July, 1919.

MINA GOLD MINING EXTENSION CO. **NEVADA**

Same office and directorate as Mina Gold Mines Co. whose property it adjoins.

MINERAL BELL MINING CO. **NEVADA**

Office: 318 Clay Peters Bldg., Reno and Mina, Nev.

Officers: L. Little, pres.; with W. G. Adams, Albert A. Baroni and Tom Sharpe, directors. A. N. Salisbury, sec.-treas.; F. B. House, mgr.

Inc. May 3, 1919, in Nevada. **Cap.,** $150,000; 10c par; 110,000 shares issued. Annual meeting, first Monday in May.

Property: 11 claims, 200 acres, in Simon (or Bell) mining district, near Mina, Mineral county. **Ore:** occurs as a contact deposit in lime and rhyolite, said to average $16-$18 in lead, silver, gold. Sinking 100′ shaft.

In mid-September, the surface equipment was burned, but was to be replaced at once and work continued.

NEVADA SIMON MINES CO. **NEVADA**

Office: 202 State Bank Bldg., Tonopah, Nev.

Officers: Lt.-Gov. Maurice J. Sullivan, pres.; Al. McCoy, v. p.; A. Shannon, sec.-treas., with H. C. Heidtmann and W. J. Douglass, directors.

Inc. 1919, in Nevada. **Cap.,** $1,500,000, par $1.

Property: 7 claims, surveyed for patent, 2,000′ from the Simon mine and on same kind of contact, according to report. Treasury stock offered at 15c. per share in May.

One of many new prospects at Mina.

NORMAN SILVER MINING CO. **NEVADA**

Absorbed in November, 1919, by Fagan Consolidated Silver Mines Co., which see.

OLYMPIC MINES CO. **NEVADA**

Address: Omco, Mineral county, Nev.

Officers: E. G. McConnell, pres.; A. E. Sharbaro, v. p.; G. J. Panario, sec., 460 Montgomery St., San Francisco, Cal.; Italian-American Bank, S. F., Cal., treas., with Jas. P. Nelson, directors. F. J. Siebert, gen. mgr.; R. J. Bonnemort, asst. gen. mgr.; R. G. McDonald, supt.

Inc. May, 1916, in Nevada. **Cap.,** $200,000; shares 10c par; 1,200,000 issued.

Property: the Royal George group, 9 claims, 160 acres, 25 miles N. E. of Mina, and 5 miles from the Simon Silver Lead mine in the Simon (Bell) mining district. Examined by R. H. Searles.

Ore: gold-silver occurs in a fissure vein in rhyolite. Mine has a fine ore-body, which is unfortunately cut off westward by a fault, displaced segment not having yet been located.

Development: by incline shaft to depth of 400′.

Equipment: included 25-h. p. gas engine, compressor, etc. The 100-ton mill and cyanide plant, completed in 1917, was reported making a recovery of from 90 to 98%, the ore averaging about $18 per ton. Mill was destroyed by fire on November 21, 1919, but will be rebuilt in spring of 1920.

Gross returns from shipments in 1918 amounted to $212,000, mainly in gold

Production: 35,000 tons of concentrating ore running $15 to $20 per ton.

PILOT SIMON SILVER MNG. CO. **NEVADA**

Address: Tonopah, Nev.

Inc. June 17, 1919, in Nevada, by J. T. Blake, H. Hamlin, Jr., and Dennis J. Fitzgerald. **Cap.,** $150,000; 10c par.

SIMON ANCHOR MNG. CO. **NEVADA**

Address: Tonopah, Nev.

Inc. May 31, 1919, in Nevada, by J. C. Williamson, F. K. Pittman, and Alfred Boyle. **Cap.,** $300,000; 20c par.

SIMON ANNEX MINING CO. **NEVADA**

Address: Tonopah, Nev.

Inc. June 4, 1919, in Nevada, by T. J. Flynn and Ray French. **Cap.,** $150,000; 10c. par.

SIMON CENTRAL MINING CO. **NEVADA**

Address: C. J. Miller, sec., Journal Bldg., Reno, Nev.

Officers: A. G. Miller, pres.; G. M. Smitten, v. p.; with A. J. Mergen, Peter Demosthenes, and Marle Woodson, directors.

Inc. 1919, in Nevada. **Cap.,** $150,000; 10c par.

Property: 6 claims in the Simon district.

SIMON CONTACT EXTENSION MINING CO. **NEVADA**

Address: P. O. Box 501, Tonopah, Nev.

Officers: C. C. Boak, pres.; H. O. Hall, v. p.; Thos. H. Griffin, sec.-treas., with A. A. Clute and W. R. McFadden, directors.

One hundred thousand shares treasury stock offered at 15c., May, 1919.

Property: 5 claims adjoining the Simon Contact in the Simon district, via Mina, Mineral county.

SIMON CONTACT MINES CO. **NEVADA**

Address: Mina, Nev.

Officers: P. A. Simon, pres. and mgr.; C. C. Boak, v. p.; B. W. Zachau, sec.-treas., with B. F. Baker, C. H. McIntosh, directors. E. W. King, supt.

Inc. April 29, 1919, in Nevada. **Cap.,** $1,500,000; shares $1 par; 500,000 shares and $40,000 cash in treasury, June, 1919. Annual meeting, first Monday in May.

Property: 6 claims, about 105 acres, adjoins the big Simon mine on N. E. in Simon district, Mineral county, said to show a body of $40 lead-silver-copper ore.

Equipment: gasoline hoist.

Planned sinking shaft and further development in 1919; 2 shafts were down 50′ showing fair value at last report.

SIMON DISTRICT MINES CO. **NEVADA**

Address: Luning, Nev.

Directors: W. G. Zulch, F. T. Dann and A. Shannon.

Inc. May 5, 1919. **Cap.,** $150,000; 10c par.

Property: in Simon mining district. A prospect.

SIMON DIVIDE MINING CO. **NEVADA**

Office: Mina, Nev.

Officers: W. J. Douglass, pres.; C. W. Taylor, v. p.; W. G. Hillier, v. p.-sec.; E. S. Chafey, gen. mgr.; A. H. Elftman, cons. engr., with C. C. Boak and E .S. Mulford, directors.

Inc. May, 1919, in Nev. **Cap.,** $150,000; shares 10c par.

Property: 4 claims in the Simon district, in the Cedar Range, at an altitude of 6,500′, 23 miles N. E. of Mina, Mineral county, Nev.

Reported by A. H. Elftman to cover 3,000′ of the apex of the S. E. contact about 3 miles S. E. of the Simon mine, with mineralized outcrop proved for 1,500′. The vein is 40′ wide on the surface with streaks 4 to 5′ wide, opened by several shallow shafts showing ore said to run 10 to 12 oz. silver, 6% copper, and 1.5% lead carbonate.

About 1,000 tons of ore shipped during past 2 years averaged $40 in silver and copper. Dr. Elftman reports showings on the claims rank second only to those of the Simon mine.

SIMON DOUGLASS MINING CO. **NEVADA**

Address: Tonopah, Nev. Sponsored by C. N. Miller & Co., of Tonopah.

Officers: C. A. Calhoun, pres.; M. E. Albert, v. p.; H. S. Deane, v. p.; H. B. Smith, sec.-treas., with C. R. Douglass, E. S. Mulford and C. N. Miller, directors. E. S. Chafey, gen. mgr.

Inc. May, 1919. **Cap.,** $150,000; 10c par; 25,000 outstanding.

Property: Cleopatra group, comprising 3 claims, 60 acres in Simon district, north of the Simon Divide and south of the Fagan group. The massive

boulders of lead ore, supposedly from the south extension of the main Simon contact are said to assay $68 per ton in silver.

SIMON EXTENSION MINES CO. **NEVADA**

Address: Mina, Nev.

Officers: P. A. Simon, pres.-gen. mgr.; Geo. S. Green, v. p.; B. W. Zachau, sec.-treas., with W. J. Douglass, B. F. Baker, directors.

Inc. April 21, 1919, in Nevada. **Cap.,** $750,000; shares 50c par.

Property: 4 claims adjoining the Simon Silver-Lead on the N., to be extensively developed.

Development: 2 shafts down 30 and 25′ by August.

SIMON FAGAN HONEYMOON CO. **NEVADA**

Office: Mina, Nev.

Officers: Fred Balzar, pres.; F. W. Fall, v. p.; Ed. C. Eustace, sec.-treas.; R. G. McDonald, gen. mgr., with F. A. Nussberger, Henry Ohlandt, Jr., Chas. Enquist, J. R. Eustace, directors.

Inc. August 26, 1919, in Nevada. **Cap.,** $150,000; par 10c; 40,000 in treasury. Transfer office: Mina, Nev.

Property: about ½ mile S. of the Simon Fagan, developed by 100′ tunnel. A prospect.

SIMON FAGAN MINES CO. **NEVADA**

Absorbed in November, 1919, by Fagan Consolidated Silver Mines Co., which see.

SIMON GOLD MNG. CO. **NEVADA**

Address: Tonopah, Nev.

Officers: Dave F. Murphy, pres. and gen. mgr.; Owen Murphy, v. p.; Julius Goldsmith, sec.-treas., with Wm. Davis and Ott Ziegler, directors.

Inc. 1919, in Nevada. **Cap.,** $150,000; shares 10c par, 750,000 shares in treasury, June, 1919.

Property: Golden Eagle group of 6 claims, 120 acres, 23 miles E. of Mina, 1,200′ from the Olympic mine at Omco, Mineral county.

Ore: said to occur in a contact between andesite and rhyolite, with a well-defined fissure vein traceable for 3,000′ along a well-mineralized course, and to average $8.70 per ton.

SIMONS JACKPOT MNG. CO. **NEVADA**

Address: 353 Bush St., San Francisco, Calif. **Mine office:** Mina, Nev.

Officers: Oscar A. Daube, pres.; P. J. Daube, sec.-treas.; Otto Hiffner, mgr., with Joe de Forrest, directors.

Inc. June 7, 1919, in Nevada. Cap, $100,000; 10c par; all outstanding; 400,000 shares held by president as trustee. Transfer office: Company's office.

Property: 6 claims, 60 acres in Simon district. An undeveloped prospect.

SIMON JUNIOR SILVER LEAD MINING CO. **NEVADA**

Address: E. C. Watson, Luning, Nev.

Officers and directors: T. R. Pledge, pres.; E. C. Watson, sec.-treas., with A. C. Bachman, N. D. Marakas, and W. D. Jones. R. G. McDonald, supt.

Inc. May 7, 1919, in Nevada. **Cap.,** $150,000; 10c par; 750,000 outstanding. Transfer offices: Luning and Mina, Nev. Stock sold at 7½c., May, 1919.

Property: a group of 9 claims, S. W. of the Simon mine, in Simon district, close in and owned outright. Said to carry a big dike of silicified breccia running $3 per ton in gold; the material is used for ball-mill pebbles at the nearby Olympic gold mill.

Development: by 200′ crosscut tunnel. Plan 500′ tunnel and shaft. In August the tunnel was in 100′ in a limestone-rhyolite contact.

SIMON LEAD MINES CO. **NEVADA**

Name changed May, 1919, to Simon Silver-Lead Mines Co., which see.

SIMON LEAD & SILVER MINES EXTENSION CO. **NEVADA**

Officers: W. J. Douglass, pres.; T. J. Flynn, v. p.; W. O. Dougherty, C. S. McCarthy, Louis Cirac, directors. Ray French, sec.-treas.

Property: 5½ claims, 110 acres, adjoining the Simon mine on the east.

Treasury stock offered by Smith & Aman of San Francisco, at 15c. May, 1919.

SIMON MINA MINING CO. **NEVADA**

Office: 318 State Bank Bldg., Tonopah, Nev.

Officers: J. K. Turner, pres.; C. A. Calhoun, v. p.; L. L. Dellinger, mgr.; Branch H. Smith, sec.-treas., with R. E. Smith, directors.

Inc. May 14, 1919, in Nevada. **Cap.,** $150,000; 10c par; 950,000 shares outstanding. Stock sold at 15c., May, 1919.

Property: 5 claims covering 3,000′ along a limestone rhyolite contact, 1½ miles S. of the Simon mine.

Development: by 280′ shaft, at bottom of which $12 silver-lead ore was encountered in an 80′ crosscut.

Equipment: gasoline hoist and buildings.

Examined by F. M. Maloney, formerly of Cerro de Pasco. A prospect.

SIMON SILVER BELL MINING CO. **NEVADA**

Address: Mina and Tonapah, Nev.

Officers: P. A. Simon, pres.; W. J. Douglass, v. p.; C. C. Boak, sec.-treas., with J. F. Wall and A. H. Elftman, directors.

Inc. May, 1919, in Nevada. **Cap.,** $150,000; 10c par; 800.000 outstanding.

Property: Bell group, 7 claims, about 80 acres, side lining the Simon on the south.

Development work started in 1919.

SIMON SILVER LEAD EAST EXT. MINES CO. **NEVADA**

Address: 221 Odd Fellows Bldg., Reno, Nev. **Operating office:** Mina, Nevada.

Officers: C. B. Burkham, pres.; J. M. Andrews, v. p.; Geo. S. Green, sec.; B. F. Baker, treas., with Ernest Rackliff, directors.

Inc. April, 1919, in Nevada. **Cap.,** $250,000; increased later to $375,000, 25c. par; 96,000 shares outstanding. Company reports $4,000 in treasury, October, 1919. Transfer office: Reno, Nev.

Property: adjoins the Simon property on the east and south. Developed by 2 shafts, 35′ and 65′ deep, and equipped with gasoline hoist.

SIMON SILVER LEAD EXTENSION M. CO. **NEVADA**

Address: Chris. McCarthy, mgr., Mina, Nev. **Office:** Tonopah, Nev. Wood Elkus, supt.

Inc. April 21, 1919, in Nev. **Cap.,** $150,000; 10c par. T. J. Flynn, Chris McCarthy, and A. C. Kearns, incorporators.

Property: the Extension group in Simon district. Work said to disclose ore at places along trend of vein.

SIMON SILVER LEAD MINES CO. **NEVADA**

Office: Mina, Nev.

Officers: P. A. Simon, pres., W. B. Zachau, sec. Burch Hershey & White, cons. engrs.

Inc. November, 1919. **Cap.,** $1,500,000; par $1; 1,100,000 issued.

Property: 9 claims in Simon (officially known as Bell) district, Mineral county, Nev., 22 miles east of Mina. Originally discovered 50 years ago, and intermittently worked until real development began in 1919. Examined in 1919 by Walter Harvey Weed.

Geology: claims cover a limestone-porphyry contact with irregular intrusions of older andesite and granite. Ore is found in veins which cross all rocks, but in part follow fault contacts. The orebody is a replacement deposit mainly in limestone, and in part in porphyry; it runs E.-W. and dips 60° N. Two shoots of sulphide ore occur, separated by mineralized porphyry. Values fade in footwall limestone, but show high-grade ore against limestone hanging. Shipping ore carrying 15-30% lead, 12-32 oz. silver per ton, and 8% zinc, occurs for a width of 8′ or so, in main orebody, and also beyond a cross fault in newly discovered orebody 300′ or more to the east of the shaft; yet the value of the mine rests upon the 400,000 tons of partly developed milling ore, which averages 3.34 oz. silver per ton, 6.4% lead and 7.18% zinc. It is estimated this can be mined and milled at a net profit of $6.20 per ton.

Development: main working shaft is 430′ deep, being vertical for 230′, then inclined to follow footwall to 6th level. The South orebody is crosscut to its hanging wall on each level, and the North orebody is crosscut and proven from the 4th (or 280′) level downward.

Surface cuts and pits show pay ore at numerous places along outcrop of vein, for total distance of 2,100′, of which only 400′ is explored underground.

It is considered possible that the mine will develop into one of the largest silver-lead properties of this country, big enough to warrant a large concentration plant and its own smelter.

SIMON TRIANGLE MINING CO. **NEVADA**

Address: Mina, Nev. and Tonopah, Nev.

Officers: E. S. Mulford, pres.; Geo. F. Thompson, v. p.; C. C. Boak, sec., with A. H. Elftman, J. W. Dunphy, E. S. Chafey and W. J. Douglass, directors.

Inc. May, 1919. **Cap.,** $150,000; shaers 10c par.

Property: 4 claims in the Simon district, adjoining the Cons. West Extension and said to be on the Simon contact.

TONOPAH DISTRICT, NYE COUNTY.

AFTER ALL MINES CO. **NEVADA**

Address: Tonopah, Nev.

Officers: Hugh H. Brown, pres.; Herman Zadig, v. p.; M. E. Albert, sec.-treas., with J. H. Evans and E. A. Keenan, directors.

Inc. March 27, 1917, in Nevada. **Cap.,** $1,000,000; shares $1 par; 700,000 shares issued; assessable. Annual meeting, April 3rd.

Reported at the time of organization to have taken over part of the holdings of the Umatilla Tonopah Mng. Co. and the Montana Tonopah M. Co. in Tonopah mining district.

BUCKEYE BELMONT MINES CO. **NEVADA**

Office: 1055 Spitzer Bldg., Toledo, Ohio, and Tonopah, Nev.

Officers: A. B. Tillinghast, pres.; W. B. Kober, v. p.; W. B. Voorhees, sec.; also directors. E. F. Rowley, treas, at last accounts.

Inc. 1908, in Nevada. **Cap.,** $2,000,000; $1 par; outstanding 700,000 shares. Annual meeting, first Thursday in Jan. Private corporation. Stock unlisted. Is a holding company, operating property formerly owned by Belmont Extension Mng. Co., now defunct, and holding interests in the Buckeye Eagle and Buckeye Tonopah companies. Reported in Oct., 1915, to have taken an option upon a drift gravel property in Plumas county, Cal.

Property: 15 claims, 13 patented, 300 acres, at Tonopah, adjoining the Tonopah Belmont on a portion of the east end line.

Ore: quartz with silver sulphides and gold occurring in fissures in trachyte. Veins strike E. W. and dip 30°.

Development: 3 shafts, 125′, 900′, and 1,234′ deep, with 5,000′ workings.

Equipment: includes 2 electric hoists, of 52-h. p. and 120-h. p., one 40-h. p. gasoline hoist and two 8-drill air compressors.

Property practically idle during the war, but plans for 1919-20 include deepening shaft and development on the 900′ and 1,200′ levels. There are two large veins of low-grade ore with several rich stringers. No production to date.

BUCKEYE EAGLE MINING CO. **NEVADA**

Tonopah, Nev. Control held by Buckeye-Belmont Mines Co. Same officers and directorate as that company.

BUCKEYE TONOPAH MINING CO. **NEVADA**

Tonopah, Nev. Control held by Buckeye-Belmont Mines Co.; same officers and directorate as that company.

CALIFORNIA & TONOPAH MINING CO. **NEVADA**

Reorganized as New California & Tonopah Mining Co., which see.

CASH BOY CONSOLIDATED MINING CO. **NEVADA**

Address: Tonopah, Nev.

Officers: J. H. Goldman, pres.; G. B. Thatcher, v. p.; E H. Mead, sec.-treas., with E. M. Hall, directors. F. H. Norcross, res. agent.

Inc. March 21, 1914, in Nevada. **Cap.,** $2,000,000; $1 par; all outstand-

ing; assessable; assessment No. 12, of 1c per share, levied August 1, 1919. Listed on San Francisco Exchange. Annual meeting, November 21.

Company is a reorganization of the Tonopah Cash Boy Cons. Mng. Co., which suspended operations in 1914 with debts of $3,476, and 76,870 shares in the treasury.

Financial statement of Cash Boy for period March 20, 1916, to March 21, 1918, showed: receipts, $134,162, which includes: assessments, 6, 7, 8, 9, 10, netting $99,878; ore shipments, $23,488; royalties, $925. Cash on hand, $8,340. Expenditures for same period were $125,822.

Property: several fractions, patented, 30 acres, at Tonopah, Nye county, adjoins the Tonopah Merger on the W., Tonopah Victor on the S., and Tonopah Extension on the N. Ore: gold-silver occurs in veins in rhyolite.

Development: by 1,646′ vertical shaft, with most of the recent work on the 1,527′ level, where crosscutting and drifts to the S. disclosed 4 distinct veins carrying ore of commercial grade reported to show higher value with depth. A total of 1,976′ of underground work was done from March to November, 1918. Crosscutting is being done to the N. on the bottom level to cut the downward extension of the veins exposed on the 1,527′ level.

In 1920, there were 5 faces in ore on the 1,537′ and 1,646′ levels. The 1,527′ level showed 30 to 36″ of $68 to $89 ore, and the 1,646′ had 1½′ of $33 ore.

Equipment: includes 75-h. p. electric hoist and 3-drill air-compressor.

Production: in 1915, 150 tons, assaying $15 per ton; from March, 1916, to November, 1918, 1,740 dry tons were shipped having a net assay value of $13.41 per ton. Shipping 150 tons weekly in 1920.

Property is a promising prospect.

GREAT WESTERN CONSOLIDATED MINING CO. NEVADA

In 1915, control of this company was acquired by the Greenwater Copper Mines & Smelter Co., which see.

Address: Emery W. Elliott, 542 Mills Bldg., San Francisco, Calif. John McGee, supt., Box X, Tonopah, Nev.

Annual statement to December 31, 1919, shows: cash on hand, January 1, 1919, $2,537; received from assessment, $20,399; expenditures $21,564; cash on hand, December 31, $1,372. Assessment No. 10 levied September, 1918, delinquent, February, 1919. No. 11 was payable in September. Listed on San Francisco Exchange.

Property: 11 unpatented claims, about 300 acres, at Tonopah, Nye county.

Development: by 2-compartment shaft, 1,150′ deep, which enters one of the ore-bearing formations at about 1,000′. Considerable exploration work was done on the 860′ level, but it is said to have been all in cap rock and commercial ore was not found. Water hindered exploration during the early part of 1917. Management intends to explore the ground thoroughly by crosscutting and drifts. In June, 1918, work was resumed on the 1,100′ level and a 12′ vein intersected about 130′ north of the shaft. All further work on the vein was suspended in October owing to the necessity of enlarging the shaft. A new 4-compartment shaft was sunk and is reported down 600′ in August, 1919.

GREENWATER COPPER MINING & SMELTER CO. NEVADA

Address: Lloyd E. Marsden, sec.-treas., Room 515-E, 30 Church St., New York.

Officers: Chas. R. Miller, pres.; M. R. Ward, v. p.; preceding, with Max E. Bernheimer, Chas. Gold, W. G. Denham, Clyde Milne, Oscar A. Daube, F. I. Mallory, B. H. Campbell and W. H. Drayton, 3rd, directors, at last accounts.

Inc. Dec. 12, 1906, in Delaware. **Cap.**, $25,000,000; shares $5 par Was a securities holding company only, and owned stock in a number of Greenwater promotions, all dead, described Vol. VIII, Copper Handbook. Company, on December 31, 1910, had $144,727 invested in choice bonds, after losing about $170,000 through the failure of Chas. Minzesheimer & Co., New York brokers, who failed October 15, 1910.

Reorganized October, 1914, and capitalization reduced to $500,000; shares

10c. par; 3,000,000 issued. Stock listed on the N. Y. Curb. Annual report December 31, 1916, showed cash assets of $52,630, less expenses and loss on $4,960, leaving $47,670 net. Corporation Trust Co., Jersey City, N. J., transfer agents. Annual meeting, second Friday in February.

Property: in August, 1911, company took over the O. K. and Supply groups, gold mines at Dale, Calif. Considerable work was done on the Supply mine. In 1915 a crosscut on the 700′ level cut the Armenian and Jeane veins, carrying practically no metal. Two winzes were sunk and drifts extended on the 800-1,100′ levels of the Supply vein with negative results. The value decreased with depth, and on the 1,200′ level no pay-ore was found. All development and prospect work gave unsatisfactory results and the property was abandoned in October, 1915.

In November, 1915, the company acquired stock control of the Tonopah Bonanza Mining Co. and the Great Western Cons. Mining Co., at Tonopah, Nev.

The cost of shares and assessments in first-named company to end of 1916 was $31,867, and of latter company $14,910. For the Ruby claims, 125,000 treasury shares at par, 10c. each, was paid.

Company now hopes to recoup losses sustained in Californian operations. Holdings described under their respective titles.

GYPSY QUEEN MINING CO. **NEVADA**

Offices: 265 Russ Bldg., San Francisco, Calif., and Tonopah, Nev.

Officers: C. F. Wittenberg, pres.; F. A. Burnham, treas.

Inc. in Nevada. **Cap.,** 1,250,000. Four assessments have been called. Listed on San Francisco Exchange.

Property: 53 acres in Tonopah mining district, Nye county, said to show silver ore. Vein is from 1 to 5′ wide. Formation is rhyolite, quartz and trachyte.

Development: by 1,370′ shaft. On the 1,350′ level a crosscut was run S. E. for several hundred feet. At 247′ from the shaft a 4′ vein was cut with ore from 8″ to 18″ in width, and a winze was being sunk on this vein at last accounts.

HALIFAX TONOPAH MINING CO. **NEVADA**

Offices: 1008 Kearns Bldg., Salt Lake City, and Tonopah, Nev.

Officers: F. M. Smith, pres.; Thos. Kearns, v. p.; F. J. Westcott, sec.; C. B. Zabriskie, treas.; preceding, directors. B. F. Edwards, gen. mgr., Syndicate Bldg., Oakland, Cal. J. W. Sherwin, supt.

Inc. Sept. 27, 1902, in Utah. **Cap.,** $2,000,000; outstanding, $1,895,000; shares $1 par. Stock transferred at company's office. Registrar & Transfer Co., 19 Nassau St., New York, registrar. Annual meeting, second Tuesday in October. Listed on New York Curb and San Francisco Exchange.

Property: 4 patented claims, 81 acres, adjoining the central portion of the Belmont property on the east. Company also operates property of the Mizpah Extension Co. of Tonopah.

Ore: gold-silver, occurring in trachyte. For geology of Tonopah district, see U. S. G. S. Prof. Paper, 42, or Jim Butler company herein.

Development: by vertical shaft, 1,734′ deep, with the deeper levels at 1,000′, 1,200′, 1,400′ and 1,700′. The 1,000′ crosscut picked up the easterly extension of the Belmont vein and ore shipments were made. After considerable work the vein was lost through faulting. Owing to an excessive flow of water work was stopped until July, 1919, when the water was reported under control and work to be resumed.

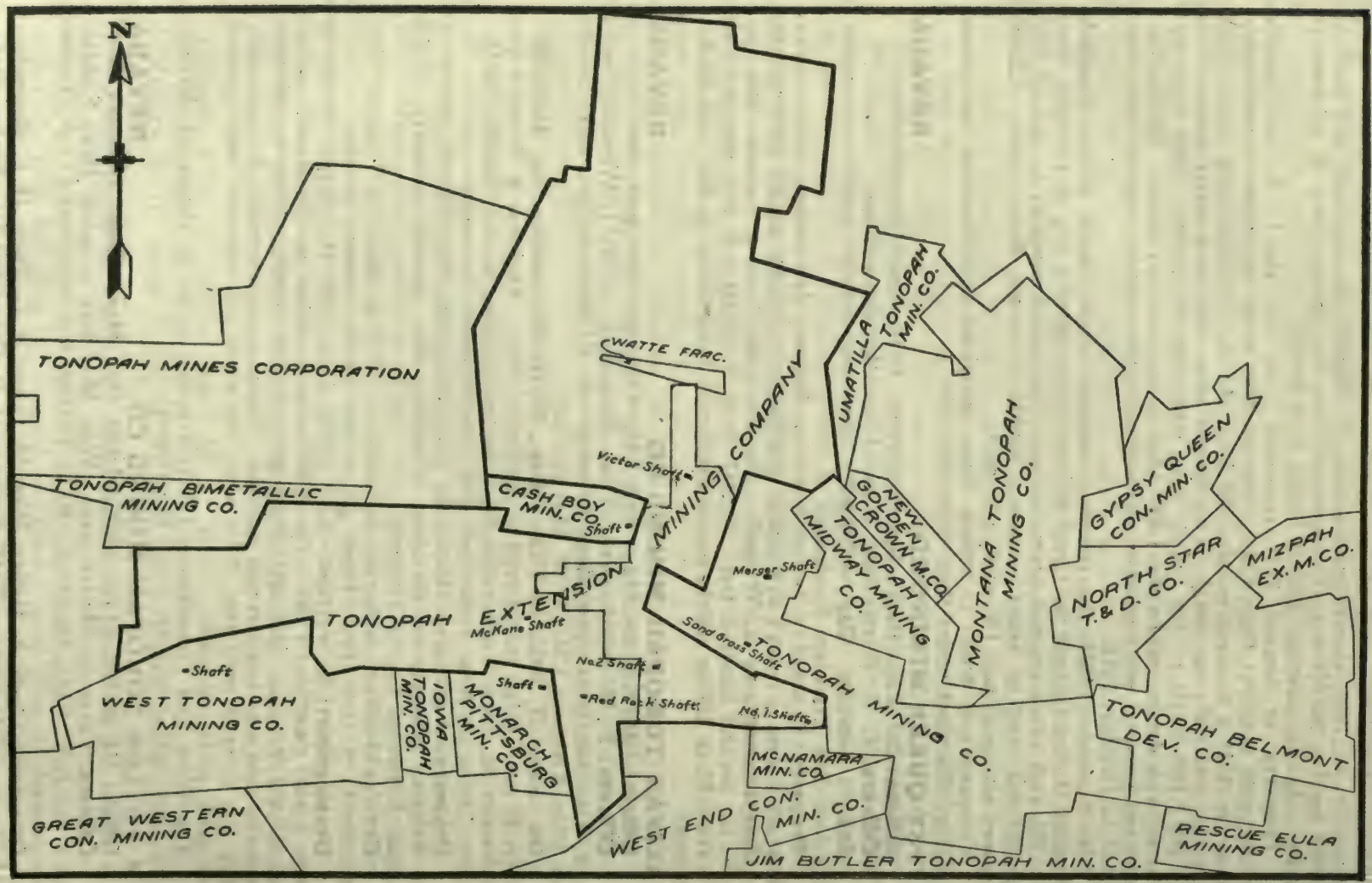
The West End Consolidated Co. is reported to be in charge of development work, taking treasury stock in payment.

JIM BUTLER TONOPAH MINING CO. **NEVADA**

Office: 500 Bullitt Bldg., Philadelphia, Pa. **Mine office:** Tonopah, Nev.

Officers: Clyde A. Heller, pres.; Wm. M. Potts, v. p.; S. Deas Sinkler, 2nd v. p.; J. K. Kitto, sec.-treas.; R. G. Wilson, asst. sec.-treas.; C. B. Taylor, gen. counsel.

Directors: Clyde A. Heller, Wm. M. Potts, R. G. Park, H. C. Brougher, C. B. Taylor, S. D. Sinkler, T. W. Synnott, M. B. Cutter and J. C. Fraley, Fred'k Bradshaw, gen. supt.; L. R. Robins, mng. engr.; Clyde Jackson, supt.



PROPERTY MAP OF TONOPAH, NEVADA.

Inc. Nov. 13, 1903, in Delaware. **Cap.**, $2,000,000; shares $1 par; all issued; 281,979 in hands of Trustee for company. Traded in on New York and Boston Curb. Listed on San Francisco Exchange. Transfer agent: company's office; registrar: Fourth National Bank, Philadelphia. Annual meeting, second Wednesday in January.

Dividends: initial of 10% was paid August 2, 1915. Total distributions to August 1, 1918 were $1,151,074.

Treasurer's statement for 15 months ended December 31, 1918, shows: receipts, $670,289, including $613,956 from ore shipments; disbursements for operations, $306,406; for Belmont Wagner Mng. Co., $235,853; for Belmont Shawmut Mng. Co., $107,435; dividends, $292,063; taxes, $42,937; cash on hand, $69,074; Liberty bonds, $102,500. Total net operating profit for the same period was $227,053, as compared with $483,675 in 1917.

Property: 16 patented, 2 unpatented claims, 241 acres, at Tonopah, Nev.; and the Ophir King group, 91 acres; also owns a one-quarter interest in an option on the Eagle Shawmut mine, California, and Belmont Wagner property, both held by the Tonopah Belmont Dev. Co. and separately described. The Jim Butler has $403,915 invested in these holdings.

Geology: of Tonopah is complex; a series of volcanic rocks, partly lava flows, partly intrusive sheets and masses of quickly varying thickness overlie one another irregularly. The productive veins are in the Mizpah "trachyte," overlaid by the Midway andesite and intruded by the West End rhyolite. The veins are cut through by the Midway andesite and do not commonly outcrop, but terminate against the Midway andesite at depths up to 1,200′. They are fissure veins which for some distance lie on or in planes of contact between eruptive rocks. Values are in gold and silver. See U. S. G. S. Prof. Paper, No. 42. The company holdings are identical in character to those of its neighbors, the Tonopah Mining and Belmont companies.

Development: is through the Desert Queen and Wandering Boy shafts. Development for fiscal year 1917 was 5,012′, costing $8.59 per foot, and for 15 months ending December 31, 1918, amounted to 4,649′, costing $10.43 per foot. Development work having failed to expose new orebodies of commercial value, further work on the 865′ level of the Wandering Boy was planned for 1919.

Ore reserves: Sept. 30, 1917, consisted of 18,320 tons positive ore, 5,000 tons possible ore, a total of 23,320 tons, compared with 19,158 tons in preceding year, practically all of which has been taken out. Geological development in various parts of the mine are not encouraging, but results late in 1919 were reported as satisfactory.

Recent production and costs per ton:

Year	Ore, Tons	Value per Ton	(A)	Mng. Dev.	Trans.	Trmt. Chge.	Gen. Exp.	Total Oper.	Oper. Profits
1918....	27,688	$26.15	$2.14	$8.21	$0.53	$3.98	$0.89	$13.61	$10.40
1917....	40,297	26.12	1.79	5.17	0.71	5.33	0.73	11.94	12.39
1916....	46,489	19.78	1.56	4.80	0.83	4.79	0.38	10.80	7.73
1915....	48,533	19.25	1.74	4.29	1.08	5.02	0.28	10.40	7.11
1914....	34,722	21.45	2.14	5.36	1.07	5.58	0.32	12.18	7.13

(A) Deductions by ore purchasers.

In the 7½ months ending July 15, 1919, the profit from 4,226 tons was $20,568. Ore is treated at the Tonopah Belmont mill.

The apex suit of the Jim Butler against the West End Co. for trespass and ore extracted was decided July, 1916, in favor of the West End Co. by the State Supreme Court, and the judgment confirmed June, 1918, by the U. S. Supreme Court. Pending the suit the West End continued to mine ore, but the revenue was impounded, the total amount being $373,614, from 62,758 dry tons of ore.

The Jim Butler has been fairly profitable, but is now a mine of diminishing assets.

MacNAMARA-CRESCENT MINING CO. **NEVADA**

Offices: 565 Mills Bldg., San Francisco, Calif., and Tonopah, Nev.

Cap., $300,000; shares 20c par; all outstanding; 750,000 shares are held by the MacNamara M. & M. Co.

Property: 9 claims, 86 acres, at Tonopah, adjoining the West End Cons. developed by 650′ shaft which is to be sunk to 1,050′ to reach the continuation of the Ohio vein.

MacNAMARA MINING & MILLING CO. **NEVADA**

Offices: 565 Mills Bldg., San Francisco, Calif., and Tonopah, Nev.

Officers: J. L. Joseph, pres., Mark Wulfsohn, v. p.; E. W. Elliott, sec.-treas., with S. D. Allen, directors.

Inc. 1914, in California, as a reorganization of the MacNamara Mining Co. **Cap.**, $1,500,000; shares $1 par; assessable; 435,000 shares in treasury. Transfer office and registrar: 565 Mills Bldg. Listed on San Francisco Exchange; traded in on New York Curb.

Annual statement for year ending December 31, 1918, shows: receipts, $235,943; expenditures, $239,427; cash on hand, $4,306.

The management got into bad repute with stockholders because no statements of operations were given out, and they were at a loss to know what had become of the money in treasury. To provide working capital the company was reorganized under its present title and the stock was put upon an assessable basis. Two assessments of 3c. and one of 2c. per share have been levied. The property of the McNamara Mining Co. was sold to the new company for 1,340,076 shares of the latter, 275,076 shares of which have since been re-purchased. In 1919 company acquired stock control in the MacNamara-Crescent Mining Co., which see.

Property: 2 patented claims, 5 acres, at Tonopah, said to have 2 orebodies under development showing silver ore in quartz vein in andesite.

Development: 800′ shaft.

From December, 1912, to 1917, the mill treated 54,000 tons of company ore, assaying from $7.04 to $11.08 per ton. The plant was shut-down in 1917, due to lack of development, shortage of money, and low price of silver. Property was not operated in 1915.

In February, 1916, arrangements were made with the West End Cons. Mining Co. by which the MacNamara Company could develop on its side of the property line a body of ore which the West End has exposed in its stoping operations near the line; work to be done through West End workings to avoid the necessity of MacNamara driving a 500′ crosscut. The joint exploration was continued during 1916 and 1917. Late in 1917 the mine and mill were reopened. Good developments on the Ohio vein in the West End mine adjoining led to exploration for this shoot in November.

In December a raise at 50′ above the 700′ level passed through what was supposed to be the eastern extension of the Ohio vein and reached the trachyte hanging wall. In 1919, company reported cutting a 10′ vein in a raise from 700′ level in the S. W. end of the ground, but up to September, no high-grade orebody had been encountered.

Equipment: includes 100-h. p. electric hoist, compressor, 10 stamps and cyanide plant.

Production: about 1,500 tons per month. Since closing of the Goldfield Consolidated mill, the MacNamara has contracted with the Tonopah Divide M. Co. to treat 60 tons of the latter's ore daily; also some from the Hasbrouck and Divide Extension. Earnings were reported to be $15,000 per month, June, 1919. By November the mill was treating 2,200 tons of domestic and custom ore.

There is said to be a considerable tonnage of low-grade ore remaining in the mine which can be worked at a profit at present high price of silver.

MIZPAH EXTENSION CO. OF TONOPAH **NEVADA**

Offices: Bullitt Bldg., Philadelphia, Pa., and Tonopah, Nev.

Officers: C. E. Knox, pres.; Lambert Ott, v. p.; C. F. Griffith, sec.; W. P. M. Braun, treas., with J. F. Braun, H. W. Davis, and M. B. Cutter, directors.

Inc. in Delaware. **Cap.**, 2,000,000 shares; 1,702,092 issued. Listed on San Francisco and Salt Lake City Exchanges; traded in on New York Curb.

Property: 24 claims at Tonopah, adjoining the Tonopah Mining and Tonopah Belmont properties on the N. E. Mine being worked by Halifax-Tonopah Mining Co.

Ore: silver. For geology see U. S. G. S. Prof. Paper 42, Geology of the Tonopah Mining District, by J. E. Spurr.

Development: 1,000′ shaft, with a winze from the 1,000′ to the 1,340′ level.

No recent work has been done on the Mizpah owing to excessive flow of water in the Halifax property, which was reported under control in July, 1919.

MONARCH PITTSBURG MINING CO. **NEVADA**

Address: P. O. Box 11, Tonopah, Nev.

Officers: H. C. Brougher, pres.; 6150 Harwood St., Oakland, Calif.; W. J. Douglass, v. p.; R. B. Govan, v. p.; E. J. Erickson, sec.-treas., with E. W. Blair, directors. John R. Jones, supt.

Inc. in Nevada. **Cap.**, $1,500,000; $1 par; fully paid; assessable; assessment No. 13, of 1c. per share, levied December 17, 1919. Stock transferred at company's office Listed on San Francisco Exchange.

Balance sheet for 1918 showed: assets, $1,655,658, which includes mine property, $1,589,026; treasury stock, $54,862; cash on hand, $11,313. Liabilities include: assessments, $152,187. Receipts for 1918 were $44,129, of which assessments furnished $41,198. Disbursements were: labor, $15,873; vouchers, $16,024, leaving a balance of $11,313.

Property: 3 patented claims at Tonopah, adjoining Tonopah Extension on south and west. Claims show veins with silver ore.

Development: by vertical shaft, 1,100′ deep. Geological conditions were so extremely favorable that it was decided to prospect in the extreme western ground; also north of the shaft. Highly silicified West End rhyolite was in the 1,003′ drift and soon a typical Extension breccia was cut. Work along the contact for 180′ disclosed a vein 43′ wide of low value. Work in 1919 was confined mainly to the 850′ and 600′ levels, amounting to 1,554′ at a cost of $10.69 per foot. Recent developments have proved disappointing.

MONTANA-TONOPAH MINING CO. **NEVADA**

Tonopah, Nev.

Officers: Chas. E. Knox, pres., 300 First Nat'l Bank Bldg., San Francisco; Henry D. Moore, v. p.; M. E. Albert, sec.-treas., with Hugh H. Brown, E. A. Keenan, J. H. Evans, J. M. Wynn, Thos. J. Lynch, directors.

Inc. in Utah, in 1912, re-incorporated Jan. 31, 1912, in Delaware. **Cap.**, $1,000,000; shares $1 par; outstanding, 998,942. Listed on San Francisco Exchange. Annual report for year ending December 31, 1919, shows: receipts, $125,201; disbursements, $88,576; cash $36,625.

Dividends: paid to April, 1914, total $530,000; none since.

Property: 15 claims, about 190 acres, traversed by the Mizpah fault and showing silver ore.

Development: 865′ shaft and over 15 miles of workings. Mine was closed down and the 40-stamp mill ceased operating on November 15, 1914, due to exhaustion of ore reserves and low prices of silver. Since then a number of lessees have been working in the mine, and apparently with success. During 1918 a vein 4 to 7′ wide was opened up on the Petrovich lease, running from $250 to $1,000 per ton, shipments averaging $400 per ton. This find is to be followed into virgin ground.

Company is one of the oldest in the Tonopah district, and has had a checkered career.

NEW CALIFORNIA & TONOPAH MINING CO. **NEVADA**

Formerly the California & Tonopah Mining Co.

Address: Frank Stall, mgr., Tonopah, Nev.

Property: in Tonopah district, opened by a 600′ shaft, and equipped with electric hoist, compressor and orebins. Rich ore has been opened on 400′ and 600′ levels, and 280 tons, assaying $28 per ton, were shipped in January, 1920.

ORIENTAL MINING CO. **NEVADA**

Address: 565 Mills Bldg., San Francisco, Calif., and Tonopah, Nev.

Inc. 1919, by Geo. Wingfield, C. Brougher, and F. E. Ostwald. J. L. Joseph, pres. and mgr. **Cap.,** $300,000; 20c par; 600,000 shares in treasury.

Property: New York-Tonopah group, 80 acres, adjoining the MacNamara-Crescent and under same management.

Development: by 850′ shaft, to be sunk to 1,400′. **Equipment:** electric hoist and 100 h. p. motor installed in June, 1919.

OVERSIGHT MINING CO. **NEVADA**

Address: M. J. Scanlon, attorney, Reno; and Nick Schade, asst. sec., Tonopah, Nev.

Inc. February, 1920, in Nevada.

Property: 3 claims in Oversight section of Tonopah district, said to be on direct strike of main E.-W. vein system. Shaft down 80′ and machinery erected in March, 1920.

RALSTON MINING CO. **NEVADA**

Officers: Chas. E. Perry, pres.; Wm. Forman, v. p.; T. A. MacDuff, sec.-treas.; J. H. Evans, R. J. Highland, directors.

Inc. July, 1916, in Nevada. **Cap.,** $1,000,000; $1 par.

Property: the K. C., or Gori McBride group, east of the Halifax and adjoining the East End mine at Tonopah. The property was paid for with 601,000 shares at 3c.

RESCUE-EULA MINING CO. **NEVADA**

Offices: 265 Russ Bldg., San Francisco, Cal., and Tonopah, Nev.

Officers: Chas. D. Laing, pres.; Herman Zadig, v. p.; with J. W. Dorsey, Oscar Daube and W. G. Morrow, directors. Chas D. Olney, sec.; J. J. McQuillan, gen. mgr.; H. D. Moore, supt.

Inc. in Nevada. **Cap.,** $1,500,000; shares $1 par; assessable; outstanding, 1,400,000 shares. Assessment No. 11 was levied in December, 1918. Stock transferred at company's office. Registration Surety Co., San Francisco, registrar. Listed on San Francisco Stock Exchange and traded in on New York Curb.

Profit for year ended June 30, 1917 was $56,133. A dividend of 2½c. per share was paid on June 8, equal to $35,539. The surplus was $33,245.

Property: the Rescue, Eula, Last Thought and Maggie May claims. 80 acres, at Tonopah, said to show silver-bearing ore in veins. Developed by an 1,100′ shaft. Recent work confined to drifting on the 1,050′ level to locate the orebody found on the 950′ level.

Shipments are made to the West End mill and prospects are considered fair.

TONOPAH BELMONT DEVELOPMENT CO. **NEVADA**

Office: 500 Bullitt Bldg., Philadelphia, Pa. **Mine office:** Tonopah, Nev.

Officers: C. A. Heller, pres.; W. M. Potts, v. p.; S. D. Sinkler, v. p.; C. B. Taylor, gen. counsel, with H. C. Brougher, M. B. Cutter, J. C. Fraley, R. G. Park, and T. W. Synnott, directors. J. K. Kitto, sec.-treas.; C. Ducheneau, comptroller. **Operating officials:** Frederick Bradshaw, gen. mgr.; G. H. Garrey, cons. geologist; Herman Dauth, mng. engr.; L. R. Robins, mine supt.; W. H. Royston, mill supt.; Temple Jackson, auditor.

Inc. 1902, in New Jersey. **Cap.,** $1,000,000; shares $1 par; increased, 1906, to $2,000,000, but $500,000 was later cancelled, leaving $1,500,000 outstanding. Stock transferred at company's main office. Fourth Street National Bank, Philadelphia, registrar. Annual meeting, last Tuesday in May, at Camden, N. J. Listed on Philadelphia, San Francisco and Salt Lake Exchanges and traded in on New York and Boston curbs.

The company controls three subsidiaries, namely the Belmont Surf Inlet Mines, Ltd. of British Columbia, in which it invested $1,294,706; the Belmont Shawmut Mining Co., California, $621,876; and the Belmont Wagner Mining Co., Colorado, $605,479. The total sum is $2,522,061, and the first-named company has repaid all loans advanced. Details of these companies will be found under their respective titles.

Comparative general balance sheet: years ending on March 1, 1918, and December 31 from then on:

Assets.

	Property	Invest's	Def. Chgs.	Supplies	Ore on Hand	Current	Total
1918..	$3,477,627	$2,368,379	$8,994	$172,141	$51,593	$642,097	$6,498,098
1917-18*	$1,055,770	$1,913,214	$6,377	$215,141	$51,546	$966,790	$3,942,111
1917..	1,360,717	20,125	1,078,525	212,800	89,159	1,255,044	4,016,370
1916..	1,563,189	27,500	360,888	188,813	108,499	1,473,522	3,722,411
1915..	2,141,473	29,453	100,040	157,735	139,796	1,425,441	3,993,938

*10 months. The large deferred charges represent money advanced for development of subsidiaries; the large investments represent the interests in these subsidiaries.

Liabilities.

Year	Capital Stock	Current	Property Reserve	Tax Reserve	Net Surplus	Total
1918.....	$1,500,000	$170,165	$2,989,041	.....	$1,838,892	$6,498,098
1917-18....	1,500,000	186,611	.....	105,656	2,149,843	3,942,111
1917.....	1,500,000	136,820	.....	.....	2,379,550	4,016,370
1916.....	1,500,000	137,670	.....	.....	2,084,741	3,722,411

Comparative Operating Account, year ending March 1:

	Metal Receipts	Oper. Expense	Oper. Profit	Total Income	Deductions	Surplus	P. & L. Surplus
1919.....	.....	.....	$357,413	.....	.....	.....	.....
1918.....	$1,313,106	$739,631	591,489	$605,391	$384,912	$220,479	$1,838,892
1917-'18.....	2,048,504	1,097,802	1,026,702	1,142,449	874,342	268,107	2,149,843
1917.....	2,365,991	1,112,349	1,253,642	1,436,474	941,391	495,083	2,379,550
1916.....	2,160,522	1,184,865	975,657	1,047,768	796,756	251,012	2,084,741
1915.....	2,806,369	1,318,306	1,488,063	1,562,695	1,568,500	(a)5,805	1,963,286

Deductions include dividends and administration, taxes, etc. (a) Defiicit.

The net income for the first quarter of 1919 was $150,524, and available cash resources on March 31 totaled $557,140. The second quarter's net was $248,425, and available resources $501,646. For the September quarter the net income was $139,403. Cash assets were $301,466. The last quarter gave $28,793 net, and cash assets were reduced to $293,402.

Dividends: 20c. in 1906; 20c in 1907; none in 1908-09; 15c. in 1910; 90c. in 1911; $1 in 1912; $1.10 in 1913; $1.10 in 1914; 50c in 1915; 50c in 1916; 50c in 1917; 22½c in 1918; and 30c in 1919 to Dec. 31, making a total of 40 distributions, equal to $10,178,063.

Property: 11 claims, 161 acres, adjoining the Montana Tonopah and Tonopah Mining properties on the east, at Tonopah; and control of the subsidiaries mentioned. In October, 1919, 360 acres of land, said to contain coal, and indications of oil, near the Walker river, was purchased. To prospect for oil, the Nevada Coal & Oil Co. was organized. The Bell copper mine in the Simon district was reported acquired in August.

Geology: the Tonopah district is made up of a thick series of rhyolitic and andesitic rocks, which is faulted in a very intricate manner, together with the accompanying veins. The deposits are quartz veins, in part filled and in part replacement, intersecting the earlier andesite and to some extent entering into the underlying rhyolite. Principal ore minerals are argentite and polybasite, with small amounts of pyrite, chalcopyrite, galena, zinc blende and gold. Veins vary in width from 3′ to 25′. The principal producer of the Tonopah Belmont has been the Belmont vein, cut off near 1,500′ depth by the Mizpah fault; the veins now producing are not as productive as they were.

Development: by 3-compartment vertical shafts, 1,127′ and 1,718′ deep. Extensions during the years 1918, 1917-'18, and 1916-'17 were 9,263′; 14,437′, and 19,276′, respectively. Total workings are about 40 miles. Results during 1918 were fair, some small new veins being opened; in 1917-'18 reserves were not

increased, and in 1916-'17 work was satisfactory. A comparison of reserves shows the following:

Year	Tons	Year	Tons
1915-'16	142,164	1917-'18	75,823
1916-'17	98,694	1918	82,798

Early in 1919, development of the South vein was under way at the 600′ level, where a good shoot of ore was opened and in May the downward extension of this vein had been cut at a depth of 1,166′. Some time previous it was found at 800 and 900′. An electric locomotive is used on the 1,000′ level, greatly facilitating moving ore and waste.

Equipment: includes a 60-stamp cyanide mill, which started operations in July, 1912. For a detailed description of this plant see Trans. A. I. M. E., August, 1915. To treat custom ore, this plant was enlarged in November, 1917. The plant at Millers was closed during 1918, but reopened 1920.

Production:

	Tons Milled	Value p. ton	Oper. Costs Mine	Oper. Costs Mill	Extr. %	Profit p. ton	Production—Oz. Gold	Production—Oz. Silver
1918.....	87,089	$16.40	$4.56	$2.95	92.13	$7.82	10,974	1,076,944
1917-'18.	130,991	16.57	4.44	3.21	94.13	8.10	19,953	1,946,757
1917.....	144,762	17.54	4.65	2.76	93.35	8.64	27,831	2,629,466
1916.....	165,157	13.88	3.92	2.68	92.97	6.59	31,112	2,968,565
1915.....	181,424	16.74	4.02	2.56	92.99	...	40,591	3,714,862
1914.....	172,398	21.08	4.35	3.05	94.45	8.83	44,465	4,251,746
1913.....	60,359	24.21	4.35	3.66	94.43	12.42	38,371	3,826,399
1912.....	87,349	20.84	4.85	3.36	....	14.31	45,069	4,535,762

To offset the decreasing production of the original claims at Tonopah, the company has been branching out, acquiring new properties, thus making the company a permanent organization independent of the life of the Tonopah mines, which is now visible. With silver at $1 per oz., the Belmont can make good profits. Returns in 1919 were good, that for April being a profit of $44,306 from 9,315 tons of ore. In July, 7,880 tons gave a profit of $36,554. The miner's strike from August to October reduced the 1919 output considerably, but early in 1920 the output was increased to 400 tons daily. In February, 1920, profit was $9,175.

TONOPAH BONANZA MINING CO. NEVADA

Address: 365 Bush St., San Francisco, Calif., and care John McGee, Box X, Tonopah, Nev.

Assessment No. 5 of 1c levied May, 1918. Cash on hand, July 30, 1919, $3,201.

Control of this property was acquired, 1915, by the Greenwater Copper Mines and Smelter Co., which see.

Property: 15 unpatented claims, 380 acres, at Tonopah, Nev., increased 1916 by acquisition of the Desert King Mining Co.'s property, 40 acres, adjoining on the S. E. The claims, which lie in the western section of the district, had a 2-compartment shaft, 1,100′ deep, when new company took over the property and some crosscutting had been done on the 600′ level, but no commercial ore developed.

During 1918 about 600′ of crosscutting was done on the 1,637′, but no ore found and all work was suspended in October. Plan repairing shaft and installing pump, 1919-'20.

TONOPAH EAST END DEVELOPMENT CO. NEVADA

Address: E. P. Cullinan, sec., Tonopah, Nev.

Inc. in South Dakota. **Cap.,** 1,500,000 shares.

Property: east of Mizpah Extension at Tonopah. Idle several years.

TONOPAH EXTENSION MINING CO. NEVADA

Office: 30 Church St., New York. **Mine office:** Tonopah, Nev.

Officers: M. R. Ward, pres.; W. A. Mitchell, v. p.; with S. A. Brown,

C. M. Schwab and W. R. Rose, directors. W. G. Benham, sec.-treas.; J. G. Kirchen, gen. mgr.

Inc. 1902, in Arizona. **Cap.,** 2,000,000 shares; $1 par; non-assessable; outstanding, 1,282,801. Original capital of 1,000,000 shares was increased June, 1915, to 2,000,000 and issue authorized of 156,294 shares for acquiring Tonopah Merger and 173,074 shares for Tonopah Victor Co. U. S. Corporation Co., 34 Nassau St., New York, transfer office and registrar Annual meeting in May. Listed on San Francisco and Nevada Stock Exchanges and on the New York Curb.

Comparative General Balance Sheet, year ending March 31:

Assets—

	Property & Equip.	Supplies	Invest's	Bullion & Cash	Other Current	Total
1919.....	$1,472,670	$132,297	$679,041	$211,698	$151,642	$2,647,349
1918.....	1,584,562	213,770	229,945	148,133	142,017	2,318,427
1917.....	1,692,766	134,965	179,945	319,586	12,238	2,339,500
1916.....	1,636,283	97,892	209,470	206,507	156,387	2,306,539
1915.....	1,217,246	79,048	130,462	190,606	128,208	1,745,570

Liabilities—

	Capital	Current	Surplus	Total
1919.....	$1,282,801	$254,928	$1,109,619	$2,647,349
1918.....	1,282,801	98,318	937,308	2,318,427
1917.....	1,282,802	246,184	810,514	2,339,500
1916.....	1,272,801	194,126	839,612	2,306,539
1915.....	943,433	134,450	667,687	1,745,570

Current liabilities include dividends payable.

Comparative Profit and Loss Statement, year ending March 31:

	Metal Receipts	Total Income	Oper'g Expenses	Admin. & Gen.	Federal Taxes	Profit For Year
1919.....	$1,652,031	$1,630,280	$946,769	$63,635	$104,366	$515,509
1918.....	1,250,983	1,229,143	923,230	61,577	26,460	217,875
1917.....	1,707,174	1,663,918	963,020	43,863	.....	673,394
1916.....	1,532,900	1,555,639	859,089	66,017	.....	584,421
1915.....	1,289,817	1,341,620	662,269	50,140	.....	596,892

Dividends: (calendar year) 15% in 1905; 15% in 1906; 35% in 1917; nothing in 1917-'18; 9% in 1918-'19, and 25% in 1919, to October 1st, making a total of $2,230,600.

Property: 628 acres in the Tonopah mining district, Nye county, Nev., adjoins Tonopah Mining Co. on the W. and West End Cons. Mining Co. on the N.

During the fiscal year 1910-11 the company acquired the properties of the Red Rock Cons. Mining Co., McKane Mining Co. and Pittsburg Tonopah Extension Mining Co. and in June, 1915, properties of the Tonopah Merger Mining Co. and the Tonopah Victor Mining Co.

The Sully claims of 77 acres were bought for $10,000 in 1916.

Geology: ore carries silver and gold in quartz veins in rhyolite, trachyte and volcanic breccia. The ore minerals are argentite, stephanite, polybasite, some proustite and pyrargyrite. There are 5 main veins, from N. to S., the Merger, O. K., New Victor, Lower Contact, and Murray, of which the Murray is the most important, showing a stoping width of 14′. The veins strike N. 45° W., S. 70° W., and N. 70° W., with dip 20 to 70°, growing steeper with depth. The orebodies occur in shoots ranging in width from 3-60′, with a maximum length of 600′ for any single shoot.

Development: by 2 vertical main working shafts, namely, No. 2, 1,440′ deep and the Victor, 1,760′ deep. Extensions during recent years were 13,967′ in 1915-'16; 12,017′ in 1916-'17; 10,993′ in 1917-'18, and 10,322′ in 1918-'19. Total

workings amount to 28 miles. During 1918-'19 the Lower Contact vein at 600′ yielded a large quantity of fair-grade ore, but the stopes were exhausted.

At No. 2 shaft, the 1,440′ level produced most of the ore. A number of good shoots were found, but chances for finding further large ore-bodies are remote. At 1,680′ in the Victor shaft the Merger vein yielded heavily, the Murray on this level, 600′ long, 3 to 30′ wide, of good grade. No definite calculation of reserves is possible. A 4-compartment shaft is being sunk below the 1,760′ level, and early in 1920, it was decided to deepen the old McKane shaft to a depth corresponding with the 1,540′ level of the Victor shaft. This will improve ventilation and give access to ground on the west. A new head-frame, hoist, compressor, skips, ore-bins and pumps were erected at the Victor shaft. Ore is extracted by overhead stoping and subsequent waste filling.

Equipment: at the mine includes two 150 horse-power hoists, Dean duplex and Aldrich quintuplex pumps, 2 compressors of 1,700′ capacity, and tramway from mine to mill. The new hoist at the Victor shaft has a capacity of hauling 4 tons at a speed of 1,000′ per min. from a depth of 3,000′. All machinery is electrically driven. The 50-stamp cyanide mill has a daily capacity of 400 tons.

In September, 1917, an auxiliary 500 k.w. power plant was tested. This is to generate electricity when the Nevada-California Power Co.'s supply fails.

Production (year ending March 31):

	Tons	Value	Extr.	Oper. Cost p. Ton			Metal Sold—Oz.	
Year	Milled	Per Ton	%	Mine	Mill	Total	Silver	Gold
1919.	114,921	$15.449	93.05	$4.80	$3.68	$8.48	1,367,440	13,143
1918.	110,188	12.543	90.51	5.26	3.38	8.64	1,169,671	11,809
1917.	109,402	17.107	....	4.90	3.62	8.82	1,882,402	18,052
1916.	91,981	18.038	92.39	4.61	4.48	9.59	1,106,519	20,576
1915.	71,882	19.966	89.57	5.19	3.75	9.39	1,790,032	17,585

Yields in 1919 were maintained, that for July being 8,660 tons, 102,081 oz. silver, 985 oz. gold, and a profit of $52,280. In February, 1920, profit was $27,412.

The Tonopah Extension is in much better physical condition than it was in 1917, and should pay regular dividends with silver at over $1 an ounce. Management is capable and careful.

TONOPAH GOLD ZONE MINING CO. NEVADA

Reorganized as Gold Zone Divide Mining Co., of the Divide district, which see.

TONOPAH MIDWAY MINING CO. NEVADA

Address: Tonopah, Nev.

Officers: H. C. Brougher, pres.-mgr.; R. P. Stenson, v. p.; E. P. Erickson, sec.-treas.; W. Brougher, R. B. Govan, W. J. Douglass, C. C. Boak, directors; W. J. Douglass, supt.

Inc. in Arizona; reorganized 1915, in Nevada. **Cap.,** 1,500,000 shares; $1 par; assessable; outstanding, 1,132,096. On April 19, 1918, assessment No. 6, of 1c per share, was levied. Annual meeting, in February. Listed on San Francisco Exchange.

Property: 5 patented claims, 50.58 acres, in Tonopah district, said to show silver and gold ore. The quartz vein in trachyte dips 45° and pay ore occurs in shoots. Five veins have been opened on the 600 and 800′ levels. During 1918 work was confined to the 600′ level. The S. crosscut from No. 2 shaft was advanced 700′ and connection made with the Tonopah Mining Co.'s workings on the Last Chance vein. This vein on the Midway is said to be from 6-15′ in width and in places runs as high as $384 per ton.

In 1919, work is being done on the 800′ and additional compressors installed to continue work on the 1,200′ level, where a 20′ vein expected to be the downward extension of the Brougher or Last Chance vein is to be developed.

Threatened litigation with the Tonopah M. Co. over the Last Chance vein has been amicably settled, the Midway receiving $34,527 in cash and a vertical side-line agreement which will obviate future apex claims. Shipments are made to West End mill.

Development: by 2 shafts, 1,400′ and 835′ deep.

Operating expenses for year ending December 31, 1918, were $41,571 and receipts totaled $66,880, including ore sales, $17,456; assessments, $14,772.

TONOPAH MINING CO. OF NEVADA **NEVADA**

Office: 572 Bullitt Bldg., Philadelphia, Pa. **Mine office:** Tonopah, Nev.

Officers: J. H. Whiteman, pres.; C. R. Miller, v. p.; C. A. Higbee, sec.-treas., with Samuel Bell, Jr., Barton Hoopes, Jr. and H. D. Moore, directors. W. H. Blackburn, gen. supt.; H. W. Stotesbury, mine supt.; H. A. Johnson, mill supt.

Inc. July 12, 1901, in Delaware. **Cap.,** 1,000,000 shares; $1 par; all outstanding. Annual meeting, May. Transfer office: 572 Bullitt Bldg., Philadelphia, Pa. Listed on Philadelphia and San Francisco Stock Exchanges and on New York and Boston Curbs.

Comparative General Balance Sheet, year to March 1, and to Dec. 31, for 1916 and thereafter; assets are as follows:

Assets.

	Prop. & Equip.	Invest's	Loans & Advances	Def'd Ch'g's	Other Current	Total
1918.....	$141,183	$2,363,230	$2,816,120	$189	$351,711	$5,672,434
1917.....	213,003	2,331,863	2,319,745	422	491,894	5,356,929
1916.....	127,234	3,085,876	1,480,667	226	661,222	5,355,224
1915-16...	113,530	3,147,832	911,432	1,603	512,364	4,686,861
1914-15...	162,970	3,104,511	566,265	1,370	929,178	4,764,294

The loans are to subsidiaries.

Liabilities.

	Capital Stock	Deprec. Reserve	Current	Net Surplus	Total
1918.....	$1,000,000	$316,740	$156,251	$4,199,444	$5,672,434
1917.....	1,000,000	316,740	177,306	3,862,884	5,356,929
1916.....	1,000,000	320,502	356,605	3,678,117	5,355,224
1915-16.....	1,000,000	250,000	53,941	3,382,920	4,686,861
1914-15.....	1,000,000	50,000	64,760	3,649,534	4,764,294

Comparative Income Account, year to March 1 and Dec. 31, for 1916 and thereafter.

	Metal Receipts	Total Receipts	Oper. Expense	Net Income	Taxes	Divid's & Deprec'n	P. & L. Surplus
1919*.....	.....	.....	.....	$243,290	.....	.....	.....
1918.....	$1,555,692	$1,848,659	$722,812	782,062	$101,441	$375,000	$4,199,444
1917.....	1,068,401	2,818,134	959,078	825,259	52,198	600,000	3,862,884
1916.....	1,141,181	.....	823,093	918,065	.....	560,502	3,748,127
1915-'16...	1,831,589	.....	1,380,693	783,064	.....	1,089,678	3,704,259
1914-'16...	.....	.....	1,628,548	925,557	.....	1,165,234	3,860,244

*7 months.

Dividends: 1905, 75% of capital stock; 1906 and 1907, 120%; 1908, 50%; 1909, 130%; 1910, 150%; 1911 and 1912, 160%; 1913, 145%; 1914, 100%; 1915, 90%; 1916, 60%; in 1917, 60%; in 1918, 37½%, and 30% in 1919 to October. The total paid is now $14,875,000.

Property: 160 acres at Tonopah, Nye county, adjoins Tonopah Extension on the east and north and Jim Butler Tonopah Mng. Co. on the north. Also owns controlling interest in the Tonopah & Goldfield R. R. Co., 55% in the Eden Mining Co. of Nicaragua, control of the Tonopah Nicaragua Co., and 83⅓% in the Tonopah Placers Co. of Colorado. Also owns $19,875 capital stock of the Esmeralda Power Co. and 92% of the Tonopah Canadian Mines Co. The company has acquired property in the Schist and Flin Flon lake district of Manitoba and is doing considerable work through its subsidiary, the Mandy mining Co. For descriptions see under respective titles.

For geology of the Tonopah district, see Tonopah-Belmont Mining Co. and Tonopah Extension.

Development: to a depth of 1,500′, chiefly through the Mizpah, Desert Queen, Silver Top, and Red Plume shafts. In 1916 the Red Plume shaft was shut down and the hoist moved to the Sand Grass, which is 1,500′ deep and is connected with the 1,170′ level of the Merger shaft. The Mizpah shaft is bottomed at 1,500′.

During 1918 new openings totaling 4,619′, failed to disclose any large bodies of ore. Ore extraction consisted essentially in removing old pillars and the underhand stoping of blocks below old drifts, a work in which a good deal of high-grade ore was found. Shipments of 150 tons of mine ore daily were sent to the Tonopah Belmont mill, while the large ore dumps at the Mizpah and Silver Top shafts were sent to the company's own mill at Millers, as much as 15,000 tons being sent there in June. This work was finished in November, 1918, and the plant closed. Work in 1919 was confined to the upper levels, the Sand Grass giving good results. Ore was sent to the Tonopah Belmont mill. In January, 1920, 30′ of good ore was opened in the Mizpah vein on the 400′ level of the Mizpah shaft.

Equipment: includes 100-stamp cyanide mill at Millers, 12 miles from the mine and complete mining plants. The mill has been closed down for some time, but late in 1919 a resumption of work was contemplated, partly to treat custom ore.

Production:

Year	Tons	Value	Extrac., %	Costs
1918	155,683	$9.75	91.4	$7.85†
1917	109,835	14.85	91.9	9.16
1916*	81,782	15.65	90.1	8.71
1915	136,246	13.66	...	7.78
1914	143,432	16.25	...	8.51

* Nine months. † Mining and company's own mill charges.

By mid-1919, the weekly output of ore to the Belmont was 1,050 tons, the return for May being 4,395 tons, yielding 63,678 oz. silver, 690 oz. gold, and a profit of $29,200. Corresponding figures for July were 3,950; 64,800; 600; and $20,800. The February, 1920, profit was $5,800.

On September 1, 1917, J. E. Spurr, in charge of the Exploration Department, resigned, and the department was discontinued. From January, 1912, to January, 1917, the cost was $261,108, and total value of results, $7,858,601.

The productive life of the Tonopah property is fast nearing an end. To counteract this and to make a permanent dividend-paying organization, new properties have been acquired. There is no doubt that the plan will succeed as the management is thoroughly experienced and capable.

TONOPAH NORTH STAR TUNNEL & DEV. CO. NEVADA

Office: 265 Russ Bldg., San Francisco, Cal. **Mine office:** Tonopah, Nev.

Officers: H. Zadig, pres.; C. D. Olney, sec.; A. E. Lowe, supt.

Inc. 1912, in Nevada. **Cap.,** $1,000,000; $1 par; assessable. Assessment No. 7 of 1½c levied October 15, 1917. Company's San Francisco office, transfer agent; Registration Surety Co., San Francisco, registrar. Annual meeting in April. Listed on San Francisco Exchange.

Property: 5 claims, Ivanpah, Elaine, Pyramid Fraction, Crosscut and Crosscut Extension, 46 acres in Tonopah, said to show gold and silver ore.

Development: by shaft, 1,250′ deep; lateral workings total about 5,000′.

Soon after reorganization the company struck a shoot which yielded some hundred of tons of shipping ore in 1913 and 1914, but the shoot proved of limited extent and shipments declined. Development is hampered by lack of funds. Since 1916 company has made sundry shipments to West End mill, but not sufficient to meet expenses, until in 1920 rich ore was found between the 950 and 1,050′ levels, and daily shipments made of $40 ore.

TONOPAH 76 CONSOLIDATED MINING CO. NEVADA

Address: L. S. Reese, Reno, Nev.

Officers: M. R. Averill, pres.; T. J. Lynch, v. p.; with W. S. Harris and L. L. Blumenthal, directors.

Inc. 1911, in Nevada. **Cap.,** 1,500,000 shares; $1 par; non-assessable; out-

standing, 1,255,575. No annual meetings since July, 1913. Listed on San Francisco Stock Exchange.

Property: 5 patented claims and fractions, about 60 acres, ½ mile W. of Tonopah.

Development: by vertical shaft 300′ deep. The West End M. Co. is now prospecting the 76 claims, having driven from its 1,800′ level to the 76 ground.

Equipment: includes a 60-h. p. electric hoist.

TONOPAH VICTOR MINING CO. **NEVADA**

Out of business. Property acquired by Tonopah Extension Mining Co., Tonopah, Nev., which see.

TONOPAH WESTERN CONS. MINING CO. **NEVADA**

Address: 85 Devonshire St., Boston, Mass.

Officers: Robt. H. Gross, pres.; F. W. Paine, v. p.; Oscar Rohn, sec.; W. Rooney, treas., with B. W. Turner, Wm. Everts, and Frank Price, directors.

Inc. in 1916.

Property: 500 acres, between the holdings of the Tonopah Bonanza Mining Co. on the north and the Great Western Cons. Mng. Co. on the south, was to have been developed through the workings of these companies. No returns received.

UMATILLA-TONOPAH MINING CO. **NEVADA**

Office: 365 Russ Bldg., San Francisco, Calif. **Mine office:** Tonopah.

Officers: Herman Zadig, pres.; A. S. Wollberg, v. p.; C. D. Olney, sec., with R. L. Colburn and S. D. Landecker, directors. A. S. Haskell, supt.

Inc. in Nevada. **Cap.,** $1,500,000; $1 par; assessable. Assessment No. 11 of ½c per share, levied June 13, 1918. Company office, transfer office. Registration Surety Co., San Francisco, registrar.

Property: 8 claims, 80 acres, in Tonopah district, Nye county, developed by 1,200′ shaft. Reported merger with Montana Tonopah Mng. Co. as After All Mines Co., in 1916, was presumably never carried out.

WEST END CONSOLIDATED MINING CO. **NEVADA**

Office: Syndicate Bldg., Oakland, Calif. **Mine office:** Tonopah, Nev.

Officers: F. M. (Borax) Smith, pres.-treas.; J. F. Carlston, v. p.; G. C. Ellis, sec., with L. W. Bennett, R. P. Jennings, C. P. Murdock and R. L. Oliver, directors. J. W. Sherwin, gen. mgr.; H. D. Budelman, mine supt.; W. D. Jenkin, mine foreman; F. C. Ninnis, mill supt.; J. R. Blair, auditor.

Inc. May 2, 1906, in Arizona. **Cap.,** $10,000,000; $5 par; 1,786,000 outstanding. Listed on San Francisco Exchange and New York Curb. Registrar & Transfer Co., New York, transfer agent and registrar. Annual meeting, first Wednesday in March.

Financial Statement.

Year	Cash on hand	Revenue	Disbursements	Dividends	Balance
1918.....	$47,656	$2,030,897*	$1,466,949	$357,697	$253,907
1917.....	130,772	1,204,442	1,198,134	89,424	47,656

* The apparent revenue is swollen by inclusion of bullion coming from custom ore treated in mill as well as the sums received in settlement of the dispute with the Jim Butler company.

Assets and Liabilities.

Year	Cash & Bullion	Invest.	Other Assets	Total Assets	Total Liabil.	Surplus
1918....	$530,743	$690,330	$390,363	$1,611,448	$201,580	$1,409,868
1917....	346,734	530,680	700,986	1,578,400	572,377	1,006,024

Dividends: in 1915, 5c.; in 1914, 15c.; in 1915, 10c.; in 1916, 5c.; in 1917, 5c.; in 1918, 20c.; in 1919, 10c. The total is $1,251,940.

Property: 10 patented and 7 unpatented claims, 84 acres, in the Tonopah district. (In the suit of the Jim Butler v. West End, concerning apex rights on the West End-McNamara vein, instituted in 1914, the West End was

given a final favorable verdict in June, 1918.) Other holdings include 2,200 acres at Searles lake, California, leased from the U. S. Government. This is being developed for potash, and $74,592 was spent to the end of 1918. In Honduras, Central America, a promising gold-silver mine is under exploitation, on which, so far, $33,953 has been spent.

Development: by 3 shafts, deepest 1,212′, with 13 miles of workings. In 1917, extension amounted to 7,625′, also sinking the Ohio shaft to 1,212′. A new vein was found on the Ohio 500′ level. Of the lateral work on this vein—1,225′—1,010′ was in pay ore, the remainder in second-class ore. From April to December it yielded 11,837 tons valued at $250,000. Reserves were 10,333 tons of positive ore, valued at $206,660; 35,905 tons of probable ore, worth $1,015,633; and 61,111 tons of possible ore. The new vein is in trachyte. During 1918, results in the Ohio were good, reserves increasing to 82,000 tons worth $2,000,000. The West End section can be counted on to yield profitably for some time.

Equipment: includes hoists, buildings, compressors, etc., and a stamp-mill and cyanide plant. The daily capacity of the mill was originally 100 tons, but has been increased to 225 tons. Total cost of plant is more than $170,000. About 1,400 tons a month are treated from other mines.

Production:

Year	Ore Treated	Extraction %	Gross Value	Silver oz.	Gold oz.	Cost per Ton
1918.....	50,195	91.97	$990,185	826,577	8,676	$11.72
1917*.....	45,910	92.69	721,937	677,117	7,161	10.69
1916.....	61,535	91.22	1,319,651	1,351,658	14,752	.....
1915.....	56,976	90.92	958,657	1,210,038	13,219	.....

* From 1917 on, these figures refer to company ore only.

Recent shipments have been over 100,000 oz. of silver-gold bullion monthly.

The company's position is greatly improved by late developments and the high price of silver.

Under date of January 7th, 1920, Mr. F. M. Smith, president of the West End Consolidated Mining Company, advised the stockholders that the directors decided to allocate the equities now possessed by the company in Tonopah, Nev., California and Honduras, Central America, by organizing a new company to be called the West End Mining Company, with an authorized capital of $2,000,000, to take over the silver properties in Nevada. A second company, viz.: the West End Chemical Company, with an authorized capitalization of $3,000,000, will take over the Searles Lake properties in California. A third company, the West End Opoteca Company, with an authorized capitaliation of $3,000,000, will take over the properties in Honduras.

The West End Consolidated Mining Company will be dissolved and 1,788,486 shares of capital stock of each of the new companies will be distributed to the present stockholders.

Mr. Smith states: "The properties at Tonopah continue to be operating with good returns. The recent increase in the price of silver materially adds to our ore reserves by making tonnages of ore, heretofore called low-grade, available for milling at a profit. Recent developments underground continue to expose continuations of ore shoots previously opened up, with good values. These factors, together with the well known condition of the mine, give assurance of continued operation of our mill."

The latest shipment of bullion from the West End company's mill at Tonopah consisted of 24 bars weighing 44,700 oz., and calculated to be worth $62,500. This shipment is the result of two weeks run in December and reflects the general good condition of operations at the mill. It is generally believed that the West End mine at Tonopah has ore reserves sufficient to operate the mill for six years and that in addition it has virgin territory yet to be explored.

WEST END EXTENSION MINING CO. **NEVADA**

Idle.

Officers: Franz Sigel, pres.; Frank S. Harris, v. p.; Daniel O. Hulse, sec.-treas., with M. T. Rowland and Jas. M. Satterfield, directors, at last accounts.

Inc. in Delaware. **Cap.**, $1,000,000; issued $600,000; shares $1 par. U. S. Corp., New York, transfer agent and registrar. Report for year ending December 31, 1917, shows an indebtedness of $1,200.

Property: 4 claims, the Bank group, 70 acres, at Tonopah; adjoins West End Cons. on the north and Tonopah 76 on the west.

WEST TONOPAH MINING CO. **NEVADA**

Office: 301 Nat'l Bank Bldg., Tonopah, Nev.

Officers: M. R. Ward, pres.; R. E. Mulcahy, v. p.; J. A. Perry, sec.-treas., with A. Hamilton, F. S. Glover, C. W. Buthmann and E. C. B. Adams, directors; J. G. Kirchen, mgr.; H. L. Williams, supt

Inc. in Nevada. **Cap.**, $1,000,000; shares $1 par; all issued; assessable. Listed on San Francisco Exchange. Annual meeting, first Tuesday after first Monday in January.

Property: 7 patented claims, 123 acres, in Esmeralda county. **Geology:** quartz vein in trachyte and rhyolite, dipping 65 to 70°, with E. W. course. Ore contains gold and silver.

Development: 1,100′ shaft, to be deepened when water is overcome. On 950′ level an 800′ crosscut passed through the vein, which is to be developed at depth.

Equipment: 75-h. p. hoist, compressor, 75-h. p. triplex pump, ventilating fan, etc.

NEW JERSEY

Companies are arranged in alphabetical order.

BALBACH SMELTING & REFINING CO. **NEW JERSEY**

Office: 580 Market St., and works, 111 Passaic Ave., Newark, and on Newark Bay, N. J.

Officers: Archibald R. Watson, pres.; Julian B. Beatty, v. p.; E. E. Dieffenbach, supt., with W. I. Cooper and E. T. Villareal, directors; F. Schmutzer, sec.

Inc. 1891, in New Jersey. **Cap.**, $1,000,000; $100 par; in 500,000 preferred and $500,000 common stock; 3,900 preferred and 3,900 common shares issued and outstanding. American Metal Co. is the purchasing and selling agent, owning 1,300 pfd. and 1,302 common shares, representing ⅓ interest, having a book value of $225,600 to A. M. Co.

Works: at Newark comprises an electrolytic refinery, a lead desilvering plant, and a small copper smelting plant. The refinery has 444 tanks, in parallel, with two 360 k. w. generators. Plant has a capacity of 1,800 to 2,000 tons electrolytic copper per month, employing 150 men. The metallurgical practice of the works ranks high. The lead refinery, with a capacity of 4,000 tons per month, erected at Newark bay, went into operation July, 1913. Company does a custom business in ores, bullion, residues, blister copper, etc., containing gold, silver, platinum, copper and lead.

Company also owns real estate in the city of Newark, and on Newark Bay, valued at $500,000.

IRVINGTON SMELTING & REFINING CO. **NEW JERSEY**

Address: Charles Engelhard, treas., 30 Church St. New York. Works at Irvington, N. J.

Officers: W. L. Glorieux, pres.; C. O. Bager, v. p.; C. W. Baker, v. p.; Robert A. Knorre, sec.

Property: is an electrolytic smelter and refinery for gold, silver, platinum and copper ores.

NEW JERSEY ZINC CO. **NEW JERSEY**

See full description in first part of United States section.

Company not only owns the Franklin Furnace, N. J., mines, but has holdings in various states and is, therefore, grouped with the Am. Smelting & Refining, U. S. Smelting and other large companies with widely scattered holdings.

ORFORD NICKEL-COPPER REFINERY **NEW JERSEY**

Propery of International Nickel Co., 43 Exchange Place, New York. Plant

at Bayonne, N. J., treats nickel-copper matte from Sudbury smelter. A. J. Wadhams, supt. of plant; H. W. Walter, asst. supt.

PERTH AMBOY SMELTER **NEW JERSEY**

Owned by American Smelting & Refining Co., which see. Has 600-ton copper-lead smelter, 200-ton lead refinery and a 300-ton electrolytic copper refinery at Perth Amboy, employing about 2,000 men.

See A. S. & R. in U. S. section of this book.

RARITAN COPPER WORKS **NEW JERSEY**

Owned by International Smelting & Refining Co. (q. v.), at Perth Amboy, N. J. A. C. Clark, supt.

THOMAS IRON CO. **NEW JERSEY**

Office: Hokendauqua, Pa. **Mine office:** Wharton, N. J.

Officers: W. A. Rarrows, Jr., pres.-mgr.; Fred R. Drake, v. p.; with Ja. Samuel Krause, Edwin Thomas, Andrew D. Chidsey, J. Mark Mauser, Thos E. Ritter, directors. Oliver T. Case, sec.-treas.; L. H. Stone, supt.

Inc. April 4, 1854, in Pennsylvania. **Cap.,** $2,500,000; $50 par. Authorized bond issue, $1,000,000; $639,500 issued. Dividends total $150,000. Stock transferred at company office.

Property: Richard iron mine at Wharton, Morris county. Ore magnetite (Fe_3O_4) occurs in lenses in gneiss, and averages 58% iron. The mine is worked by back stoping and shrinkage methods.

Development: by vertical shaft to depth of 1,400', with 10,000' of workings.

Equipment: includes 200-h. p. electric double drum hoist, two electric compressors of 800 and 2,800 cu. ft. capacity and 1,000-ton magnetic conc. mill.

Reserves: estimated by management to consist of 800,000 tons of ore blocked out with total reserves amounting to 2,000,000 tons.

Production: to 1918, 3,000,000 tons. Mine was not operated in 1918. In June, 1919, company reports sinking a new electrically equipped shaft.

Company operates five blast furnaces at Alburtes, Helertown and Hokendauqua, Pa., producing 1,249,423 tons pig iron in 1918.

UNITED STATES METALS REFINING CO. **NEW JERSEY**

Subsidiary of the American Metal Co., which see, under United States.

NEW MEXICO

According to the U. S. Geological Survey the output of the mines of New Mexico for 11 months of 1919, with December estimated, amounted to $568,000 in gold, 709,000 ounces of silver, 2,800,000 pounds of lead, 52,200,000 pounds of copper, and 8,000,000 pounds of zinc, as compared with $682,791 in gold, 782,421 ounces of silver, 8,398,239 pounds of lead, 98,264,563 pounds of copper, and 24,050,324 pounds of zinc in 1918. These preliminary figures show decreases of $115,000 in gold, 73,000 ounces of silver, 5,600,000 pounds of lead, 46,000,000 pounds of copper, and 16,000,000 pounds of zinc.

Mills of the Mogollon district, Socorro county, produced $129,000 in gold and 310,000 ounces of silver as compared with $119,710 in gold and 302,902 ounces of silver in 1918. The Mogollon Mines Co.'s mill was operated steadily, but the Socorro Mining & Milling Co.'s mill was closed April 1, and operations were not resumed. The shipments of gold-bearing siliceous copper ores from Lordsburg increased heavily, but there was a decrease in the shipments of gold-bearing iron-copper ores from Orogrande. Very little gold or silver ore was shipped from Pinos Altos. The Whiteoaks district continued to produce gold from amalgamating mills.

The output of copper in 1919 was only a little more than half that in 1918. In 1919 the Chino Copper Co.'s output was 43,992,000 pounds, as compared with 79,340,372 pounds in 1918. The Burro Mountain Branch of the Phelps Dodge Co., which in 1918 produced 53,146 tons of concentrate averaging 14.9 per cent. copper, was even more seriously affected by the drop in the price of copper and suspended milling operations early in the year. The copper-matting plant at San Pedro was dismantled. The 85 Mining Co., at Lordsburg, made a large in-

crease in shipments in 1919, but shipped crude ore entirely as compared with concentrates and crude ore in 1918. The copper ore shipments from Orogrande decreased heavily.

The mining companies of this state are arranged alphabetically.

ADMIRAL GOLD AND COPPER MINING CO. NEW MEXICO

Idle. **Office:** Tusas, Rio Arriba county, N. M. G. F. Hall, mgr.

Inc. 1900, in New Mexico. **Cap.,** $500,000; shares $1 par.

Property: 8 claims, 160 acres, in the Bromide district, shows 3 fissure veins carrying silver, copper and gold ores, opened by 3 shafts, deepest 150′. Inactive owing to lack of funds.

ALHAMBRA MINING CO. NEW MEXICO

Defunct. Silver City, New Mexico.

AMERICAN EXPLORATION & MG. CO. MEXICO & NEW MEXICO

Mine offices: Steeple Rock, Grant county, N. M.; Ahumuda Bravos, Chihuahua, Mex., and Terrazas, Iturbide, Chihuahua, Mex.

Officers: Henry A. Haile, treas., with Jas. Duckworth, Geo. Empsall, Hinsdale Smith, Arthur Smith, of Springfield, Mass., Jesse W. Morton and Harry Hinckley, directors.

Inc. Sept. 28, 1907, in Maine. **Cap.,** $500,000; $1 par; issued 275,748.

Property: 600 acres, 16 claims, in New Mexico, and 12 properties in Mexico, also 3 mill sites.

Property includes the Burnham mine at Terrazas, the San Ignacio at Ahumuda, in Chihuahua, Mexico, and the Hinckley, at Steeple Rock. The New Mexican property has tunnels of 100′ and 313′ and shafts of 100′, 100′ and 150′, with 1,223′ of workings, carrying mainly silver ore. The property at Ahumuda has shafts of 25′, 100′, 160′ and 474′, giving ore assaying about 30% lead, 6% zinc and 12 to 20 oz. silver per ton. The property at Terrazas shows contact deposits between limestone and porphyry, giving assays of about 3% copper, 24% lead, 8 to 20 oz. silver and $2.50 to $12 gold per ton. Development: by shafts of 187′ and 200′. Equipment included a 55-h. p. gasoline plant and necessary mine buildings.

AMERICAN GOLD, COPPER M. & SM. CO. NEW MEXICO

Address: Santa Fe, New Mexico.

This company was forced into a receivership and the properties were purchased by George Heineman, of 1524 Poplar St., Kansas City, Mo., at receivers sale. Awaiting final decision of court.

AMERICAN SILVER CORPORATION NEW MEXICO

Inc. 1920 in West Virginia, to acquire property of Socorro M. & M. Co.

ANACONDA SKOOKUM COPPER GROUP NEW MEXICO

Mail returned unclaimed from last address: E. H. Rodgers, 310 West Missouri St., El Paso, Texas. Owned by E. H. Rodgers, L. H. Davis and J. F. Dowling.

Property: 4 claims, unpatented, located at north end of the San Andreas Mts., Socorro county, 26 miles west of Oscuro, on the E. P. & S. W. R. R. Said to cover 6,000′ of a quartz lode in granite, from 20′ to 100′ wide, and to show disseminated copper sulphide ore, assaying 2½% copper, 1½ oz. silver and $2 to $3 gold per ton.

Development: opencuts and pits along the strike of the lode.

ANDERSON-APACHE COPPER CO. NEW MEXICO

Mail returned unclaimed from last address:

Robt. Anderson, El Paso, Tex., chief owner. **Mine address:** Hachita, Hidalgo Co., N. M.

Officers: at last accounts, Hon. Geo. H. Neale, pres.; Harry Duey, v. p.; Chas. H. Howe, sec.-treas.; Arthur Houle, cons. engr.

Inc. June 1, 1907, in Arizona. **Cap.,** $500,000; shares $5 par. Held lands under a $100,000 bond and lease, with $20,000 paid.

Property: the Apache mine, 5 claims, 100 acres, 5 miles southeast of Hachita. Mine, opened 1883, was worked continuously until 1907 by leasers, producing approximately $200,000. Property said to show contact deposit 50-150′

wide between quartz-feldspar-hornblende-porphyry and carboniferous limestone, with ore, oxidized to present depth, and running 4 to 30% copper with one ounce silver to each unit of copper. Bornite ore occurs at the bottom of the shaft.

Development: by a 360′ shaft, for a length of 400′ and along the surface for 600′, said to show 200,000 tons of ore, with about 40,000 tons blocked out for stoping.

Shipments of low-grade copper and silver ore with lime gangue made intermittently to the El Paso smelter. Presumably idle.

ANIMAS PEAK GOLD MNG. CO. **NEW MEXICO**

Property: at Hillsboro, Sierra county, N. M., formerly owned by the defunct Hillsboro Cons. Mng. Co. of odious fame. Management planned refinancing company and development in accordance with available funds. Work on 200′ double compartment shaft started March, 1915. On the 200′ level an oreshoot, 3′ wide, was said to average $35 per ton in gold. No recent returns secured.

ATWOOD COPPER CO. **NEW MEXICO**

Name changed to Boston-Emerald Mining Co., which see.

AUSTIN-AMAZON COPPER CO. **NEW MEXICO**

Offices: 116 Texas Bldg., El Paso, Texas; Room 4 Porterfield Bldg., Silver City, N. M. **Mine address:** Tyrone, N. M.

Officers: Chas. E. Davis, Mayor of El Paso, pres.; M. W. Porterfield, v. p.; C. H. Leavell, sec.-treas., with John M. Wiley, managing director, and D. M. Jackson, director. J. H. Shockley, mgr.

Inc. Dec. 1, 1916, in New Mexico. **Cap.,** $1,500,000; $1 par; 1,060,000 outstanding. El Paso Bank & Trust Co., registrar and transfer agents. Annual meeting, second Tuesday in March.

Property: 15 claims, 500 acres, in Burro Mtns., Grant county, 6 miles W. of Tyrone.

Ore: chalcopyrite occurs in contact and quartz veins, running N.E.-S. W. through monzonite (quartz-diorite), and said to average 6% copper. A N.-S. mineralized shear zone, in places 150′ wide, is said to traverse several claims.

Development: 3,000′ of shafts, drifting, etc. Over 30 shallow openings show ore. Management planned sinking to 700′ level, in 1917-18, but due to war conditions, high costs, etc., the property was closed down January 1, 1918.

Equipment: includes 18-h. p. gasoline hoist and compressor. Shipments to October 1st, 1917, 137 cars of 6.26% copper ore. J. H. Shockley reported that property could be made one of the important copper mines of the West.

AZTEC COPPER CO. **NEW MEXICO**

Office: 707 Colorado Bldg., Washington, D. C. **Mine office:** Organ. Dona Ana Co. N. M.

Officers: Gen. H. H. C. Dunwoody, pres. and mgr.; C. C. Clements, v. p.; B. K. Roberts, sec.-treas., with Col. M. C. Wyeth, C. F. Humphrey and Admiral C. H. Davis, directors.

Inc. in Arizona. **Cap.,** $1,000,000; $1 par; 600,000 shares issued.

Lands: 4 claims, 6 acres, in the Organ Mountain mining district, about 12 miles by good road southeast from Las Cruces. Claims cover the mineralized limestone porphyry contact worked by the Modoc mine. Developments are on the Orejon claim, opened by a 140′ 45° inclined shaft, sunk on a 12 to 18″ vein, reported to carry copper, silver, lead and zinc ore, averaging $40 per ton. No recent reports available.

AZURE MINING CO. **NEW MEXICO**

Office: 170 Broadway, New York City. **Mine office:** Tyrone, Grant county, N. M. Louis Kahn, pres.; M. D. Rothschild, sec.-treas. Wm. Rogers Wade, supt.

Inc. 1890, in New York. Is operated as a close corporation.

Lands: 110 claims, 1,800 acres, near the Burro Chief group of the Chemung Copper Co. Company sold 73½ acres, 1909, to Mangas Development Company.

Geology: the Burro Mountain property shows monzonite, quartz-

porphyry and granite, with fissure veins in granite and disseminated ore in porphyry, there being 7 orebodies with 2 under development. The Santa Fé vein is from 15 to 75′ wide, averaging 40′ and is traceable for 6,000′. This vein is developed by a 417′ shaft, having 5 levels with 15,500′ of workings showing gem turquoise as well as copper ore. The old turquoise mine has 2 tunnels and large open-cast workings.

Besides the Santa Fé vein, the property has disseminated ore, one orebody on the contact between granite-porphyry and monzonite-porphyry being 152′ thick, developed for 500′ in length and carrying 2½% copper present as disseminated particles of chalcocite. Property has been explored by churn drills and diamond drilling.

The mine was at one time the largest turqouise property in the world, systematic mining having begun in 1891. Gem production has practically ceased and the property is considered valuable for its copper ore alone.

Company also owns the Tres Hermanos zinc mine in the Tres Hermanos district, 23 miles S. of Deming, Luna county, N. M., said to show oxidized ores carrying zinc-lead-silver values.

Ore: occurs as blanket and chamber deposits in limestone, 2-5′ wide, reported to assay from 30-35%zinc, 30-40% lead, and 6-8 oz. silver. Developed by several vertical shafts, from 30-100′ deep.

Equipment: includes compressor and 20-h. p. gasoline hoist.

Production: in 1915, mainly from development work, was 720,000 lbs. zinc, 300,000 lbs. lead and 2,000 oz. silver.

Claims under option to Phelps Dodge Corporation (Burro Mountain Branch), and systematic drilling of the property was started in 1917; results were not encouraging at last accounts.

BATTLESHIP MINING & MILLING CO. **NEW MEXICO**

Probably dead. See Vol. XII. Former office: 412 Mack Bldg., Denver, Colo. Mine near Lordsburg, Hidalgo county, N. M.

Dr. O. L. Blachly, pres.; O. B. Crum, sec.-treas. Property reported under lease to Andrew Bain, of El Paso, in 1915.

BEARUP GROUP **NEW MEXICO**

Owned by D. E. Bearup, Cooney, N. M. Located in Mogollon-Cooney district, Socorro county, N. M.

Claims: 4 on Gold Hill and 9 in western part of district. The Gold Hill claims show the Maud S. lode. Vein where opened has width of 2′ to 13′, and is said to assay $12 per ton. There is also a narrow high-grade streak.

Development: by tunnels, longest 600′. Total amount underground workings, 1,500′. Small shipments made of ore extracted during development work said to have assayed $98 to $235 per ton and 50 tons shipped to concentrator assayed $21 per ton. There was a small 2-stamp mill and gasoline engines on the property. No recent returns secured.

BENNETT-STEPHENSON M. & M. CO. **NEW MEXICO**

Officers: O. Jolliffe, pres.; Jas. C. White, v. p.; C. B. Gill, treas.; J. L. McCullough, sec. Annual meeting, April 7th, at Las Cruces. Controls, through stock ownership, the Organ Mountain Mining Co., which see. Fully described, Vol. X.

Mines under lease until 1921 to Phelps Dodge Corp.

BETHLEHEM COPPER CO. (INC.) **NEW MEXICO**

Mail returned unclaimed from former address: Steins, N. M.

Officers: J. A. Sund, pres.-mgr.; Wm. Charles, v. p.; F. P. Davy, sec.-treas.

Inc. June 1, 1917, in New Mexico. **Cap.,** $1,000,000; $1 par; 527,500 issued.

Property: 12 patented claims, 240 acres, in San Simon mining district, Hidalgo county, said to show a contact deposit between diorite and porphyry. Vein reported to be 100′ wide and 3,500′ long. Values of ore given as $2.40 gold, 3 oz. silver and 1.4% copper per ton. Developed by open cuts.

Is a prospect. No recent information obtainable.

BIG THREE MINES **NEW MEXICO**

Situated 3 miles north of Organ, Dona Ana county, N. M. Owned and operated by Capt. C. B. Gill, Geo. Luchen and Dr. J. H. Johnson.

Property: 7 claims show copper, silver and lead deposits. Workings 116′ deep, and equipped with 14-h. p. gasoline hoist. No recent information.

BITTER CREEK MINING CO. **NEW MEXICO**

Address: Taos, New Mexico.

Officers: Fred S. Lewis, pres.; Wm. T. Hinde, v. p.; Condon C. Lowe, sec.-treas.-mgr., with Wm. McKean and Alvin Burch, directors. L. O. Haberstich, supt., Red River, N. M.

Inc. July, 1916, in New Mexico. **Cap.,** $1,000,000; 425,070 shares outstanding, March, 1919. U. S. Corporation Co., New York, registrar and transfer agents. C. W. Galvin & Co., 50 Broad St., New York City, selling agents.

Property: 5 claims, 100 acres, known as the Hub mines, at Red River, Taos county, said to show telluride ore in fissure veins in andesite. Values are gold and silver.

Development: by prospect shaft and several shallow tunnels. Plan continuing the Dorothy tunnel. Company purchased an additional claim, 20 acres, in 1918, said to show a 150′ body of quartz and quartz-porphyry ore, assaying from $1-$7 in gold, to be developed by crosscut tunnel.

BLACK COPPER CO. **NEW MEXICO**

Mine office: Elizabethtown, Colfax county, N. M. Developed by shafts and credited with past gold production of $200,000. No recent returns available.

BLACK HAWK CONS. MINES CO. **NEW MEXICO**

Formerly Black Hawk Mining & Milling Co.

Mine address: E. D. Lidstone, pres.-mgr., Box 456, Silver City, N. M. Fiscal agents, C. A. O'Leary, Pioneer Bldg., St. Paul, Minn. Business office: 706 Security Bldg., Milwaukee, Wis.

Inc. May, 1919, in Delaware. **Cap.,** $1,500,000; $1 par.

Officers: E. D. Lidstone, pres.; J. A. Camm, v. p.; Geo. H. Cheyne, treas.; J. L. Dietz, sec. John P. Fetsch, directors. Liberty Trust Co., Boston, Mass., transfer agent. Equitable Trust Co., Boston, Mass., registrar.

Property: two groups, a total of 700 acres of mineral land in the Hanover-Santa Rita district, Grant county, New Mexico. Also 8 claims, 90 acres in Bullards Peak district, N. W. of Burro mountains, comprising all holdings of Black Hawk M. & M. Co.

The Hanover property held under lease and bond, comprises two groups, one on each side of the A. T. & Sta. Fe R. R. line at Hanover junction. There are seven shafts, the Lucky Bill shaft on the South Group, opening a 30′ vein that yielded 320 tons of ore in September, 1919, from the 150′ level with the 300′ level reported ready for stoping. Shipping ore is also mined at the Walker and Lucky Bull shafts and milling ore at Patterson shaft. Examined in January, 1919, by I. L. Wright.

Equipment: all five shafts are equipped with hoists, air-compressors, pumps, buildings, etc.

Production: in 1919 was 406,000 lb. lead, 2,100 oz. silver. The **Black Hawk group,** southwest of Silver City, is idle. It has yielded bonanza silver ore in former years, but is not in shape for economic working at present.

The Hanover property is a young one, with proven orebodies and in a district that has been productive for a half century. Considered promising.

BLACK HAWK MINING & MILLING CO. **NEW MEXICO**

Fully described in Volume XIII. Holdings purchased in May, 1919, by the Black Hawk Consolidated Mines Co., which see.

BLACK RANGE TUNNEL & MINING CO. **NEW MEXICO**

Address: E. D. Randolph, sec.-gen. mgr., 219 Main St., Lafayette, Ind.

Officers: H. E. Black, pres.; A. O. Behrn, v. p.; W. C. Mitchell, treas., with T. F. Gaylord, B. L. Phillips and Martin Hardsocg, directors; C. B. Hullinger, supt., Chloride, Sierra county, N. M.

Company presumably a reorganization of the Black Range Copper Mining Co. and Black Range Reduction Co. (see Vol. X), both now dead.

Property: the Silver Monument mine, showing a vein of silver-copper ore.

Development: 2,300′ tunnel and shaft. Main vein has apparently not been found. Equipped with steam plant, compressor and a 25-ton concentration mill. No recent reports obtainable.

BONNEY CONSOLIDATED COPPER CO. **NEW MEXICO**

Office: Lordsburg, Hidalgo county, N. M.

Officers: D. L. Hill, pres.; H. W. Peak, v. p.; R. S. Spann, ssec.; J. P. Porteus, supt.

Inc. 1919, in Texas. **Cap.**, $2,000,000; $1 par. Company reports that it is an unincorporated association, operating under declaration of trust, without personal liability, in any event, of the trustees or of any stockholder.

Property: Bonney mine group, property of Tyndale Copper Mining Co., El Dorado group, Manilla group, Misers Chest Extension group and others, in all about 750 acres, located in Virginia district, about 5 miles S. W. of Lordsburg. The Bonney Mining Co., on September 15, 1918, refused to extend the lease on the property held by the Lawrence Mining Co., and accordingly the mine was operated by the Bonney Mining Co. until January, 1919, when the copper market was demoralized. Property was purchased in July, 1919, by D. L. Hill, of Lordsburg, N. M., who consolidated it with adjoining mineral ground, under the present title.

Geology: veins are strong, well-defined fissures, 4-20′ wide, which below water level carry sulphides well disseminated through quartz gangue. Country rock is andesite, with monzonite, diorite and rhyolite.

Ore: of the Bonney mine occurs as chalcopyrite, bornite, chalcocite and some covellite, carrying gold and silver values in five fissure veins in andesite. Veins are located in isolated hills, 4 miles N. E. of Pyramid Peak, but entirely separated therefrom. Shipments in 1918 averaged 0.156 oz. gold, 3.77 oz. silver and 3.39% copper.

Development: at Bonney mine, by 3 shafts, 500, 400 and 350′ deep; 500′ of raises and 4,500′ of drifts and crosscuts. Company has opened 1,400′ on main vein and 600′ on 500′ level. The reserves are estimated at 257,000 tons with average value of $15.50 per ton.

Reserves: broken ore 21,000 tons, blocked out 16,000 tons. Estimated 220,000 tons (figured to 400′ below 500′ level).

Equipment: includes 100-ton flotation-concentraton mill, semi-Diesel power plant, hoist, dwellings, concrete office, etc.

Production: for 16 months prior to January, 1919, company shipped ore to Copper Queen smelter, Douglas, Ariz., containing 1,882 oz. gold, 50,732 oz. silver and 898,421 lb. of copper all valued at $286,056.

BONNEY MINING CO. **NEW MEXICO**

Property purchased by the Bonney Consolidated Copper Co., which see.

The Bonney mine was under option to the Lawrence Mining Co., until September, 1918, then operated by the company until January, 1919, when due to the demoralized copper market, the smelters refused to pay a definite price for ore. This forced the company to shut down the mine. Property was sold July, 1919, to D. L. Hill of Lordsburg, N. M., who formed the Bonney Consolidated Copper Co., to take over this and adjoining property.

BOSTON & BRICE COPPER CO. **NEW MEXICO**

A reorganization of the Jarilla Consolidated Copper Co. Mine at Brice, Otero county, N. M.

Officers: at last accounts, E. E. Locklin, pres.; W. W. C. Spencer, treas.-gen. mgr., with Clinton Gowdy, G. E. Moffett and John Colthrop, directors.

Inc. 1917, in New Mexico. **Cap.**, $2,000,000; $1 par; issued, 1,000,000. Annual meeting, first Monday in May.

Property: 40 claims, about 800 acres, in Jarilla (Silver Hill) district, Otero county, carrying sulphide ore in contact deposits between limestone

and monzonite porphyry. Vein said to be 3 to 30′ wide, 300′ to a half mile long, and proven to 170′ depth, averaging 3 to 5% copper, 2 oz. silver and $1 gold per ton.

Development: by 5 shafts, deepest 172′, and the Harvey tunnel, 165′ long.

Company is a merger of and holds the properties formerly owned by the Eureka Mines Cons. Co., Boston Jarilla Copper Co., Amarillo Mining Co. and Eureka Placer Mining Co., whose combined capitalization of $8,000,000 was reduced to $2,000 000. No recent report obtainable.

BOSTON EMERALD MINING CO. **NEW MEXICO**

Formerly known as the Atwood Copper Co. **Address:** J. Tangye, supt., Lordsburg, New Mexico.

Property: the Atwood mine, near Lordsburg, Hidalgo county. Late in 1918 it was reported that H. V. Snell, of Globe, Ariz., had purchased the controlling interest from Morningstar & Augustine.

Development: shaft being unwatered, preparatory to sinking to the 1,000′ level, in 1919.

BOSTON-HECLA MINING CO. **NEW MEXICO**

Office: 40 Court St., Boston, Mass. **Mine office:** Lordsburg, N. M.

Officers: R. E. Candruff, pres.-treas.; J. B. Piscope, v. p.; D. W. Taylor, sec., with R. S. Fisher and M. W. Lawlor, directors.

Inc. April 18, 1918, in Arizona. **Cap.,** $2,000,000; $1 par; 1,000,800 shares outstanding. Equitable Trust Co., Boston, Mass., transfer agent.

Property: 9 claims, 3 patented, 120 acres, about 3 miles S. W. of Lordsburg, Hidalgo county, between the 85 and Octo mines.

Ore: sulphide occurs in quartz-fissure veins in andesite and diorite. reported to assay 0.04 oz. gold, 2.17 oz. silver and 2.6% copper. Orebody is 20—125′ wide, with E.-W. course and dip of 70°.

Development: by 300′ shaft. Sinking a second shaft to same depth. **Equipment:** includes 40-h. p. hoist and compressor.

Property has been examined by O. H. Reinholt, San Diego, Calif. and J. T. Bickle, Globe, Ariz.

BUFFALO-NEW MEXICO MINES CO. **NEW MEXICO**

Office: 450 Brisbane Bldg., Buffalo, N. Y.

Officers: J. F. Rooney, pres.; H. F. Heinrich, v. p.; C. H. Reeser, sec.; W. G. Germain, treas. R. P. Kelly, supt.

Inc. 1910, in Arizona. **Cap.,** $1,000,000; $1 par; 350,000 shares outstanding.

Property: 15 unpatented claims, 200 acres, at Red River, Taos county, said to show a quartz vein in andesite and rhyolite with gold and silver values.

Development: by 200′ shaft and 300′ of workings. A 2,300′ tunnel is being driven to drain the mine. **Equipment:** includes 40-h. p. steam hoist and steam compressor.

BURRO MOUNTAIN COPPER CO. **NEW MEXICO**

Out of existence. Property operated as Burro Mountain Branch of the Phelps, Dodge Corporation, which see.

BURROS DEVELOPMENT CO. **NEW MEXICO**

Address: J. M. Kiner, pres., Silver City, N. M. R. W. Jackson, v. p.; C. C. Royall, sec.-treas.

Inc. 1917, in New Mexico. **Cap.,** $600,000; shares $1 par; 100,000 shares offered the public October, 1917, at 10c to provide funds for patenting and development. No later returns received.

Property: 21 claims, 420 acres, a short distance south of Leopold, said to show a vein of 7.2% copper ore in a 75′ shaft.

B. V. N. MINING CO. **NEW MEXICO**

Probably defunct. **Last address:** Pinos Altos, Grant county, N. M.

Officers: at last accounts. Dr. A. M. Torello, pres.; J. W. Bettes, T. D. Fischer, Robt. Noble, Jos. Vinot, H. Bettes and S. D. Bettes, directors. Wm. Donovan, supt.

Inc. Nov., 1914, in New Mexico. **Cap.**, $250,000.

Property: Silver Hill mine, in Pinos Altos district, shows gold-silver-zinc ore in vein, 1′ wide, believed to be continuation of rich orebody on adjoining Lankston and Pacific No. 2 claims.

Development: 3 tunnels, 289′, 300′ and 400′ deep and 260′ stope Some work done in 1915, no reports received since.

CALUMET-NEW MEXICO MINING CO. **NEW MEXICO**

Office: 154 W. Randolph St., Chicago, Ill. **Mine office:** Silver City, New Mexico.

Officers: Alex. McCallum, pres.; Alpheus McCallum, v. p.-treas.; J. A. Pement, sec.; A. W. McCallum, asst. sec.; J. A. McCallum, supt., with Jacob Ehrenberg, directors.

Inc. in New Mexico. **Cap.**, $1,000,000; $1 par; practically all outstanding.

Property: three groups in Magdalena district, 12 claims, 10 patented, 240 acres, 2 miles from a railroad and 5 miles from Magdalena, reported to show ore assaying 3 to 21% copper, 3 to 97 oz. silver, 0.06 to 0.96 oz. gold, a lead maximum of 24%, and a zinc maximum of 12%.

In Pinos Altos district company has 3 deeded claims, and 3 claims under option, 120 acres; 7 shipments from there assayed between 0.20-1.26 oz. gold, 7 to 19 oz. silver, 9 to 43% lead and 3 to 38% zinc. The company also holds a 6-year working bond on the Langston mine, located near the Pinos Altos property; Calumet receives ½ profits made after all expenses are paid, including a profit for milling the ores.

Development: by tunnels with 3,000′ of openings at Magdalena; by 2 shafts and 3,000′-4,000′ of drifts and stopes at Pinos Altos; by 200′ shaft and considerable drifts at the Langston mine.

Equipment: includes hoisting plants, blacksmith and machine shops, dwellings and a concentration and a flotation mill near Pinos Altos with a capacity of 1,500-3,000 tons per month.

CARIBEL MINING & MILLING CO. **NEW MEXICO**

Address: H. L. Pratt, mgr., Red River, N. M.

Company said to be operating a mine near Red River, Taos county.

CARLISLE MINING CO. **NEW MEXICO**

Office: 50 East 42nd St., New York City.

Directors: August Heckscher, of New Jersey Zinc Co.; G. M Heckscher, Sumner Girard, H. K. Welch, and S. Makeever; M. K. Welch, mgr

In February, 1918, company filed petition of bankruptcy giving liabilities as $116,473 and assets as $43,829. Although the petition is nominally a voluntary one, it is reported that the company's action was taken in response to the demand of the Heckschers for protection of their interests. Of the total liabilities $101,353 had been advanced by the Heckschers.

Cap., $3,000,000.

Property: the Carlisle group, at Steeplerock, N. M. After the bankruptcy proceedings, this mine was turned back to the owner G. H. Utter, and is described under that name. It produced $6,000,000 in gold ores, when owned by Marshall Field, L. Z. Leiter, and N. K. Fairbanks. With depth, the ores turned into complex sulphides which were not amenable to the metallurgical processes of the early '80s. Mine had been idle 39 years, until the Carlisle company took it over.

CASE AND WEST **NEW MEXICO**

Address: Gage, N. M.

Is a private concern which does not furnish financial information.

Property: 3 claims, near Gage, Victoria Mining district, Luna county; reported to show a quartz vein, running N. E.-S. W., containing gold, silver and copper, and developed by a 30′ shaft. Only a small amount of development work has been accomplished.

CHAMPION COPPER CO. **NEW MEXICO**

Offices: 7 Government St., Kittery, Me., and 1853 Commonwealth Ave., Boston, Mass. **Mine address:** Copper Hill Box, Dixon, Taos county, N. M.

Officers: R. J. Barton, pres.; Benj. B. Earl, v. p.; Arthur M. Cripps, sec.-treas.; preceding, with Ralph Thompson, E. J. Quiry, directors. Jas. A. Burton, gen. mgr., Dixon, N. M.

Inc. July 7, 1911, in Maine. **Cap.,** $400,000; increased March, 1919, from $200,000; shares $1 par; changed in 1918 from 2,000,000 shares, 10c par. Listed Boston Curb. Annual meeting first Tuesday in March. Commonwealth Trust Co., Boston, transfer agent.

Report issued March 1, 1918, shows assets of $20,336 cash, $2,742 in accounts receivable, $26,913 as equipment and development, and $150,008 as mining property.

Property: 468 acres, made up of 15 claims, on Copper Hill, in the Copper Mountain district of Taos county, 9 miles east of Embudo, the nearest railroad station, and 25 miles N. E. of Taos. 2 potash claims of about 40 acres, a mile from the mine, and 85 acres in the Big Bug mining district of Arizona. The potash claims, the Arizona property, and ten claims of about 200 acres, were purchased in 1917. The remainder of the property was acquired at foreclosure sale 1914, for $15,499. Mine is said to have 8 practically parallel veins of 18″ to 20′ width, between a schist footwall and quartzite hanging wall, the ore carrying cuprite, malachite and chrysocolla, succeeded at depth by chalcocite and gray copper; ore carries silver and gold, with chalcopyrite beginning to show in lower workings, all in a quartz gangue.

Development: includes shallow shafts and surface cuts on several claims, a 250′ shaft on the Champion, a 180′ shaft sunk on a 4′ vein in the Oxide mine, and a 500′ tunnel, which has stoping ore and cuts a 45° blanket vein. Report for 1917 showed 200′ of stoping and drifting, 930 tons hoisted and a yield of 67 lb. per ton milled.

Equipment: includes 2 horizontal boilers 54″x14″, two engines, one 80-h. p. the other 40-h. p. gasoline hoist, 2 compressors and several drills. A 1,000′ ground tram leads from the mouth of the Champion tunnel to orebins. A 15,300′ gravity pipe line, of 7″ spiral steel riveted pipe conveys water from spring to reservoir at mill.

In May, 1918, company tried the Greenawalt process of leaching and electrolysis, thus saving, it was reported, 98% of all ore values. A plant capable of 60 tons per day was installed early in 1919. No record of later activity.

CHEMUNG COPPER CO. **NEW MEXICO**

Dissolved, see Vol. XIII. Formerly at Tyrone, N. M.

CHICAGO COPPER MINING CO. **NEW MEXICO**

Address: E. G. Rafferty, pres.-gen. mgr., Oscuro, Lincoln county, N. M.

Company has not operated since 1910. Property described in Vol. XIII.

CHINO COPPER CO. **NEW MEXICO**

Office: 25 Broad St., New York. **Mine office:** Hurley, Grant county, N. M.

Officers: Charles M. MacNeill, pres.; Daniel C. Jackling, v. p. and managing dir.; Charles Hayden, v. p.; R. Babbitt, sec.; with A. Chester Beatty, Sherwood Aldrich, W. Hinckle Smith, Mark L. Sperry, John M. Sully (gen. mgr.), directors; C. W. Peters, treas.; Chadbourne, Babbitt & Wallace, gen. counsel. H. G. S. Anderson, asst. gen mgr.; Horace Moses,

CHINO COPPER COMPANY

Our Statistical Department will furnish complete information on application

HAYDEN, STONE & CO.

Members New York, Boston and Philadelphia Stock Exchange

25 Broad Street, NEW YORK **87 Milk Street, BOSTON**

mill supt.; G. L. Webster, cashier; D. D. Moffat, cons. eng. for mills; H. M. Merry, metallurgical statistician. Guaranty Trust Co. of New York and Old Colony Trust Co., Boston, registrars; Bankers Trust Co., New York, and American Trust Co., Boston, transfer agents.

Inc. Aug., 1909, in Maine. **Cap.**, $3,500,000; shares $5 par; increased to $4,000,000, June 30, 1911; and again increased to $4,500,000, April 2, 1912, of which 100,000 shares are reserved for conversion of bonds and 30,000 shares remain unissued; 869,980 issued. Bond issue has been retired. Annual meeting, third Friday in April.

With the A. S. & R. Co. and Ray Consolidated, Chino Copper owns the Gallup American Coal Co., capitalized at $4,000,000, and operating at Gallup, New Mexico.

Financial Statement, years ending December 31:

Assets.

	1918	1917	1916	1915
Property	$2,134,817	$1,954,811	$1,931,580	$1,824,085
Expended on equipment	7,874,936	7,011,797	5,880,353	4,991,609
Expended on development	1,149,534	1,060,979	993,027	943,391
Investments	579,840	475,640	192,040	192,040
Deferred charges to stripping	3,135,663	2,910,197	2,615,447	2,160,158
Materials and supplies	1,989,990	1,782,130	980,398	491,387
Accounts and notes receivable	508,621	339,144	54,764	22,927
Copper and ore	4,094,875	5,324,011	6,882,340	4,124,765
Marketable securities	1,939,921	1,054,898	248,750	.....
Cash and cash due for copper	2,155,012	2,428,794	3,022,091	2,113,091
Total	$25,563,210	$24,342,401	$22,800,790	$16,963,454

Liabilities.

	1918	1917	1916	1915
Capital stock	$4,349,900	$4,349,900	$4,349,900	$4,349,900
Accounts payable	723,825	324,176	469,369	344,821
Accrued taxes, insurance	1,794,212	1,232,403	372,127	151,606
Treatment, refining and delivery—not due	842,782	576,742	650,267	508,573
Surplus from sale of securities	2,995,253	2,995,253	2,995,253	2,995,253
Surplus from operations	14,857,238	14,863,926	13,963,874	8,613,261
Total	$25,563,210	$24,342,401	$22,800,790	$16,963,454

Current Assets and Liabilities:

Assets.

	1918	1917	1916	1915
Copper	$3,886,176	$5,106,240	$6,664,155	$3,930,727
Ore	208,708	217,771	218,185	194,036
Accounts receivable, etc.	113,621	139,144	54,765	22,927
Notes receivable	395,000	200,000	.....	.....
Materials and supplies	1,989,990	1,782,130	980,398	491,387
Marketable securities	1,939,921	1,054,898	248,750	.....
Cash	1,000,050	533,525	1,561,996	1,065,735
Cash due for copper	1,154,962	1,895,269	1,460,095	1,047,357
Total	$10,688,420	$10,928,976	$11,188,344	$6,752,171

Liabilities.

	1918	1917	1916	1915
Current accounts.....	$723,825	$324,177	$841,496	$496,224
Accrued taxes, insurance, etc	1,794,211	1,232,403	.....	243
Treatment, refining, and delivery charges—not due..	842,782	576,742	656,267	508,573
Total	$3,360,818	$2,133,322	$1,491,764	$1,005,040
Surplus of quick assets	$7,327,602	$8,795,656	$9,696,580	$5,747,130

Income Account:

Years	Metals sold, etc.	Operating expense	Other charges net	Profit	Dividends paid	Profit or loss
1919...	.....	.....	.....	$1,389,984	$2,609,940	*$1,219,955
1918...	$17,032,364	$13,079,040	$45,102	3,908,222	3,914,910	—6,688
1917...	19,571,741	9,434,690	624,198	9,512,854	8,612,802	+900,052
1916...	19,545,053	6,701,891	315,213	12,527,949	7,177,335	+5,350,614

* Deficit.

Dividends: initial in June, 1913, $2.25 being paid in that year; since when $2.50 per share in 1914; $3 in 1915; $8.25 in 1916; $9.90 in 1917; $4.50 in 1918, and $3 in 1919. On March 31, 1920, 37½c was paid. The total is $29,339,224.

Property: 206 mining claims (3,493 acres) at Santa Rita, of which 177 claims (3055 acres) are patented. Also 120 acres of agricultural land adjacent to the mining claims. The mill-site at Hurley, including water-rights and residue-disposal area, totals 18,530 acres.

The property is the old Santa Rita del Cobre mine, which is the oldest copper mine in New Mexico, and the second oldest in the United States, having been opened, 1804, by Spaniards. The property was worked by an American named Pattie, in 1822 and to 1827. It was in possession of a Frenchman from 1828 to 1834, when an American called McKnight, began operations which ceased in 1836. From 1840 to the late fifties, it was in possession of a Spaniard. In 1851 Santa Rita was the headquarters of the American Commissioners, of the Boundary Survey. Some time before 1860 four Americans attempted to operate the property. In 1862 Gen. Sibley, of the Texas Confederate force, held the mine. In 1873 M. B. Hayes, acting on behalf of Denver people, succeeded in purchasing the claims, attempting to perfect the title by obtaining U. S. patents, although patents had been refused by the Commissioner of the Land Office in 1870. Hayes' application was turned down in April, 1873. Between that date and the final decision of the Secretary of the Interior in November, 1873, title was obtained by Hayes from the surviving heirs of the original Spanish estate and final U. S. patent was obtained to the claims covering the Santa Rita del Cobre Grant. Title was acquired by the Chino Copper Co. from the Santa Rita Mining Co., since dissolved.

Geology: Santa Rita is situated in the Central mining district, Grant county, New Mexico on a branch of the Santa Fe system which connects at Whitewater with the Deming-Rincon division of the same railroad. The orebody and town of Santa Rita are located in a distinct basin and the rocks exposed in the district may be roughly divided as follows: 1. sedimentary; 2, intrusive; 3, extrusive. The sedimentary formation, of which there is a large area in comparison with the intrusive exposures, consists of limestones of more or less purity, and belonging to the sub-carboniferous and carboniferous series, there also being some isolated exposures of Devonian rocks. These beds vary from nearly pure limestones, through cherty limes and shaly limes, to shales. A considerable area of Cretaceous sandstones and shales is exposed through faulting, the former converted

into quartzite in the immediate neighborhood of the intrusives. The principal intrusive rocks in the Santa Rita basin are grano-diorite, a quartz-monzonite porphyry, and another of distinct porphyritic texture which may be classed as andesite. This latter rock intrudes the two general types as also the sedimentaries, in sills, lacoliths and dikes. The boundary forming the S. E. side of the Santa Rita basin is composed of two flows, the principal one being rhyolite and rhyolite tufa overlaying an older flow which is of an andesite nature.

The grano-diorite is intrusive into and across the edges of the sedimentary series, which form a syncline dipping to the south from the northerly bordering ridges toward the lowest point of the basin. The area within the basin has been strongly faulted in wide zones and in two general directions. The intersections of the numerous faults have resulted in a roughly circular shear zone that has a diameter of ¾ of a mile. This zone has been the depository of the valuable copper minerals, chalcocite, cuprite and native copper. Bornite, chalcopyrite and cupriferous pyrites are also found, but to a much lesser extent than the previously named. There also occurs in small restricted areas, malachite and azurite with a very limited amount of chrysocolla.

Development: the old workings, which were very extensive, have been practically eliminated by the steam-shovel operations.

Recent work:

Year	Churn-drilling feet	Overburden moved cu. yd.	Ore mined tons	Ore reserves tons	Copper content per cent	Cost of mining cents p. t. per ton
1918	15,020	3,264,556	3,749,238	96,552,026	1.630	69.55
1917	22,425	3,712,414	3,607,825	.....	.....	50.88
1916	13,161	3,564,623	3,216,065	95,555,843	1.656	37.97

Equipment: consists of 10 steam-shovels, 21 locomotives, 140 dump cars, of 6 to 20 cu. yd. capacity. Company operates about 24 miles of track, giving access to the pits. There is also a primary crushing plant, equipped with 48″x60″ jaw crusher, together with bins for handling and breaking up coarse material loaded by shovels.

Mill: the concentrating plant at Hurley, 9 miles from the mine on the Santa Rita branch of the Santa Fe railway, with original capacity of 5,000 tons per day, was started in October, 1911, but is now equal to 11,000 tons daily, due to improved metallurgical methods, and addition of 2 units, making 7.

The mine has a coarse-crushing plant, consisting of gyratory crushers, 72″x20″ Garfield rolls, producing a maximum size of ¾″. The mill is equipped with 16″x42″ rolls for preliminary grinding and Garfield Chilean mills for final grinding. Roughing treatment consists of Garfield tables, followed by Wilfleys and Richards-Janney classifiers and Isbell vanners. Part of the enlarged mill was set aside for treating 500 tons of partly oxidized ore daily. A 5,000-ton tailing retreatment plant will start as soon as preliminary tests are satisfactory. There are several million tons of material awaiting treatment.

Graphic metallurgical control at the works is described by H. M. Merry in Bull. 153, September, 1919, of A. I. M. & M. E. By means of large wall-charts, a daily record of essential data is kept, such as weight of ore milled, assays of headings, tailings, and concentrates, screen analyses, costs, and price of copper. Such presentation is necessary at any plant, or mine, so results may be seen at a glance.

Power plant includes twelve 445-h. p. Heine boilers, three 1,250 k. w. generators, direct-driven by Nordberg Corliss engines, and one 2,000 k. w. Allis-Chalmers turbo-generator set. Primary water is secured from the Apache Tejo Spring, 3½ miles south of Hurley, from underflow of Whitewater draw, Cameron Creek draw and Whiskey Creek draw. There is also in use a storage reservoir below the mill, the dam forming this reservoir

having been built out of mill tailings and having storage area of nearly 3,000 acre feet. Coal is now obtained from a mine in the Gallup field of New Mexico, owned by Chino and two other companies.

Settlement at Hurley includes in addition to mill and accessory buildings, office building, store, school, shops and dwellings, town having population of about 3,500 people. Town of Santa Rita, on company ground, has population of over 4,000.

Production:

Year.	Tons Treated.	Cost per ton in cents Ore.	Waste.	Mill.	% Cu.	% Rec.	Ratio conc.	% Cu. in cents.	Lb. Cu. Rec. per ton ore.	Lb. Cu. net prod.	Net Cost per lb. cts.	Rec'd per lb cts.
1912	1,120,375	.....	.....	.....	2.077	61.63	16.6:1	21.20	24.79	27,776,088	7.69	.....
1913	1,942,700	23.13	16.	61.08	2.033	67.31	10.6:1	14.52	27.37	50,511,661	8.787	15.489
1914	1,907,300	22.13	16.12	55.01	2.115	67.86	12.9:1	18.50	28.70	53,999,928	7.60	13.325
1915	2,379,800	19.47	16.51	54.19	2.155	66.59	15.0:1	21.55	28.70	64,887,788	7.12	17.420
1916	3,094,400	19.88	18.09	64.00	1.833	66.59	12.0:1	14.82	24.42	75,761,978*	8.7	26.465
1917	3,608,100	50.88		103.00	1.640	69.32	13.6:1	15.50	22.70	83,339,782	11.39	24.116
1918	3,836,400	69.55		137.00	1.630	63.27	13.4:1	14.25	20.67	79,340,372	17.18	22.536
1919†	1,765,200	.....		.....	1.826	.....	.....	.....	24.04	42,325,449	14.90	.....

* From all sources. † 9 months. For 12 months, 42,345,449 lb. The average price received was 18.2c. and costs were 15.9c.

Both property and management are regarded as exceptionally good, and the stock as a very high-grade investment.

CHINO DEL NORTE COPPER CO. **NEW MEXICO**

Address: C. W. Hoyt & Co., 79 Milk St., Boston, Mass. **Mine address:** Geo. E. Coxe, gen. mgr., Hanover, N. M.

Officers: Wm. A. Ulman, pres., 233 Broadway, New York City; with Elmer E. Fox, Mesheck Frost, H. O. Bursum, Geo. E. Coxe, Clarence W. Hoyt, F. Greer Dodd, directors. John H. Leddy, sec.-treas. Wm. H. Janney, cons. engr.

Inc. in Delaware. **Cap.**, $3,000,000; $1 par. Stock offered at 50c.

Owns its properties through ownership of capital stock of El Norte Copper Co., of New Mexico, the operating company. Properties were paid for partly by 110,000 shares, $1 par, of preferred stock of the El Norte Copper Co.

El Norte Copper Co.

All the common stock and all but 11,000 shares of preferred stock of this company, held by Chino Del Norte Copper. The El Norte owns the New Mexican holdings.

Property: 4 separate tracts, 29 claims, 600 acres, and 17 more claims under option near Fierro and Hanover in the Central mining district, Grant county. Tracts cover contact deposits, in part covered by gossan, extensively mined for iron ore.

Development: by 130' Mockley shaft, showing 12' vein with 8 to 12% copper ore; also the Rattler tunnel and workings and several shallow shafts mostly sunk by former owners to get out very high grade oxidized ores, and not carried below water level. Examined by D. C. Sutton.

Regarded as a promising development proposition if properly financed and managed.

CLEAVELAND & WEATHERHEAD CO. **NEW MEXICO**

See under Deadwood Mining & Milling Co. Described in Vol. XIII.

C. O. D. LEASING CO. **NEW MEXICO**

Idle for many years. Probably out of business.

Mine: at Lordsburg, Hidalgo county, N. M. Described in Vol. XII, 1916.

C. & O. MINING & MILLING CO. **NEW MEXICO**

Address: Pinos Altos, Grant county, N. M.

Officers: J. L. Caddel, pres.; A. Caddel, v. p.; Jackson Agee, sec.-treas.; above, with John James and A. L. McCarty, directors; A. L. McCarty, supt.

Inc. April, 1914, in New Mexico. **Cap.**, $100,000; shares $1 par; outstanding, at last accounts, 90,000 shares.

Property: 2 claims, patented, in the Pinos Altos mining district, 7 miles N. W. of Silver City.

Ore: lead-zinc-copper in fissure vein in diorite. Vein has a N. S. course, dips 65° and is said to have an orebody 6" to 4' wide. Ore minerals are galena, sphalerite, chalcopyrite and pyrite and average assay is said to be 2% lead, 2% copper, 8% zinc, $4 to $10 gold, and 10 oz. silver per ton.

Development: by 200' incline shaft with 4,000' of workings.

Equipment: included 20-h. p. gasoline hoist, a 50-ton concentrator which was run jointly with P. A. M. & M. Co. In 1917, unwatering of shaft was only work done. No later returns available.

CO-OPERATIVE MINING CO. **NEW MEXICO**

Office: Lordsburg, N. M.

Officers: E. H. Taber, pres.-gen. mgr.; C. A. Ball, sec.-treas.; D. W. Taylor, asst. sec.; E. H. Gould, eng.; H. C. Walter, mill supt.

Inc. 1919, in New Mexico. **Cap.,** $250,000; $1 par; 170,000 outstanding.

Property: a lease and option on 8 claims, 160 acres, in Gold Hill district, Grant county, said to show argentiferous lead sulphide in 4' fissure vein in monzonite. In Jan., 1920, a body of native silver ore was found 150' from the surface, which was said to assay $1,000 per ton. The Yankee Girl claim, purchased 1919, has 3 feet of 15 oz. ore which will be developed in 1920.

Developed: by 200' incline shaft and 250' of workings, blocking out 3,000 tons. Company estimates reserves at 5,000 tons.

Equipment: 10-h p. hoist and an 80-ton mill with flotation unit is in course of construction.

COPPER BELT SILVER & COPPER MNG. CO. **NEW MEXICO**

Office: 512 Exchange Bldg., Denver, Colo. F. E. Wire, sec.

Inc. in Colorado. **Cap.,** $175,000; 5c par.

Property: 13 claims, unpatented, 252 acres, 3 miles N. W. of Magdalena, Socorro county, said to show silver-copper ore with some gold.

Development: mainly assessment work consists of open-cuts with several shafts 15 to 50' deep. Company is sinking a double-compartment shaft, down 100' in November, 1919. It is equipped with a hoist.

COSSACK MINING CO. **NEW MEXICO**

Mail returned March, 1919, from former address, Bland, N. M. Company probably dead.

Property: Lone Star group, formerly owned by Navajo Gold Mining Company, and said to show gold-silver, in veins, running nearly N.-S. and from 12 to 40' wide.

Development: about 5,000' of workings, including crosscut tunnels.

Equipment: 100-ton cyanide plant and concentrating mill.

CUCHILLA COMPANY **NEW MEXICO**

Idle. **Address:** care Stephen B. Davis, Jr., East Las Vegas, New Mexico.

Property: 1,500 acres of mineral land between the towns of Lucero and Guadalupita, Mora county, N. M., slightly developed by tunnels and shafts. Company has been inactive since 1916.

DEADWOOD MINING & MILLING CO. **NEW MEXICO**

Address: Mogollon, Socorro county, N. M. Earl C. Cleaveland, gen. mgr.

Property: the Deadwood and Sunburst mines and mill, near Mogollon, showing the Queen, Deadwood and Confidence-Last Chance veins which average 8-10' in width, extend for 2,500' through the claims and carry gold-silver ore.

Development: by 500' shaft and about 5.000' of workings.

Equipment: includes 60-ton mill with concentration and cyanide equipment, oil engine, electric hoist, etc.

Production: 44,000 tons of ore since 1905, yielding $325,000.

Property is under option to the Mogollon Mines Co.

DIVIDEND MINING & MILLING CO. **NEW MEXICO**

Defunct and stock valueless. Mine near Estey, Socorro county, N. M. See Vol. XIII.

DONNA DORA MINING CO. **NEW MEXICO**

Organ, Dona Ana county, N. Mex. Reorganized as Mineral Hill Mining Co., which see.

DUNCAN MINING & MILLING CO. **NEW MEXICO**

Address: Duncan, Ariz. **Mine address:** Steeplerock, N. M.

Officers: H. C. E. Spence, pres.; H. W. Evans, sec.-mgr.; F. N. Hall, treas.

Inc. in New Mexico. **Cap.,** $150,000; 50c par.

Property: 8 claims, 9 miles N. E. of Duncan, Ariz., in the Steeplerock district, Grant county, is said to show 2 veins running through the entire property, the Mt. Royal 40′ wide, on which most of the development work has been done, and 40′ east of it the Jim Crow vein, 80′ wide. The vein filling is a reddish brown monzonite and quartz carrying gold and silver and the high values occur where the hematite is massive.

Development: mainly on Golden Fleece claim by a 410′ incline shaft and about 2,000′ of workings. Company estimates reserves at 40,000 tons of $25 ore and 60,000 tons of lower grade ore.

Equipment: includes a 6-drill compressor driven by a 60-h. p. engine, a 24-h. p. hoist, power house, machine and blacksmith shops, etc. Company has erected the first unit of a 125-ton mill, with power supplied by oil engines; mill said to contain crushers, ball mills, Dorr classifier and steel cyanide tanks.

ECLIPSE MINING & MILLING CO. **NEW MEXICO**

Address: Duncan, Ariz., and Steeplerock, N. M.

Officers: Geo. W. Trimble, pres.; Ben. F. Barbour, sec-treas. and mgr., with W. C. Downey, Wm. O. Olsen, Chas. H. Lee, Morgan M. Wilson and C. R. Meyer, directors.

Inc. in Arizona. **Cap.,** $1,000,000; shares $5 par; 106,000 shares issued. Annual meeting, first Wednesday in January. Is the successor to the Shamrock Mining & Milling Co., described in Vol. XII.

Property: 24 claims, 480 acres in Steeplerock mining district, Grant county, said to show a fissure vein in andesite, from 6-8′ wide with S. E.-N. W. course. Ore is silicious and reported to assay 1.16 oz. gold, 15.1 oz. silver and 6.84% copper.

Development: by several tunnels and shafts.

ECONOMIC MINING & MILLING CO. **NEW MEXICO**

Probably dead. No returns since 1916. Fully described in Vol. XIII.

EDISON MINING & MILLING CO. **NEW MEXICO**

Probably dead. Mail returned unclaimed March, 1919, from former address, Red River, Taos county, N. Mex.

EIGHTY-FIVE EXTENSION COPPER CO. **NEW MEXICO**

Office: Miami, Ariz. Mines at Lordsburg, N. M.

Officers: Lester B. Doane, pres.; L. D. McClure, v. p. and gen. mgr.; De Witt Murray, sec.; C. C. Faires, treas., with E. K. Davis, directors.

Inc. in Arizona. **Cap.,** $5,000,000; $1 par; 2,000,000 shares paid for property are being held in escrow; 400,000 shares offered the public at 50c each, April, 1917.

Property: 600 acres adjoining the 85 Mining Co.'s ground at Lordsburg, shows several veins along a dike reported to be 75′ wide and traceable for 600′. Ore is silicious and carries gold, silver and copper values.

Development: by 310′ vertical shaft, 265′ air shaft and the Hart shaft 125′ deep, with about 1,700′ of openings. The management (or perhaps we should say the promoters) claimed to have 463,460 tons of ore in sight averaging $13.50 per ton, giving the property a valuation of $6,284,517 This estimate is based on a report by J. L. Wells.

Production: to date 149 cars of ore shipped in former years from the Atwood mine, which netted leasers $40,965.

Property may have merit, but the statements above are in our opinion not warranted by facts.

EIGHTY-FIVE MINING CO. **NEW MEXICO**

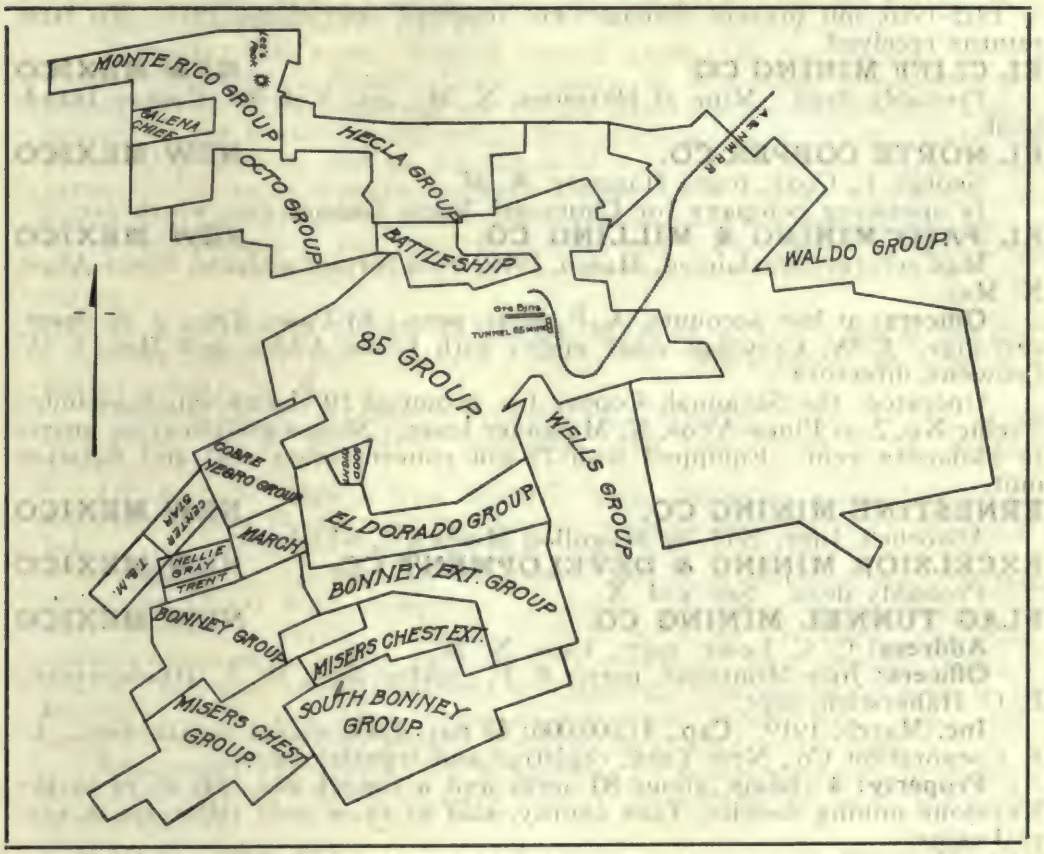
Office: Valedon, Hidalgo county, N. M.

Officers: A. P. Warner, pres.; C. H. Warner, sec.; P. B. Yates, treas.; A. J. Interrieden, mgr.; J. Jackson, supt.; M. Merry, mill supt.

Inc. Sept. 23, 1909, in New Mexico. **Cap.**, $1,000,000; shares $1 par. Annual meeting, second Wednesday in December.

Company purchased the Superior mine of the Superior Mining Co., in 1912.

Property: 6 claims, in Shakespeare camp, about 4 miles from Lordsburg, in the Virginia district, includes a vein in rhyolite, developed by 1,600′ tunnel and a 1,700′ blind shaft, with a 300′ air shaft to surface, and



MAP OF MINING CLAIMS OF LORDSBURG DISTRICT.

7,500′ of drifting on each level. Vein is estimated by company to average 10′ in width and to carry 3.5% copper, 6 oz. silver and 0.1 oz. gold per ton.

Equipment: includes 100-h. p. electric motor, hoist, four 500-h. p. engines, electric pump, and a 300-ton mill equipped with tables, 6 vanners and flotation unit. In 1919, company installed a 1,000-h. p. steam turbine using oil for boilers and driving a 750 k. w. generator. Mill recovery is 91%. About 250 men are employed.

Reserves: 263,460 tons of $13.56 ore, with normal metal prices, besides ore between 210 and 310 levels.

Production: latest figures received were for 1916; gross $1,456,586, as compared with $762,921 in 1915. In February, 1920, the mill was treating 150 tons daily, an equal amount going to smelters.

Property considered good, and management competent.

EL CENTRO MINING & MILLING CO. **NEW MEXICO**

Address: Lordsburg, Hidalgo county, N. M.

Officers: E. S. Eno, pres.; Geo. M. Peck, v. p.; R. F. Fitz, sec.-treas., P. O. Box 275, Los Angeles, Cal., with Henry Muntz, Alfred Cole, D. D. Culver and J. A. Rovelstad, directors.

Inc. Nov., 1914, in Arizona. **Cap.,** $200,000; $1 par; outstanding 100,000. Company, in 1915, bought the Last Chance mine, owned by the Sutton Consolidated Mining Co., and claimed to have produced $135,000 in the past.

Property: 4 claims, 2 patented, 68 acres, in the Pyramid mining district, 8 miles south of Lordsburg, said to show shoots 9-30′ wide of silver-copper ore in a fissure vein in andesite.

Ore reserves: claimed to be 10,000 tons of ore, assaying $4 to $12 per ton.

Development: 275′ vertical shaft with 2,000′ of workings. Mine idle in 1915-1916, but present management resumed operations, 1917. No later returns received.

EL CLIFF MINING CO. **NEW MEXICO**

Probably dead. Mine at Hermosa, N. M. See Vol. XI, Copper Handbook.

EL NORTE COPPER CO. **NEW MEXICO**

George E. Coxe, mgr., Hanover, N. M.

Is operating company for Chino del Norte Copper Co., which see.

EL PASO MINING & MILLING CO. **NEW MEXICO**

Mail returned unclaimed, March, 1919, from former address, Pinos Altos, N. Mex.

Officers: at last accounts, A. F. Kerr, pres.; El Paso, Tex.; J. E. Spencer, mgr.; J. W. Crowdus, cons. engr.; with Louis Addoo and Mrs. J. W. Crowdus, directors.

Operated the Savannah Copper Co. group of 19 claims which included Pacific No. 2, at Pinos Altos, N. M., under lease. Shows gold bearing quartz in Skilacorn vein. Equipped with 75-ton concentration mill and flotation unit.

ERNESTINE MINING CO. **NEW MEXICO**

Absorbed, June, 1915, by Mogollon Mines Co., which see.

EXCELSIOR MINING & DEVELOPMENT CO. **NEW MEXICO**

Probably dead. See Vol. X.

FLAG TUNNEL MINING CO. **NEW MEXICO**

Address: C. C. Lowe, mgr., Taos, N. M.

Officers: Jose Montanar, pres.; R. F. Oakley, sec.; W. T. Hinde, treas.; L. C. Haberstich, supt.

Inc. March, 1919. **Cap.,** $1,000,000; $5 par; 7,000 shares outstanding. U. S. Corporation Co., New York, registrar and transfer agent.

Property: 4 claims, about 80 acres and a tunnel site, 200 acres in the Keystone mining district, Taos county, said to show gold tellurides in several veins.

Company plans to push a tunnel, which will unwater and develop their claims.

GARNET COPPER CO. **NEW MEXICO**

Address: Ohaysi, N. M.

Officers: James H. Parker, pres., and C. Jungk, sec.

Inc. in New Mexico, in 1916. **Cap.,** $60,000; shares $1 par.

Company operates the Garnet, Mae Belle, James Fisk and Shoo Fly mines at Ohaysi, Otero county, N. M.

Development: deepest shaft is down 450′. The deposit occurs in garnet-lime zone of altered sedimentaries at porphyry contact, and ore contains copper and gold. Ore was sent to the El Paso smelter. No recent returns received.

GIANT COPPER CO. **NEW MEXICO**

Address: J. L. Burnside, Silver City, N. M.

Officers: F. R. Jones, pres., El Paso: J. L. Burnside, v. p.; D. C.

Crowell, sec.-treas.; F. P. Jones, T. L. Lowe, J. Agee, T. W. Carter, D. C. Crowell and D. T. White, directors.

Inc. 1917, in New Mexico. **Cap.**, $3,500,000; $1 par; 620,000 issued.

Property: 61 claims in the Burro Mountain district, N. M., including those of National Copper Co. Considerable development done.

GOLD BELL MINING CO. **NEW MEXICO**

Probably dead; mail returned unclaimed, March, 1919, from former address, Deming, N. M.

Inc. 1916, to develop a silver property N. E. of Hillsboro, Sierra county, N. M.

GOLD BUTTES MINING & MILLING CO. **NEW MEXICO**

Office: Duncan, Ariz.

Officers: G. F. Fraser, pres.; Daniel Fraser, v. p.; John Evans, sec.-treas.; A. Fraser, mgr., with W. Hutchins and M. C. Tilletson, directors.

Cap., 750,000 shares; par $1.

Property: 920 acres, divided into 3 groups in the vicinity of Twin Peaks, Steeplerrock district, Grant county, N. M., about 20 miles N. E. of Duncan, Ariz. The properties are (1) the Rival Extension group of 9 claims, located on the Rival lode, showing a low grade gold ore; (2) the Twin Peaks group of 26 claims, said to contain gold sulphides; (3) the Dark Thunder group of 120 acres reported to have shipped 30% copper with some silver and gold. Company also owns 50,000 shares of the Rival Mining Co.

Development: at the Rival Extension and Twin Peaks, by a 265′ shaft and 4,000′ of workings; the Dark Thunder has been prospected in several places.

GOLD & COPPER DEEP TUNNEL M. & M. CO. **NEW MEXICO**

Office: Beaver Falls, Beaver county, Pa. **Mine office:** Elizabethtown, Colfax county, N. M.

Officers: A. T. McIntyre, pres.; G. E. Dachtler, v. p.; W. H. Martin, sec.-treas.; W. P. McIntyre, gen. mgr. and supt., with J. M. Richards, directors.

Inc. Oct. 10, 1900, in New Mexico. **Cap.**, $500,000; increased 1912 from $200,000; shares $1 par; 282,948 issued. Annual meeting third Tuesday in July.

Property: in the heart of Cimarron range, on the west slope of Baldy mountain, 12,500′ high, comprises 12 claims, 260 acres, in the Moreno district, 18 miles from the St. L. R. M. & P. R. R. at Ute Park. Orebody, a contact between slate and monzonite, is developed by 2 shallow shafts and a 2,300′ crosscut tunnel, planned to penetrate the mountain with a final length of 3,500′, cutting 2 bodies of low-grade copper ore. Also said to carry a deposit of molybdenite. Total underground work, 4,400′.

Equipment: includes a 12-h. p. gasoline air compressor and 10 buildings; 20-ton stamp-mill. See U. S. Geol. Survey Prof. Paper, 68, p. 95, for geology of this district.

GOLDEN LINK CO. **NEW MEXICO**

Probably dead. See Vols. XII and XIII.

GRANT COUNTY COPPER CO. **NEW MEXICO**

Address: H. B. Link, mgr., Santa Rita, N. M.

Company said to be developing a body of zinc ore, 1½ miles north of Santa Rita. Mining is by tunnels. A mill was constructed in 1919, and was producing a good grade of zinc concentrate early in 1920. About 25 men employed.

GREAT EAGLE MINING CO. **NEW MEXICO**

Address: Red Rock, N. M.

Officers: J. H. Cauthen, pres.; J. S. McCelvey, v. p.; R. S Spann, sec.-treas.; F. A. Kroll, mgr.

Inc. Jan., 1919, in New Mexico. **Cap.**, $750,000; $10 par.

Property: 16 claims, 300 acres, in the Anderson mining district, Grant county, showing a vein with gold, silver, copper in fluorspar; vein is 15′ wide

and 2,000′ long, surrounded by granite, course, N. 30° W. Company reports that ore carries 91.7% fluorspar.

Development: 800′ of open-cuts. Reserves are said to be estimated at 300,000 tons with 10,000 tons blocked out.

Equipment: includes a compressor and tramway. Production to May, 1919, about 3,000 tons. Company plans to sink a 3-compartment shaft and to erect another compressor.

HANOVER BESSEMER IRON & COPPER CO. **NEW MEXICO**

Address: Fierro, Grant county, N. M.

Officers: B. D. Coleman, pres.; C. F. Hess, sec., and J. W. Brock, treas. D. M. Barringer, B. D. Coleman, J. W. Brock, R. A. F. Penrose, Jr., J. P. Brock, C. C. Tegethoff and John Brockman, directors. C. K. Barnes, mgr. L. M. Kniffen, supt.

Inc. Nov., 1914, in Delaware. **Cap.,** $1,000,000; $1 par; 625,000 outstanding. Notes authorized and issued, $100,000. Transfer office, 511 Bullitt Bldg., Philadelphia, Pa. Annual meeting, first Monday in May.

Property: at Fierro, Grant county, shows ore averaging about 50% iron and 5% copper. Company had a 10-year contract which required the shipment of 20,000 tons of iron ore per month to the Pueblo plant of the Colorado Fuel & Iron Co., which was closed temporarily in September No work was being done late in 1919, but in December, the U. S. S. R. & M. Co. was reported to have purchased the mine.

HANOVER COPPER CO. **NEW MEXICO**

Address: Hanover, Grant county, N. M. Geo. A. St. Clair, pres., Duluth, Minn.; F. T. Walker, mgr.

Inc. 1909. **Cap.,** $50,000; shares $10 par.

Property: 18 claims, north of the Chino Copper property and near the holdings of the Philadelphia Copper Co. Mine has shafts 70′, 100′ and 150′ deep and tunnels 40′ and 60′ long, showing copper and zinc ores. Equipped with hoist and compressor.

HARDSCRABBLE MINING CO. **NEW MEXICO**

Company is out of existence, as holdings have been taken over and are being operated by the U. S. Copper Co., which see. See Vol. XIII.

HECLA MINING CO., THE **NEW MEXICO**

Office: 652 South Spring St., Los Angeles, Calif. **Mine address:** Lordsburg, N. M.

Officers: R. E. Vandruff, pres.; John W. Wilson, v. p.; W. G. Wilbern, sec.-treas.; O. H. Reinholt, cons. engr.; Franklin Smith, geologist; E. K. Davis, gen. mgr.

Inc. Oct. 17, 1916, in Nevada. **Cap.,** $850,000; shares $1 par; treasury reserve, $200,000; balance used, partly to pay for property and equipment and partly for development. No indebtedness.

Property: 9 claims fully paid for, and another, the Bonnie Jean, under option, about 140 acres lying between the 85 and the Octo mines, 3 miles S. W. of Lordsburg, in Hidalgo county, and 2 miles from the S. P. R. R.

Geology: similar to that of the 85 and Octo mines. Country rock is diorite-porphyry. General geology fully described by Lindgren in Prof. Paper 68, U. S. Geological Survey. Outcrops conspicuous and form landmarks, such as Lee's Peak 500′ from the Hecla, frequently mentioned by Lindgren. Gangue very silicious and ore is therefore in demand for fluxing the basic ores from Bisbee. Sulphides found near the surface. Many mineral varieties occur, but main values lie in copper, gold and silver contents, said to average over $30 a ton before the rise in metal prices.

Development: includes two 300′ and several shallow shafts. One of the deeper shafts was to be enlarged, retimbered and deepened. The topography does not lend itself to successful tunnelling.

Equipment: includes 250-h. p. boiler plant, 40-h. p. hoist, 700 cu. ft. air-compressor, pumps, etc. No 1919 returns received.

HEMBRILLO COPPER MINING CO. **NEW MEXICO**

Mine in Socorro county, N. Mex. No returns received in many years. Probably dead. See Vol. XIII, for full description.

HERMOSA COPPER CO. **NEW MEXICO**

Office: 30 Church St., New York. **Mine office:** Hanover, Grant county, N. M.

Owned by the General Electric Co. Property has been closed down and in the hands of a caretaker for the past 7 years.

HOP CANYON MINING & SMELTING CO. **NEW MEXICO**

Office: 154 West Randolph St., Chicago, Ill. **Mine address:** Magdalena, Socorro county, N. M. **Registered office:** Oscuro, N. M.

Officers: Alpheus McCallum, pres.; A. Pement, v. p.; E. G. Raffety, treas.; A. W. McCallum, sec., with Alexander McCallum and A. B. Wilson, directors. J. A. McCallum, supt.

Inc. April, 1906, in New Mexico. **Cap.**, $1,000,000; shares $100 par; 8,852 shares outstanding.

Property: 11 claims, 220 acres, 3 miles from Santa Fe R. R., in the Magdalena mining district, shows a shear zone in rhyolite running N. 25° W., with steep dip N. E. Surface shows thin seams of oxidized ore, developed by 1,550′ crosscut tunnel together with shafts and open pits of about 4,000′. Company has expended almost $71,000 on development work. Ore assays, 2.5% to 24.64% copper, 1.2 oz. to 5.42 oz. silver, and 0.02 oz. to 1.15 oz. gold per ton.

No production figures received.

ILLINOIS & SARATOGA MINES **NEW MEXICO**

Address: C. T. Brown, Socorro, N. M. Mine at Kingston, Sierra county, N. M.

Nothing has been done at these mines for several years, but management expected to resume operations in 1919.

JACK MINING & MILLING CO. **NEW MEXICO**

Mine probably closed down as mail was returned unclaimed in March, 1919. The property was known as the Roosevelt group, a former gold mine in Gold gulch, Santa Rita mountains, near Bayard, a few miles S. W. of Santa Rita. The ore deposit was said to show both silver-lead and molybdenum.

JACKS PEAK TRAMWAY & MNG. CO. **NEW MEXICO**

Office: Dalhart, Tex. **Mine address:** Carrizozo, N. M. N. M. Vinyard, pres.-gen. mgr.

Company has iron ore properties about 25 miles east of Carrizozo. In July, 1919, an 8-mile tramway, to connect with the Chicago, R. I. & Pacific R. R. was in course of construction.

JARILLA CONSOLIDATED COPPER CO. **NEW MEXICO**

Has been reorganized under name of Boston & Brice Copper Co., which see.

JARILLA COPPER SYNDICATE, INC. **NEW MEXICO**

Address: Brice, via Oro Grande, Otero county, N. M.

Produced a small tonnage in 1913 and early 1914. Operations were resumed late 1915. No recent information received. Fully described in Vol. XIII.

JOHNNY BULL MINE **NEW MEXICO**

W. H. Henry, owner, Boston Road, New York, N. Y.; David L. Creswell, purch. agt., Steins, Hidalgo county, N. M.

Property: 3 patented claims, south of Steins Pass, between S. P. and E. P. & S. W. R. R., on western slope of Peloncillo range, shows a contact deposit between limestone and a N.-S. monzonite dike. The ore is said to average 5% copper and to run high in lime and iron.

Development: includes 2 old shafts, 100′ and 150′ deep, with 1,000′ of work, exposing 2 parallel veins, each 20′ wide. Property was formerly owned by the Johnny Bull Copper Mining Co., whose charter was forfeited in 1902.

Production: about 225 tons of 5% ore has been mined to date, yielding gold and silver also.

Owner reports that the lode is to be diamond drilled in 1920 to prove the orebodies in sight.

JUMBO MINING CO. **NEW MEXICO**

Office: Deming, N. M. C. W. Lininger, supt.

Officers: J. J. Hyatt, pres.; C. J. Kelly, v. p.; E. L. Foulks, sec.-treas.

Inc. 1917. **Cap.,** $250,000; shares $1 par; 50,000 treasury shares offered, October, 1917.

Property: in Cook mining district, 25 miles north of Deming and near the Graphic and the Cook Peak mines. Claims show four strong parallel fissure veins in andesite porphyry.

Development: by 250 shaft with levels at 200′ and 250′. On latter level, vein No. 1 is 2′ wide and carries high-grade silver lead ore.

Equipment: 50-h. p. boiler, compressor, 50-h. p. oil engine and 8x10″ steam hoist.

KING COPPER CO. **NEW MEXICO**

See same title under Arizona.

KING & QUEEN COPPER CO. **NEW MEXICO**

Office: 111 S. Second St., Albuquerque, N. M.; also Trust Bldg., El Paso, Texas.

Officers: J. O. Hamilton, pres.; J. R. Fisk, v. p.; W. K. Ramsey, sec.-treas.; H. F. Perry, supt.

Inc. 1907, in New Mexico. **Cap.,** $1,000,000; shares $1 par. El Paso Title Co., El Paso, Texas, registrar.

Property: 14 claims, about 260 acres, 8 miles S. W. of Steins Pass, near the King Kendall and Johnny Bull mines, shows limestone cut by a large N.-S dike of monzonite porphyry with ore occurring in contact metamorphic deposit of altered garnetiferous limestone. Ore carries a little bornite, chalcopyrite, pyrite, and on the Queen claim, some chrysocolla. It is low-grade, carries zinc and lead, and is hard to concentrate.

Development: by shallow workings showing ore said to average 3½% copper. Company expected to explore with core drills in 1919. Property has been worked by lessees for 5 or 6 years.

LA LUZ COPPER CO. **NEW MEXICO**

Property probably closed down as letters were returned in 1917. See Vol. XII.

LAS ANIMAS PEAK GOLD MINES CO. **NEW MEXICO**

Office: 1516 No. American Bldg., Chicago, Ill. **Mine office:** Hillsboro, N. M.

Officers: Hon. E. W. Kirkpatrick, pres.; R. Liebman, v. p.; C. B. Van Deman, sec.-mgr.; W. A. Nason, treas., with L. E. Marvin, W. McCarty Moore and J. H. Palmer, directors. E. B. Van Deman, supt.

Inc. 1914, in Arizona. **Cap.,** $1,000,000; shares $1 par; 450,000 issued. Annual meeting, third Wednesday in January.

Property: 12 claims, unpatented, 240 acres, 4 miles N. of Hillsboro, Sierra county, shows gold-silver ore in a fissure vein, said to be 3-12′ wide, striking N. and dipping 70°. Developed by several shafts to depth of 435′. Management estimated 100,000 tons of ore blocked out in 1917.

Equipment: includes 50-h. p. steam hoist, pump, compressor and mill.

Property was a good producer under former owners, the Philadelphia M. & M. Co., which went into bankruptcy in 1907. Litigation followed and mine remained idle until acquired by present company in 1914.

No returns for 1918 available.

LAWRENCE MINING CO. **NEW MEXICO**

Office: Oliver Bldg., Pittsburgh, Pa. Probably dead.

Had a lease on the Bonney mine of the Bonney M. Co., in the Virginia mining district, Lordsburg, N. M., which was taken over September 15, 1918, by the owners, and sold, July, 1919, to the Bonney Consolidated Copper Co., which see.

LITTLE HATCHET MINING CO. **NEW MEXICO**

Address: A. E. Bader, Santa Rita, N. M.

Officers: F. W. Lincoln, pres.; H. L. Linx, v. p.; E. H. Williamson, v. p.; A. E. Bader, sec.

Property: about 160 acres, 30 miles south of Santa Rita, Grant county, containing copper and silver. A rich and large vein was reported cut in November, 1919. Sinking is in progress, showing good ore. This is "a 1,000-to-1 shot," according to an advertisement of the company's treasurer.

LONE MOUNTAIN SILVER MINES CO. **NEW MEXICO**

Address: H. W. Loomis, Deming, N. M.

Inc. 1919, in New Mexico. **Cap.,** $150,000; shares 10c par.

Officers: C. A. Overlock, pres.; D. A. Richardson, sec.; H. W. Loomis, treas.-mgr.

Property: 8 claims, in an old silver district between Chino and Tyrone, 3 miles from the Hurley concentrator of Chino Copper Co., Grant county. A porphyry intrusion in limestone is to be explored.

LUCKY GROUP **NEW MEXICO**

Address: M. D. Gaylord, mgr., Brice, via Oro Grande, Otero county, New Mexico.

Presumably idle for past 4 years. Property fully described in Vol. XIII.

MAMMOTH MINING & MILLING CO. **NEW MEXICO**

Address: Pinos Altos, Grant county, N. M.

During 1918 it was reported that A. C. Dundas, J. H. Tilley, W. J. Clayzer and A. L. Williams, had secured a lease on the Mammoth mill. The operators plan to treat the Mammoth mine dump and to handle custom ore.

MANGAS DEVELOPMENT CO. **NEW MEXICO**

Presumably dead, and property owned and operated by Phelps Dodge Corp'n. **Former office:** Silver City, N. M. **Mine office:** Tyrone, Grant county, N. M.

Officers: J. E. Saint, pres.; G. A. Kaseman, v. p.; M. W. Porterfield, sec.-treas., with W. C. Porterfield and R. P. Barnes, directors, at last report.

Fully described in Vol. XIII.

MEMPHIS MINING CO. **NEW MEXICO**

Office: 204 Mills Bldg., El Paso, Texas. **Mine office:** Organ, Dona Ana county, N. M.

Officers: J. I. McCullough, pres.; W. N. Small, v. p.; Jas. C. White, sec.-treas., with T. S. Semple and Chas. E. Head, directors.

Inc. 1911, in Arizona. **Cap.,** $1,000,000; shares $1 par; 650,000 shares outstanding.

Property: 5 claims, 100 acres, consisting of the Old Memphis mine, Contention and Copper Bow group.

Development: by 4 shafts with about 2,000′ of workings. Past shipments said to have averaged 10% copper, 6 oz. silver, and $3 gold per ton. No 1918 returns received.

Property under lease to Phelps Dodge Corp. for 5 years, from April 1, 1916.

MEMPHIS RED RIVER MINING CO. **NEW MEXICO**

Address: Box 487, Raton, N. M.

Officers: H. B. Pooler, pres.; W. D. Kershner, v. p.; W. G. Hughes, sec.-treas. J. M. Clarke, F. B. Evans, F. T. Divers, Chas. Frazer, Thos. Gable and J. Kastura, directors.

Inc. June, 1914, in New Mexico. **Cap.,** $300,000; $1 par.

Property: 4 claims, patented, 70 acres, in Red River mining district, Taos county, showing a quartz vein 3-6′ wide containing gold and silver sulphides surrounded by porphyry.

Development: by tunnels 300′, 225′ and 175′ long. Underground workings total 1,100′. Reserves estimated at 5,200 tons of $12 ore.

Equipment: includes 25-ton mill, with a flotation unit, 6 miles from mine. Management expects to erect mill at mine early in 1920, and to resume development work.

Production: 300 tons of $17 ore up to 1917, when operations were suspended

MEXARKO MINING CO. **NEW MEXICO**

Office: Merchants' Bank Bldg., Ft. Smith, Ark. **Mine office:** Silver City, N. M.

Officers: Geo. Sengel, pres.; R. C. Bollinger, treas.; W. D. Logue, sec.; John W. Bettes, gen. mgr. E. P. Seeley, engr.-supt.

Cap., $1,000,000.

Property: at Silver City, Grant county.

MINERAL HILL MINING CO. **NEW MEXICO**

No returns received since 1916. See Vol. XIII.

MOGOLLON MINES CO. **NEW MEXICO**

Address: Sidney J. Kidder, gen. mgr.; C. A. Botsford, supt., Mogollon, Socorro county, N. M.

Officers: Frank H. Hitchcock, pres.; Alfred Levinger, sec.; J. H. Hoban, treas., all of New York City, with J. U. Sebinius, O. F. Weber, R. J. McKay and F. W. Vellacott, directors.

Inc. Dec. 6, 1912, in Maine. **Cap.,** $1,778,410; $5 par; all outstanding. New York Trust Co., New York, registrar. Annual meeting, second Monday in October. Gross earnings, 1917, $408,765; operating expenses, $366,781 amounting to $7.026 per ton. During 1918 plant operated at only part capacity due to water shortage and influenza epidemic; during 1919 normal operations were maintained.

Property: 16 claims, 12 patented, 216 acres, at Mogollon. In 1915, management absorbed the Ernestine Mining Co., which was organized November, 1902. During 1918, company acquired options on both the Confidence and Deadwood mine, adjoining properties in Mogollon, also has under option the Ruby King and the Forest Queen groups at Irwin, Gunnison county, Col.

Ore: gold and silver sulphide, in quartz veins in andesite and rhyolite, said to average $12 to $15 per ton. Main vein, known as the Last Chance, strikes S. E.-N. W.; dips 60 to 70° and is 10 to 26′ wide.

Development: incline shaft 900′ below main tunnel, which is 1,972′ long; greatest depth of workings, 1,780′; workings total 27,131′. Shrinkage stoping is used. Main workings are on Last Chance and Top claims.

Equipment: includes electric hoist, compressor, oil engines, electric power, 40-stamp mill and cyanide plant, capacity 160 tons daily.

Production:

	Ore treated, tons	Yield — Gold, oz.	Yield — Silver, oz.
1918	38,566	4,312	203,560
1917	52,222	6,460	344,691
1916	44,904	7,171	371,350

Total output in 25 years is $7,500,000. Property is fully described by D. B. Scott, in Bull. 158 of., A. I. M. & M. E. February, 1920.

In December, 1919, property was operating at full capacity; 150 tons daily, making good profits.

MONITOR SILVER, LEAD & ZINC M. & M. CO. **NEW MEXICO**

Offices: 115 Broadway, New York, and McLaughlin Bldg., Santa Fe, New Mexico.

Officers: Chas. E. Berner, pres.; Chas. W. Berner, v. p.; Gustave F. Ettensperger, sec.-treas., with Sidney H. Hirsch and Francis C. Wilson, directors. Ricketts & Co., 280 Madison Ave., New York, mgrs.

Inc. Feb. 5, 1916, in New Mexico. **Cap.,** $1,000,000; issued $800,000; shares $1 par. Security Registrar & Transfer Co., New York, transfer agent and registrar.

Property: 500 acres in Hermosa, Palomas mining district, Sierra county, New Mexico.

Equipment: includes a concentrating plant, hoist, compressor, sawmill, steam power and houses. No recent returns received.

MONTE RICO MINING & MILLING CO. **NEW MEXICO**

Office: 428 Washington Trust Bldg., Washington, Pa. **Mine office:** Lordsburg, Hidalgo county, N. M

Officers: Lawrence R. Boyd, pres.; F. B. Theakson, v. p.; James V. Boyd, sec.-treas.

Property has been closed down since 1916, due to litigation, which was settled in May, 1919. Fully described in Vol. XIII. Work was resumed in 1920, the main tunnel being extended to cut the ore shoot opened above.

NATIONAL COPPER CO. **NEW MEXICO**

Idle and probably dead. Chas. P. Laughlin, sec., Tyrone, Grant county, N. M. Fully described in Vol. XIII.

NATIONAL GOLD & SILVER MINING CO. **NEW MEXICO**

Office: Unity Bldg., Chicago, Ill.

Officers: M. R. Sherman, pres.; S. W. Winn, sec. Is a close corporation. Cap., $3,000,000.

Property: 10 claims, including the Beck mine, 2 miles from Steins, Hidalgo county, developed by 2 miles of workings with a 300′ shaft, showing a 12-18″ vein of gold-silver ore. Vein strikes N 70° E. and dips steeply northwest.

Equipment: includes 5-drill compressor, hoist, 50-ton mill, blacksmith shop, offices and dwellings.

Mine has been worked steadily since 1915 and shipments are made at various times to the El Paso smelter.

NEVADA HILLS MINING CO. **NEW MEXICO**

Presumably idle, as mail is returned from former address: Gage, Luna county, N. M.

Property: 8 claims, purchased in 1916 for $15,000, in Victoria mining district, near Gage, said to show a vein 20′ wide of tungsten ore in lime formation with quartz gangue, opened on the 40′ level. Developed by 2 shafts, 130′ and 90′ deep. The property was formerly worked for silver values.

NEW MEXICO ZINC & COPPER CO. **NEW MEXICO**

Address: J. L. Terry, mgr., Hanover, N. M.

Officers: Judge W. H. Winter,, pres.; H. O. Bursum, v. p.; J. A. MacDonald, sec.-treas.

Property: 1,200 acres, includes the Mountain Home zinc mines, 11 patented claims, 211 acres, and the Copper Flat group, 52 unpatented claims, covering the extension of the first named group. Holdings adjoin Phelps Dodge, Empire Zinc, and are near Hanover Bessemer C. & I., El Norte Copper and other producers.

Geology: contact deposits, shear zones and fissure veins in contact metamorphic areas of altered limestone near monzonite dikes and granitic intrusive masses.

Company planned to sink a 500′ shaft and also to drive a 500′ tunnel. No recent returns received.

NEW YEAR'S GIFT GROUP **NEW MEXICO**

Address: Jos. Hardy, Duncan, Ariz.

Property: 3 claims, patented, 48 acres, on south side of Vanderbilt mountain, Steeple Rock district, Grant county, N. M., 10 miles northeast of Duncan, Ariz., bought from G. H. Utter in July, 1919. Ground carries 2 quartz veins in porphyritic andesite, the 20″ paystreak assaying 0.16 oz. gold, and 13 oz. silver per ton.

Development: by 125′ shaft and 200′ of workings. Exploration under way and shipments of ore being made to Douglas.

NOVEMBER MINING CO. **NEW MEXICO**

Property located 12 miles south of Steins Pass. Company presumably idle, as mail was returned, unclaimed from former address, Steins Pass, N. M. Fully described in Vol. XIII.

OAKS CO., THE **NEW MEXICO**

Address: Alma, Socorro county, N. M. W. J. Weatherby, pres.; H. A. Hoover, sec. Earl C. Cleaveland, gen. mgr.

Dividends: four 1% dividends were paid on pfd. stock, Dec. 1, 1916; Jan. 1, Feb. 1, March 1, 1917. On April 1, 1917, a 1¾% dividend was declared, payable quarterly on prefered stock.

Property: the Pacific, Hub and a portion of the Johnson groups, 500 acres, in the Cooney, or Mogollon district, about 80 miles from Silver City, the nearest railway point. Also has a bond on 300 acres additional, including the Eberle, Deep Down, Maud S., Deadwood and McKinley groups. Company installed a compressor at the Deep Down mine in 1918.

The Maud S. has produced silver-gold ore worth $800,000. The Pacific mine has yielded silver-gold ore to value of $200,000, mostly from above the 250′ level.

The company was driving the Oaks tunnel, which starts at Mineral creek and will crosscut the Gray Hawk, Socorro, Pacific and other veins in its 9,800′ length. It will be used as a main drainage and haulage tunnel for the district. Shipments made to the Socorro mill.

OCTO MINING CO. **NEW MEXICO**

Office: 112 East State St., Redlands, Calif. Mine at Lordsburg, Hidalgo county, N. M.

Officers: E. W. Smith, pres.; G. S. Turrill, v. p.; F. E. Sanford, sec.; J. M. Wilson, treas.; O. H. Reinholt, cons. engr., directors; E. K. Davis, gen. mgr.; E. J. Ernest, supt.

Inc. Nov. 15, 1912, in Calif. **Cap.,** $500,000; $1 par; issued, 300,000. Annual meeting, third Thursday in December.

Property: 8 claims, 125 acres, 3½ miles S. W. of Lordsburg, N. M., and 2 miles from the S. P. Ry. Geology is similar to that of the Eighty-Five and Hecla mines adjoining and is fully described in U. S. Geo. Survey, Prof. Paper.

Ore: contains copper, silver, and lead. Shipments were said to have netted $28 per ton.

Development: by several old and a 145′ 3-compartment shaft, which was sunk in 1919 to 600′.

Equipment: includes 40-h. p. hoist, 6-drill compressor, 200-h. p. boiler plant, etc.

ORGAN MOUNTAIN MINING CO. **NEW MEXICO**

Office: 204 Mills Bldg., El Paso, Tex. **Mine office:** Organ, N. M.

The property, consisting of 340 acres, is located 12 miles N. E. of Las Cruces, N. M., and was owned by the Bennett Stephenson M. & M. Co. The mine is credited with a production of about $1,000,000 mainly in lead, zinc, silver and copper. The American S. & R. Co. had a lease, which was given up. The Phelps Dodge Corp. took a 5 year lease, which will expire in April, 1921. The company is fully described in Vol. XIII.

ORGAN ORE CO. **NEW MEXICO**

Address: Organ, N. M.

Officers: W. W. Cox, pres.; J. D. Isaacks, v. p., L. B. Bentley, sec.-mgr.; V. B. May, treas., with C. T. Seale, directors.

Inc. April, 1919, in New Mexico. **Cap.,** $50,000; $10 par; $19,650 outstanding.

Property: about 20 acres, near Organ, Grant county, N. M. Company reports ore reserves at 600,000 tons, averaging 4% copper and 5 oz. silver per ton.

ORO IRON CO. **NEW MEXICO**

Address: Ohaysi, Otero county, N. M.

Officers: Winchester Cooley, pres.; T. M. Wingo, sec.; J. H. Parker, gen. mgr.; Edward Salveson, supt.

Cap., $20,000; shares $1 par.

Property: the Cinco de Mayo, Iron Duke, Iron King, Iron Queen, Iron Mask, and Laura claims at Ohaysi developed by surface workings, showing hematite and magnetite iron ores.

Equipment: compressor and 5 drills. No recent returns received.

OTERO COPPER CO. **NEW MEXICO**

Presumably idle, as mail is returned unclaimed from former address, Brice, via Oro Grande, Otero county, N. M. See Vol. XIII.

OZARK SMELTING & MINING CO. **NEW MEXICO**

Office: 601 Canal Road, Cleveland, Ohio. **Mine office:** Magdalena, Socorro county, N. M. Philip Argall & Sons, of Denver, Colo., cons. engrs. Smelter: Coffeyville, Montgomery county, Kans.

Officers: Geo. A. Martin, pres. and gen. mgr.; Oliver Box, asst. gen. mgr.; L. P. Pressler, supt.; W. S. Stevens, mill supt.; W. E. Corts, smelter supt. The company is a subsidiary of the Sherwin-Williams Paint Co.

Property: includes the Graphic mine, 30 claims, 227 acres, with total holdings of 800 acres in the Magdalena district, showing limestone, shale and quartz, carrying contact ore deposits between limestone and schist, of about 50′ proven width, 500′ length, and known depth of 500′. The upper workings show large quantities of lead and zinc carbonates, ores being mainly smithsonite and sphalerite, with some cerrusite and argentiferous galena, and occasional cuprite and native copper. Ores are mainly low in grade, with principal values in zinc. The ore-shoot, of about 500′ length on the 7th, 8th and 9th levels, is about 100′ wide on the 9th level.

Development: is by a 300′ shaft, and two 1,500′ cross-cut tunnels, with about 8 miles of workings, the lower levels showing a slightly argentiferous sulphide complex of zinc, lead and copper. Property regarded as one of the largest zinc deposits of America.

Equipment: 125-ton mill was erected, 1912, to treat the large tonnage of low-grade complex zinc-lead-iron sulphide ore already developed, by the froth flotation process, using it as an adjunct to older methods of concentration. A 50-ton mill does dry concentration on ores above 20-mesh, and wet concentration on ores below that size. Electric power is used.

Production: mainly zinc ore, is shipped to the works at Coffeyville, for the manufacture of lead and zinc oxides, as the base for pigments, of which the Sherwin-Williams Co., in control of this corporation, is one of the largest American manufacturers.

Lessees paid $4,000-$5,000 royalties monthly, 1917. No later returns received.

PECOS COPPER CO. **NEW MEXICO**

Office: 581 the Arcade, Cleveland, Ohio. **Mine office:** Cowles, San Miguel county, N. M.

Officers: Alfred H. Cowles, pres., Sewaren, N. J.; I. C. Gifford, v. p.; Frederick W. Swan, sec.

Inc. 1904, in Michigan. **Cap.,** $100,000; $25 par. A close corporation. The company had a floating debt of $65,000, all owed to stockholders, of whom there are only 5. Mine holdings under lease, since 1915, to Pecos Mines Co.

Property: 15 claims, 573 acres, all patented and 238 acres including valuable coal veins and placer ground, in the Hamilton district, 12 miles from Santa Fe. Holdings include water rights to the Pecos river for 2½ miles, with 2,000 h. p. available for development.

Lands show lower Carboniferous limestone. The property carries a contact "vein," vertical, 200′ wide, outcropping for 750′ and lying alongside an altered schistose diorite. The band of shipping ore is 9′ wide with further width of concentrating material. The ore, being complex, is difficult of treatment.

Development: includes 370′ Evangeline shaft. Report by W. E. Burlingame, in 1907, claims 168,304 tons blocked out on four levels. Lessees have accomplished much new development and in 1917, the ore reserves were reported to be more than double those of 1907, the pay streak having averaged 50′ in width.

Equipment: includes a 165-h. p. steam plant, with 2 hoists, 1 good for 600′ depth; and a 3-drill compressor.

PECOS MINES CO. **NEW MEXICO**

Operated under lease the property of the Pecos Copper Co., which see.

PINOS ALTOS M. & M. CO. **NEW MEXICO**

Dead. Company had a bond and lease on 14 claims belonging to the Savannah C. Co., in the Pinos Altos district, N. Mex.

Claims show fissure veins 2′ wide in diorite, carrying complex sulphide ores said to carry .25 oz. gold, 8 oz. silver, 2.5% copper, 10% zinc and 2% lead.

Fully described in Vol. XII.

PINTADO CONSOLIDATED COPPER CO. **NEW MEXICO**

Dead. See Vol. XIII.

PROGRESS MNG. CO. **NEW MEXICO**

Address: Chas. F. Hanson, mgr., or John Evans, supt., Steeple Rock, via Duncan, N. Mex.

Property: 14 miles N. E. of Duncan, shows quartz monzonite with chalcopyrite stringers and veins.

Development: by shaft, which was 105′ deep in 1917. No later reports available.

Equipment: includes 45-h. p. gas engine.

PYRAMID MILLING CO. **NEW MEXICO**

Address: B. Prescott, mgr., Leidendorf, via Lordsburg, N. M.

Property: a lease and option on the Last Chance mine, a silver property, located 8 miles south of Lordsburg. Company also said to be unwatering the 400′ shaft of the Viola mine, an adjoining property.

Equipment: includes 50-ton concentrator and flotation plant. Early in 1919, company was shipping to the El Paso smelter.

RED PEAKS COPPER CO. **NEW MEXICO**

Address: Norton, N. M.

Officers: W. P. McCall, v. p.; D. F. Thomas, sec.-treas., with J. E. Whitmore, W. S. Townsend, J. Parker and Benham Cain, directors. J. S. Thornton, mgr.

Inc. Oct. 3, 1916, in New Mexico. **Cap.**, $1,500,000; shares $1 par; about 800,000 shares outstanding.

Company has 340 acres in Cap Rock district, 30 miles S. E. of Tucumcari, reported to carry a disseminated deposit of oxidized copper ore, with 1.1 to 1.4% copper. The mine is developed by open cuts and will be mined by steam shovel. A 1,000-ton leaching plant is planned for 1918.

A very remarkable and ridiculously amusing "report" on property by Jos. W. Boileau, who is said to be a "metallurgical engineer and geologist," states that the ores carry 2½% copper, 20% nickel and 17% aluminum and that "volcanic bombs (rich in copper nickel ore)" abound over the property. Unfortunately such crass statements, with accompanying piffle, are taken seriously by men not versed in mining. No recent report available.

REPUBLIC MINES CO. **NEW MEXICO**

Office: 526 Exchange Bldg., Denver, Colo.

Mine is located at Lucero, Mora county, N. M. Company refused in 1917 to forward any information. Property and operations are fully described in Volumes XII and XIII.

REPUBLIC MINING & MILLING CO. **NEW MEXICO**

Office: Harrison Bldg., Philadelphia, Pa., or O. Wiser, pres.-gen-mgr., Hanover, N. M.

Inc. 1916. **Cap.**, $500,000; $1 par; outstanding, 410,198 shares.

Income account year ending December 31, 1918, showed operating revenue, $108,868; expense, $56,956; net income, $51,911; previous balance, $712; total balance, $52,624.

Balance sheet of December 31, 1918 showed, current assets of $44,681 against current liabilities of $7,594.

Property: the Welch group, about 90 acres, near Hanover, containing zinc and iron ores, sold to the Empire Zinc Co. of Colorado in 1920.

Development: by 3 shafts and 1,254′ of openings. During 1918, new openings, including shaft sinkings, totalled 616′. Company estimates ore blocked out as 50,000 tons of 20% zinc. There is also an undeveloped body of magnetic iron oxide, outcropping for 700′, varying from 50-75′ in width and indicating 500,000 tons, one half of which should assay, according to company report, 50-60% iron.

Production: 1918 about 3,000 tons of 44% zinc.

Company installed an oil driven compressor in 1918 and plans the erection of a 100 ton mill with flotation unit.

The mine, a prospect last year, has sufficient minable reserve to insure working at full capacity for some years.

RIVAL MINING CO. **NEW MEXICO**

Office: Bisbee, Ariz. **Mine office:** H. M. Ziesemer, supt., Duncan Ariz.

Officers: J. M. Ross, pres.; Arthur Notman, v. p.; R. A. Ziesemer, sec.-treas., with E. E. Elinwood, J. F. Frazer, L. R. Budrow, M. J. Cunningham and Robert Rae, directors.

Inc. March 13, 1917, in Arizona. **Cap.**, $500,000; $1 par; 275,000 issued. Annual meeting first Monday in March.

Property: 1 claim, 20 acres, in Steeplerock district, Grant county, N. M.

Geology: quartz vein in andesite, with 70° dip and N. W.-S. E. course.

Ore: carries gold and silver.

Development: by 500′ shaft, and about 2,000′ of workings, which gave encouraging showings.

Equipment: includes hoist, 50 cu. ft. compressor and 100 h. p. gas engine.

Early in 1919, company reported that operations were temporarily suspended.

ROCKY MOUNTAIN MINES CO. **NEW MEXICO**

Office: care G. L. Brooks, pres., Albuquerque, N. M. Mine at Cerrillos, Santa Fe county, N. M. H. O. Brooks, sec. and mill supt., and E. L. Grose, directors.

Inc. April 4, 1913, in N. M., to work the Tom Payne mine and other properties. **Cap.**, $1,000,000; $1 par; 470,000 issued.

Property: 9 claims, 100 acres, in the Cerrillos district held under lease and bond. Claims show orebodies in zone of crushed monzonite and andesite, averaging 2-5′ in width. Vein said to be continuous for 700′.

Development: by former companies, includes 3 shafts, 60 to 175′ deep, and 3 drift tunnels, 317, 450 and 550′ long, said to show ore carrying 0.30% copper, 8% lead, 14% zinc, 3 oz. silver and $0.03 gold per ton. Company is steadily working the Tom Payne claim.

Equipment: includes a 12-h. p. hoist, several buildings and concentrator with crusher, 4 Wilfley tables, 2 slime tables. Smelter, 6 miles from the mine, has not been operated by present company, but mill has worked continuously since July 1, 1915. Lead concentrate is shipped to Illinois smelters and zinc concentrate to Kansas and Oklahoma plants.

ROMERO MINING CO. **NEW MEXICO**

Address: H. C. DeBoca, Las Vegas, N. M.

Company is out of business. Fully described in Vol. XIII.

ROPER GROUP MINING CO. **NEW MEXICO**

Address: Room 306, 20 Broad St., New York. B. Labows, mgr., Lake Valley, N. M.

Officers: Stephen Thurber, pres.; S. Bendheim, v. p.; Bernard Labows, sec-treas.-mgr.; with Joseph Heilig, B. Garr, C. H. Harris, R. H. Holley, T. P. Fisher, C. C. Carmany and J. G. Millbourn, directors.

Inc. in Delaware. **Cap.**, $1,000,000; $1 par; 150,000 shares in treasury. Security Transfer and Registrar Co., New York, registrar and transfer agent. Listed on New York Curb.

Property: 14 claims, 225 acres, in Lake Valley mining district, Sierra county, about 7 miles from Lake Valley, said to contain silver and lead ore in a vein 2½-7′ wide in andesite and extending 6,000′ on surface. The district is located between two old producers, the Bridal Chamber and the Graphic mines, which are 25 miles apart.

Development: 2 shafts, 175′ apart, one 525′ and the other 200′ deep. with some lateral workings. Diamond-drilling has been done on the Good Luck claim. It is said that the vein widens and carries more silver with depth, such as 2½′ and 12 oz. at 200′ and 5′ and 50 oz. at 500′. Is a much advertised and probably somewhat over-rated company.

Equipment: includes 2 boilers, one 40 h. p., the other 100-h. p, a hoist with 800′ of cable, compressors, 5 pumps and necessary buildings. Over $400,000 is said to have been spent on the mine.

R. & S. MOLYBDENUM MINES CO. **NEW MEXICO**

Address: C. W. Savery Securities Co., 604 Denham Bldg., Denver, Colo. M. B. Rapp, mgr.

Cap. $3,000,000; shares $1 par. Pre-organization offer at 75 cents each.

Property: 350 acres on the Red river, 8 miles N. E. of Questa, at an elevation of 8,500′, in Taos county. Ore is found as veinlets in altered limestone and monzonite-porphyry. After spending $50,000 in driving a 500′ tunnel, in ore all the way, averaging 1½% molybdenite, it was advertised that "a conservative mining engineer places a value on the ore of two hundred and fifty million dollars. An expert who recently visited the property stated that he had examined 72 different molybdenum mines and this property contained more ore than all of the other 72 put together," which is a stupid assertion for any reputable engineer to make. The property is described in the Eng. & Min. Journal, December 13, 1919.

A small mill, 5 miles from the mine, was rented and October, 1919, 550 tons of ore were treated that yielded 25 tons of 85% concentrate. It is proposed to erect a hydro-electric plant and 200-ton flotation mill.

Calculating on basis of 1 ton of concentrate from 74 tons of ore, a recovery of 85%, and a market price of 50 cents per pound of molybdenite, it is contended that the revenue would be $850, operating cost $403, and profit $447 on 1 ton of concentrate. This multiplied by 2½ tons daily output from the new mill for 300 days per year, gives a total profit of $335,286..

SACRAMENTO COPPER CO. **NEW MEXICO**

Address: 310 Two Republics Bldg., El Paso, Texas. **Mine office:** D. C. Sutton, mgr., Tularosa, N. M.

Officers: Ed. Mechem, pres.; Eli Knight, v. p.; R. B. Rawlings, sec.-treas., with W. P. Stiles, T. J. Stafford and J. M. Gale, directors.

Inc. March 28, 1916, in New Mexico. **Cap.,** $750,000; 50c par; 250,000 issued.

Property: 54 claims, 1,080 acres, 6 miles N. E. of Tularosa, N. M., covering Copper Basin, at head of Coyote creek, at base of White Mtns.

Development: by 200′ incline shaft and various test pits and cuts. The whole area is to be explored by drilling before mine equipment is ordered. It is said that at a depth of 100′ copper ore was cut and 34′ of ore passed through, assaying 1 to 7%; at 400′ there was 10′ of 2 to 9% ore.

SAN LAZARUS MINES CO. **NEW MEXICO**

Office: 2837 Hennepin Ave., Minneapolis, Minn. Mine near San Pedro, Santa Fe county, N. M. Company has been idle for many years. Property is fully described in Vol. XIII.

SANTA FE GOLD & COPPER MINING CO. **NEW MEXICO**

Office: 11 Broadway, New York City. **Mine office:** San Pedro, N. M.

Property: 279 acres of patented mining claims in Santa Fe county and 31,594 acres of miscellaneous grazing lands comprising the San Pedro grant in Santa Fe, Sandoval, and Bernalillo counties and in addition 300 acres of grazing lands comprising the Canon del Agua grant in Santa Fe county.

Early in 1918 the mine was closed due to lack of ore. Is a Lewisohn company, operated while high metal prices prevailed, but whose diminished

reserves, probably do not warrant working under present excessive prices for supplies and labor. Fully described in Vol. XIII.

SAVANNA COPPER CO. **NEW MEXICO**

Address: Henry Hovland, Lonsdale Bldg., Duluth, Minn. Mine near Pinos Altos, N. M. I. J. Stauber and I. L. Wright, lessees.

Inc. September 16, 1908, in Arizona. **Cap.,** $2,000,000; $10 par. The company was a merger of the Copper Gulf Mining Co. and Comanche Mining & Smelting Co., and also absorbed the Casa Grande Development Co., owning in fee simple all property formerly owned by the Comanche Mining & Smelting Co. and holding all but 320 shares, or 99.36% of the stock issue of the Copper Gulf Mining Co. In January, 1919, the company had 149,000 shares of full-paid stock outstanding. Cash balance, February 1, 1919, was about $10,000.

Property: 17 claims, 16 patented, in the Pinos Altos district, 4 patented claims in the Anderson district, and 1 patented claim in the White Signal district. The claims in the Burro Mountain group sold January, 1916, to Phelps, Dodge & Co., for $700,000, constituted the principal and most valuable holdings. The Comanche group comprised 43 claims. The Copper Gulf group consisted of 1,440 acres. The Jennie group of 4 claims, patented 1910, on the Gila river, 35 miles N. W. of Silver City, is not worked owing to its inaccessibility, and development on the Chloride Flat property has been confined to assessment work.

SENORITO COPPER CORPORATION **NEW MEXICO**

Office: 34 Pine St., New York. **Mine office:** Senorito, Sandoval county, New Mexico.

Officers: H. B. Walmsley, pres.; W. E. Greenawalt, v. p.; J. A. Kern, sec.; H. W. Webb, treas. J. T. McLaughlin, supt.; W. L. Bain and Oswald Becker, cons. eng.

Inc. November, 1916, in New Mexico. **Cap.,** $1,250,000, in $1,000,000 common shares at $1 par, and $250,000 cumulative 8% pfd. shares at $10 par, convertible on call at par to common. All common shares are outstanding and 4,100 shares of pfd. are outstanding. Common listed on New York Curb. Empire Trust Co., New York, transfer agent.

Property: 22 claims, 400 acres, in the Naciemento district, Jemez mountains, 2½ miles from Senorito, N. M. The most important mines are the Eureka mine, consisting of Conglomerate No. 1 and Conglomerate No. 2 beds, and the Copper Glance mine. Some of the property was worked by the Juratrias Copper Co., now dead.

Development: considerable tunnelling, etc., exposing a large deposit of low-grade ore. A U. S. Geological Survey report in 1910 said that the ore of the Copper Glance claims consisted of sulphides, carbonates and silicate of copper in white, to reddish sandstone or grit. The ore beds aggregate about 100′ thick. The average ore will probably be low grade, which also applies to the Conglomerate claims. Management reports about 800,000 tons of ore in place and several thousand tons on dump running up to 6% copper in the carbonate ore, also, high grade sulphide ore.

Equipment: includes, a sintering plant, a 50-ton smelter, sawmill, powerplant and necessary buildings.

Leaching trials were made on the ore in 1915 by W. E. Greenawalt of Denver, producing copper at under 5c per lb., including mining and milling. Company does not claim to be able, under existing costs, to attain this result. The property was sampled in Oct., 1916, by R. S. Ransford for J. G. White & Co. Late in 1917, a group of strong interests agreed to drill and explore the entire ore beds in consideration of their being granted an option on 501,000 shares, representing control of the company. Exploration commenced in April, 1918, and later it was announced that property contained approximately 3,300,000 tons of ore. Property apparently has considerable merit.

SHERIFF MINING CO. **NEW MEXICO**

Address: F. G. Kaermer, mgr., El Paso, Texas.

Inc. in Arizona. **Cap.**, $30,000.

Property: 2 claims, 40 acres, on Caballo mts., near Rincon, contains a blanket deposit and a fissure vein 4 to 6′ wide in limestone. Ten tons of ore daily, containing 22% manganese and 27% lime, are treated in a lime kiln turning the lime carbonate into quicklime. Washing out the lime as white emulsion leaves the manganese in concentrated state with but little loss in tailings. No crushing is necessary.

Development: by 35′ vertical and 15′ incline shaft, and about 100′ of prospect holes.

SIERRA CONSOLIDATED MINING CO. **NEW MEXICO**

Out of business. Property taken over by Statehood Mines Co., both of which companies were reported forced into bankruptcy through incompetent management and spectacular get-rich-quick financing. Mine now operated by the Snake and Opportunity Mines Co., which see.

SILVER GLANCE GROUP. **NEW MEXICO**

Address: Joseph Oliver, owner, Box 112, Fairview, N. M.

Property: 200 acres, at Mineral Creek, Apache mining district, Sierra county, said to show veins containing 10% copper, and 20 oz. silver per ton. Property is developed by 150′ shaft and about 400′ of tunnelling.

SNAKE AND OPPORTUNITY MINES CO. **NEW MEXICO**

Address: 50 Broad St., New York City, N. Y. **Mine office:** Hillsboro, N. Mex.

Officers: H. L. Carr, pres.; E. F. Carlson, v. p.; E. L. Kerstetter, sec.-treas.; N. C. Sheridan, mgr.

Inc. June, 1919, in Delaware. **Cap.**, $1,000,000; $1 par; 800,000 shares outstanding. Company is controlled by the Mines Holding and Operating Corporation of New York, through ownership of 450,000 shares of stock together with an option on 200,000 additional shares.

Property: 28 claims, 5 patented, about 400 acres, near Hillsboro, Sierra county, formerly owned by the Sierra Consolidated Mining Co. and later by Statehood Mines Co., both of which companies were reported forced into bankruptcy through incompetent management. Property contains 3 gold bearing fissure veins in andesite.

Development: by 3 shafts, 570′, 458′ and 240′ deep. Company reports 170,000 tons of low grade ore, assaying $5-$10 per ton, broken in the stopes, having been left by former operators as filling.

Equipment: 50-h. p. gasoline hoist, compressor, 100-gal. pump and oil engines.

Reported that property produced over $2,000,000 gross, previous to 1901. Present company expects to ship in 1920.

SOCORRO MINING & MILLING CO. **NEW MEXICO**

Office: J. D. Fackenthal, 165 Broadway, New York. **Mine office:** Mogollon, N. Mex. D. B. Scott, gen. mgr. in 1920.

Officers: Wm. Childs, Jr., pres.; Harry Balfe, v. p.; Robt. T. Neeley, v. p.; J. Diehl Fackenthal, sec.; Adam K. Luke, treas.; with Wm. A. Barber, Henry D. Hotchkiss, A. L. Williams, David Luke, directors, in 1917.

Cap., $2,000,000; par, $5. Company is in hands of a receiver, and a reorganization is planned. On November 10, 1919, 42,177 shares were sold at public auction in New York at $1,085 for the 5 lots.

Bought entire holdings of Mogollon Gold & Copper Co. for $100,000 at public sale in Socorro, N. Mex., August, 1915. Sale ordered to satisfy judgment of $416,626, obtained by Equitable Trust Co., New York, holders of bonds to that amount.

Property: 66 claims, partly patented, over 1,200 acres, including the Cooney, Peacock, Little Charlie, Independence, and Fluoride groups, sometimes known as the Silver Bar mine, in the Cooney district of the Mongollon mountains, 85 miles N. E. of Silver City, the nearest rail point. The Fanny is the principal mine, it having yielded $4,869,000 in gold and silver; followed by the Cooney with $1,700,000 in copper and silver. See account by D. B. Scott in Bull. A. I. M. & M. E., February, 1920.

Geology: the property shows porphyry and andesite, carrying the Fanny fissure vein of 5 to 10′ average width, with a paystreak of about 3′ average and 30′ maximum width, having numerous narrow feeders, some of which carry high value gold. Ores include slightly auriferous and strongly argentiferous chalcopyrite, bornite and chalcocite, claimed to carry increasing silver values at depth, and the east vein has been said to show native copper at depth of 600′.

Development: 3 mines—the Fanny, Johnson and Cooney. The Fanny has a 1,200′ shaft, and the Johnson, a mile west, has 400 and 450′ incline shafts. The Fanny is the largest mine of the district and the chief producer. There are also various tunnels on the several groups with an approximate total of 30,000′ of workings.

Equipment: includes hoists, compressor, aerial tram and 250-ton mill, with ball-mills and cyanide plant. The power plant has four crude oil engines developing 960 h. p.

The old mill was destroyed by fire in October, 1917; late in 1918, the new plant was put in operation, but was closed and all work ceased April 1, 1919. In March, 1920, property was acquired by American Silver Corp. of West Virginia.

STATEHOOD MINES CO. **NEW MEXICO**

Preceded by the Sierra Consolidated Mining Co.

Property taken over by the Snake and Opportunity Mines Co., which see.

STEEPLE ROCK DEVELOPMENT CO. **NEW MEXICO**

Out of business. Formerly at Steeple Rock, N. M.

Property: the Carlisle and Jim Crow groups, 33 claims, sold to George H. Utter, in 1914, who sold it 1915 to H. K. Welch and S. McKeever, of New York, who organized the Carlisle Dev. Co. See Utter, Geo. H.

SUNSET COPPER CO. **NEW MEXICO**

Probably dead. See Vol. XIII. Former address, care L. M. Stiles, pres., Box 393, El Paso, Texas.

SUSQUEHANNA MINING CO. **NEW MEXICO**

Address: C. J. Plankenhorn, sec., Williamsport, Pa. Company succeeded North American Copper Co., described in Copper Handbook, Vol. XI.

Property: 9 claims, patented, in the Pryamid and Virginia districts, near Lordsburg, containing copper, silver and iron. Part of property was worked by lessees in 1915 and 1916, but no recent reports received. Fully described in Vol. XIII.

TAOS MINING CO. **NEW MEXICO**

Mine office: Twining, N. Mex.

Probably idle as no recent returns have been received.

Officers: A. Clarence Probert, pres.-mgr., P. O. Box 56 Taos, N. Mex.; John B. Bidwell, v. p.; J. Wright Giddings, sec.; H. F. Probert, treas., with Harry W. Davis, directors.

Inc. November 11, 1914, in Delaware. **Cap.**, $2,000,000; shares $10 par; $1,173,090 outstanding. Annual meeting, last Monday in January.

Property: 15 claims, 4 patented, 333 acres in Rio Hondo mining district, near Twining, said to carry copper-gold-silver ore in schist and gneiss, averaging 2½% copper, $4.17 gold and 5 oz. silver per ton. Developed by 1,800′ vertical tunnel and several shorter tunnels.

Equipment: includes air compressor and concentrator.

TEXAS CANYON MINING & MILLING CO. **NEW MEXICO**

Office: C. S. Cleaver, 5427 University Ave., Chicago, Ill. **Mine office:** J. S. Dodd, supt., Organ, N. M.

Officers: E. H. Bickford, pres.; C. S. Cleaver, sec.; H. R. Gottman, treas.; also directors.

Inc. January, 1917, in New Mexico. **Cap.**, $100,000; $100 par.

Property: 8 claims in Texas canyon, Organ mountains, 7 miles E. of Organ, Don Ana county, N. M. Examined by C. M. Becker.

Development: by short tunnels. Ore averages 0.43 oz. gold, 14.05 oz. silver, and 2.3% copper. Faulting is evident through the property. Not enough work done to place any value on mine. No recent returns securable.

TORPEDO MINE. **NEW MEXICO**

Address: Robert McCart, El Paso, Texas, who with P. D. Thompson and Roland Cox, of New York, are the owners.

Property: in Organ mountain district, near Las Cruces, N. M. Formerly under lease to Phelps, Dodge & Co., who withdrew from their lease early in 1918.

Development: several thousand feet of underground work done in search of lead-zinc ore.

TRI-BULLION SM. & DEV. CO. **NEW MEXICO**

Office: 10 Wall St., New York. **Mine office:** Kelly, Socorro county, N. Mex.

Officers: J. O. Wall, pres.; S. W. Traylor, v. p.; with G. C. Van Tuyl, Jr., W. B. Nash, H. V. M. Dennis, Jr., J. M. Henderson, A. S. Somers, S. F. Dominick, Gustavus Taylor and Frank Coenen, directors; D. O. Deyer, sec.-treas.

Inc. 1903, in Arizona. **Cap.**, $5,250,000; shares $5 par; in 50,000 participating cumulative 4% stock with 1,000,000 common; issued 6,700 shares preferred and 999,900 shares common. Listed on New York Curb. Empire Trust Co., New York, transfer office.

Property: about 115 acres, at Kelly, N. M., including the Nit and Silver Bell groups asquired in 1912. The Nit mine, adjoining the Graphic, has an underground connection with the Waldo mine of the Ozark Smelting & Milling Co. The workings of this mine disclose a 50′ vein of 4.7 to 6% copper ore, 454′ E. of the 215′ shaft, in a crosscut from the bottom of a 45′ winze sunk from the bottom level. Company owns also 2 copper and lead claims about 150 acres, known as the Starlight group, in the Stanley Butte district, Ariz.

The Tri-Bullion Co., suffered a loss of over $32,000 from embezzlement by its former treasurer in 1913-15. Property now in good hands, and with an able consulting engineer has a promising future.

TULAROSA COPPER CO. **NEW MEXICO**

Office: Tularosa, N. M. **Mine office:** Bent, Otero county, N. M.

Officers: E. P. Kern, pres.; H. E. Forrester, v. p.; G. B. Kent, sec. and gen. mgr.; W. F. Drake, treas., with J. A. Thatcher, A. J. Merrill and P. M. Lynch, directors.

Inc. March 5, 1905, in New Mexico, as successor of Tularosa Mining & Milling Co. **Cap.**, $5,000,000; shares $5 par; issued, $3,500,000. Stock listed on New York Curb. Registrar & Transfer Co., New York, transfer office.

Property: 807 acres, 307 acres, patented, at Bent, on the Tularosa river. Mine is 12 miles N. E. of Tularosa on the E. P. & S. W. R. R., about 100 miles N. E. of El Paso, Texas.

Geology: the property is underlain by a flat sheet of diorite resting on quartzite and covered in general by the basal sandstone of the Red Beds of the region. This diorite outcrops at the Virginia mine, as the company's workings are called, and dips gently in every direction away from this point. The ore is found in the uppermost part of the diorite, which is much altered to a depth of 35 to 55′ below its surface. This ore bed shows lenses of glance, 2 to 18″ wide, running in all directions, which together with stringers and veinlets of ore, make a stockwerk proved to be ore-bearing over an area 200′ wide and about 1,200′ long. The altered rock between the lenses also carries disseminated copper glance and the ore as a whole averages 2½% copper; 30 to 55′ below the diorite surface, the rock is fresh except along fractures; stringers of ore occur, however, at depths of several hundred feet.

Development: at the Virginia mine there is an open pit 60 by 120′ across and 35′ deep which is opened on the richest part of the deposit. The

first level corresponds to the bottom of the pit; the 2nd level is 25′ deeper. These workings are said to block out 85,398 tons of ore in an area of 105x 180′ in extent. Twelve diamond-drill holes from 88 to 400′ deep prospect the ground, and the results form the basis for an estimate of 800,000 tons of indicated ore of an average value of 2½% copper.

Property was to be drilled in 100′ squares and the limits of the orebody fully determined. One drill-hole encountered 136′ of ore at a depth of 300′.

Equipment: includes a 12,000′ ditch, hydro-electric plant, and concentrator of 300 tons capacity.

In a circular published by New York brokers it is stated that Tularosa has all the potent essentials to make just as great and valuable a property as Chino, Ray, Inspiration and Miami; and is today practically the one big, undeveloped porphyry copper area that shows the existence of a wonderful orebody that needs only development, which is being aggressively pushed.

Compared with other deposits of similar character, this one is, in our opinion, small and the ore bed thin, averaging perhaps 35′, while the ore reserves are not large enough to compare with those of any of the copper porphyries. The property does not warrant a large mill.

The orebody may, however, extend over a greater area, and a drilling campaign should be made. The new parties in control have had wide experience in mining and possess ample means to test the property thoroughly.

No information available for two years, so presumably dormant.

TULLOCH GOLD & COPPER CO. **NEW MEXICO**

Address: D. H. Tulloch, pres., Silver City, Grant county, N. M.

Idle. Property fully described Vol. XIII.

TUSA PEAK GOLD & COPPER MINING CO. **NEW MEXICO**

Office: Portage, Wis. Mine and mill at Tusa, Rio Arriba county, N. M. R. H. Owen, pres.; R. J. Rosenfeld, sec.-treas.

Mine has been closed down since 1910. See Vol. XIII for full description.

TYNDALE COPPER MINING CO. **NEW MEXICO**

Inactive or dead. Described in Volume XIII.

Property being operated by the Bonney Consolidated Copper Co., which see.

TYRONE—EL PASO COPPER CO. **NEW MEXICO**

Address: 1115 N. Kansas St., El Paso, Texas. **Mine office:** Tyrone, N. M.

Officers: R. M. Dudley, pres.; T. Lia, v. p.; N. F. Work, sec.-treas.; with J. F. Ross, J. H. Maxey, R. K. Bell, H. L. Watson, J. B. DuBase and P. J. Mortinez, directors.

Inc. Nov. 31, 1917, in New Mexico. **Cap.**, $1,500,000; $1 par.

Property: 23 claims, 400 acres, 2 miles S. of Tyrone, N. M., said to show disseminated copper-silver-sulphide ore in porphyry, assaying 3.4% copper and 2 to 6 oz. silver per ton.

Development: by 260′ shaft sunk during 1917. No later returns received.

UNITED STATES COPPER CO. **NEW MEXICO**

Office: 1639 Broadway, New York. **Mine offices:** Hanover, and Pinos Altos, N. M.

Officers: J. W. McAlpine, pres.-treas.; C. B. Manville, 1st v. p.; A. E. Austin, 2nd v. p.; J. T. Janes, supt.-sec. Hardscrabble group, Pinos Altos, N. M.; W. P. Fletcher, supt., Philadelphia mine, Hanover, N. M.

Inc. April, 1911, in New Mexico, as a reorganization of the Philadelphia Copper Mines Co. **Cap.**, $1,500,000; $1 par; all outstanding. Registrar & Transfer Co., New York, registrar; Security Transfer & Registrar Co., New York, transfer agents.

Property: totals about 297 acres divided into 2 groups, the first at Hanover, in the Central mining district, consisting of about 80 acres, 8 claims, 2

of which are the townsite of Hanover, the remainder known as the Philadelphia mine; the second group, 9 miles distant, 14 claims, 212 acres at Pinos Altos, known as the Hardscrabble mine. Company also owns the Russel Davidson sawmill near the Pinos Altos property.

Development: at Hanover, by 2 main shafts, north, No. 1, and south, No. 2, 200′ and 712′ deep, respectively, together with some minor shafts, and about 4,000′ of workings. Early in 1919, company was stoping from the 700′ level where heavy mineralization and stringers of chalcopyrite and bornite, dipping east, indicate large orebodies nearby. No work was being accomplished at the Pinos Altos property in 1919, but management believes this to be a very valuable mine, following a heavy mineralized grano-diorite dyke and traversed by several veins, dipping west, running N. E.-S. W. The country formation is monzonite porphyry, grano-diorite and granite. Previous operators sunk 29 shafts from 20 to 150′, mostly inclines on the veins.

Equipment: includes 2 hoists, each capable of reaching 2,500′ depth, steam plant, compressor, pump and sawmill.

Production: from both mines about $180,000 from development and from upper levels by previous operations. In 1917, shipments of 12 cars carried from 3.40 to 18.00% copper, with $3 for silver and gold, and from 40 to 60% iron. It returned over $1,000 net per car. This was from the Hanover mine. Ore from the Pinos Altos mine returned from 4 to 26% copper and 16 to 39 oz. silver per ton. In November, 1917, P. A. Newman, who was selling the company's stock under a contract, which he failed to carry out, brought suit against J. W. McAlpine for non-performance of contract, but the trial resulted in a verdict against Newman. Management has eliminated undesirable associations and has made progress in mine development, so that the future seems to promise success.

UTTER, GEO. H. **NEW MEXICO**

Office: 329 Cedar Ave., Long Beach, Calif. **Mine office:** Steeple Rock, N. M.

Property: the Carlisle, East Camp, Jim Crow, and Summit group of mines in Steeple Rock district, N. M., acquired from the Steeple Rock Development Co., which is out of existence.

The Carlisle Group.

Consists of 3 patented claims and millsite, in the Steeple Rock Mining district, Grant county, N. M., 15 miles N. E. of Duncan, Ariz. The ore is free-milling gold and silver down to 300′, where it changes to base ore carrying galena, sphalerite, and chalcopyrite with small amounts of gold and silver.

Development: by 500′ shaft with winze to 600′ level, showing in places a width of 40′ feet′ of mineralized lode matter.

Equipment: includes a 100-ton concentrator and flotation mill.

Production: in 1918 totaled 2,500 tons yielding 50% lead, 10% zinc, 4% copper, 80c. to $2 gold, and 13 oz. silver per ton. Also produced 175 tons of complex zinc-copper ores. Not operated in 1919, but kept unwatered, and part leased to Eastland and others, who have opened some good ore.

East Camp Group.

Consists of 8 claims, patented, 118 acres, Grant county, 18 miles N. E. of Duncan, Ariz. On one of the claims two quartz veins join. The Nugget mine, of this group was operated in 1918.

Development: by shafts, 200 and 300′ deep and some tunnels. Veins about 3′ wide contain gold and silver. Property was worked in the 70s, but most of the old workings are now caved.

Jim Crow-Imperial Mines.

Consists of 8 claims, patented, 123 acres, 11 miles N. E. of Duncan, Ariz., but in the Steeple Rock mining district, Grant county, N. M. The mine contains a fissure vein with many branches, in eruptive rock. The

vein, about 4′ wide carries ore said to assay 0.65 oz. gold and 10 oz. silver per ton.

Development: by four shafts, two of which are 100′ deep, the third 200′ deep and the last 300′ deep. **Equipment:** includes 25 h. p. hoist, compressor, 2 gas engines of about 50 h. p., etc.

Production: mine was idle from 1896 to 1914; previous production estimated at $50,000 in gold and silver. Ore shipped in 1915, averaged 0.7 oz. gold and 40 oz. silver per ton.

Summit Group.

Consists of 10 claims, patented, 180 acres, 16 miles N. E. of Duncan, Ariz., in Steeple Rock mining district, Grant Co., N. M. Mine shows 2 fissure veins running through the property N. E.-S. W.

Development: by 2 tunnels, 120′ and 470′ long, a 264′ shaft and 3 open cuts. Owner reports 2 oreshoots 12′ wide by 50′ long, assaying $7 to $8 gold and silver per ton, and the outcrop assaying from $10 to $50 per ton.

Mr. Utter also owns the Apex and Ballali gold-silver mines, the former is 1½ miles N. W. of the Carlisle, and the Ballali adjoining the Norman King mine, leased to Christy, and others of Clifton, Arizona, and in which rich ore was opened in 1919. Two cars sent to El Paso netted $13,500. In July, 1919, the New York's Gift group was sold to Jos. Hardy and associates of Duncan, Ariz., the consideration being $15,000, cash.

VICTORIA MINING AND SMELTING CO. **NEW MEXICO**

Bankrupt. Holdings bought by C. J. Boyd of Los Angeles at sheriff's sale, December, 1915.

Property: 2 groups, 1,000 acres, 20 miles apart, the Southern group between Organ and San Andres Mts.; the other in Plomo district, San Andres range, 35 miles N. E. of Las Cruces. Claims said to show silver-lead ores.

VICTOR SMELTING & MINING CO. **NEW MEXICO**

Address: Gage, N. M. Company is a close corporation.

Officers: J. T. Duryea, 437 E. 162nd St., New York, pres. N. J. Welsh, pres.; Benito Colonna, supt.

Property: 9 claims, 8 patented, 136 acres in Victorio mining district, Luna county, 3½ miles south of Gage. Mine was operated by the Hearst-Haggin interests in 1880-1890, and purchased by present company in 1907; worked intermittently since by leasers. Management describes property as having two vein systems, the primary system being fissures in limestone, paralleling and dipping toward a N. E.-S. W. fault fracture; these are connected with the fault fracture and with one another, irregularly, by a secondary system of veins which strikes N.-S. and dips east. Ore assays 20-25% silica, 20-25% iron and 7-10% line.

Development: by 300′ vertical shaft, 100′ incline shaft, and about 4,000′ of workings. Company plans to sink a new vertical shaft 500′ or 400′ below present deepest workings. **Equipment:** includes 2 hoists and compressor.

Production: $1,500,000 in the past. Present management reports 100-150 tons monthly production.

WESTERN MINING & DEVELOPMENT CO. **NEW MEXICO**

Probably out of business. See Vol. XIII.

WHITE OAKS MINES CONSOLIDATED, INC. **NEW MEXICO**

Mine office: White Oaks, N. M.

Reported, 1916, that "internal dissension arose in the White Oaks Co.'s management, and rather elaborate plans for reopening the mines have apparently been abandoned." No recent returns have been received. Fully described Vol. XIII.

ZORO GOLD & COPPER CO. **NEW MEXICO**

Address: G. E. Moffett, supt., Alamogordo, N. M.; E. M. McClintock, pres., El Paso, Texas.

Inc. 1916, in New Mexico. **Cap.,** $250,000; shares $1 par; non-assessable; 140,000 issued.

Property: 3 claims, 55 acres, in Silver Hill district, Jarilla mountains,

Otero county, N. M., said to show a contact deposit in limestone. Ore carries 2.5% copper, 0.1 oz. gold and 1 oz. silver.

Development: about 1,200′ of tunnels.

Production: lessees in 1916 mined ore which contained 120,000 lb. copper. No later returns available.

NEW YORK

CANOPUS IRON CORPORATION — NEW YORK

Offices: Garrison, N. Y., and Phillipstown, Putnam county, N. Y. J. G. Pearse, supt.; E. Maltby Shipp, cons. eng.

Inc. in New York. **Cap.,** 100,000 shares; $10 par. Listed on New York Curb, but stricken from list on October 21, 1919. U. S. Corporation Co., transfer agents.

Property: corporation owns in fee the minerals under 140 acres, with the surface in fee of 40 acres, at Phillipstown, Putnam county, N. Y., 3 miles from the Hudson river and from rail, and 49 miles from New York. Examined by G. O. Angell, who endorsed reports of the above named officials.

The ore is magnetite, and deposit outcrops for 2,200′, varying from 40 to 180′ in width. A 2,000-ton shipment averaged 64% iron, 3.27% silica, 0.27% sulphur, and 0.11% phosphorus. Concentrates from low-grade ore contain from 66.01 to 68.95% iron, 2.12 to 4.75% silica, 0.138 to 0.16% sulphur, and 0.025 to 0.037% phosphorus.

Development: in shaft at depth of 165′ the orebody is 25′ wide, but a thickness of at least 75 or 100′, is expected, as magnetic needle readings indicate 180 to 190′ in width. Company assumes an average width of 50′ at 400′ depth, with reserves estimated at 6,000,000 tons. The Forest of Dean mine, due west, has been mined to 1,100′ in depth and has shipped ore for over 100 years. Equipment and houses are being erected.

With iron ore at 12c per unit, 60% shipping ore is said to be worth $7.20 per ton. Freight to eastern Pennsylvania furnaces is given as $2.25 per ton, while mining and placing ore on cars or boat is $1.70, making total cost of $3.95. On this basis a profit of $292,500 per annum (300 days) is calculated, or a return of 29.25% on capital. The company's shares were extensively traded in on the New York Curb, and the property well advertised, but thus far the share market seems to have received more attention than the mine.

CHATEAUGAY ORE & IRON CO. — NEW YORK

Address: Lyon Mountain, Clinton county, N. Y. Jos. R. Linney, mgr.; Chas. W. Carpenter, purch. agent.

Property: at Lyon Mountain, Clinton county, in the Adirondack Mtns. Ore is a standard low phosphorus, assaying 28% iron, .007% phosphorus, .09% manganese. Open pit and underground methods used.

Equipment: includes magnetic concentration mill.

Production: in 1918 amounted to 44,359 tons. Total output, 54,205 tons.

DOUGLAS, LACEY & CO. — NEW YORK

Company was notorius promoter of numerous mining and oil propositions and was in hands of a liquidating organization, known as the Amalgamated Properties, Inc., at last accounts. Mr. Stevens' opinion of this firm and their clever scheme for obtaining money from small investors is fully described in Vol. X, under the title given above and that of the Amalgamated Gold & Copper Co. of Arizona.

GRANT MINE — NEW YORK

Mine near Carmel, Putnam county, N. Y. The orebody consists of a complex of arsenical sulphides, carrying copper, quicksilver, gold and iron. The crude ore is estimated to have a gross value of about $25 per ton, but, on account of its refractory nature, has no present commercial value,

and cannot be utilized without special metallurgical treatment. Closed down for several years.

MATHESON LEAD CO. **NEW YORK**

A subsidiary of National Lead Co., New York, and described thereunder.

MINES HOLDING & OPERATING CO. **NEW YORK**

Address: 50 Broad St., New York City.

Officers: Wm. R. Jones, pres.; Jackson B. Sells, 1st v. p.; Homer L. Carr, 2nd v. p.; E. L. Kerstetter, sec.-treas., with B. Brown Barker, Wm. P. Hoffman and Frank H. Rogers, directors.

Inc. July 3, 1919, in Delaware. **Cap.**, $3,000,000; $1 par; 1,600,000 issued.

Company controls through stock ownership the following companies: Midnight Mining Co., Idaho (1,310,595 shares), Onondago Mines Corporation, Nevada (277,560 shares), Snake & Opportunity Mines Co., New Mexico (450,000 shares). Also has option on 200,000 shares additional of Snake & Opportunity Mines Co. The companies are all in the development stage and are described under their respective titles.

NEW YORK PYRITES CO. **NEW YORK**

Address: 25 Broad St., New York City.

Property: near Gouveneur, St. Lawrence county.

NICHOLS COPPER CO. **NEW YORK**

Office: 25 Broad St., New York. **Works office:** Laurel Hill, Queens county, N. Y. Employs about 1,500 men.

Officers: C. W. Nichols, pres.; J. B. F. Herreshoff, v. p.; J. A. Church, Jr., sec.; Edw. R. Nichols, treas.; M. E. Harris, auditor.

Inc. May, 1905, in New York. **Cap.**, $10,000,000; reduced 1912 to $7,000,000; $1,000,000 preferred stock issued 1914; shares $100 par; bonds $3,000,000. Is the successor of Nichols Chemical Co. The American Metal Co., Ltd., owns 1,400 pfd. and 9,805 com. shares and 450 bonds, its share interest equaling 14% of capital, and total investment $1,570,500.

Dividends: to Oct., 1914, at rate of 6% per annum, paid quarterly on common stock; then a break of 2 years, with a disbursement of 4% in December, 1916.

Works: the Laurel Hill plant includes a smelter and electrolytic refinery, with steam and electric power.

The smelter has a Herresshoff water-jacket blast furnace of 600 tons rated daily capacity.

The electrolytic plant is operated on the series system, and has 550 tanks. Anodes are cast. The final product is cast mainly into wire bars. This company enjoys a deservedly high reputation for the purity of its product and the efficiency of its metallurgical practice. Is the largest electrolytic refining plant in the world; capacity about 45,000,000 lb. of copper per month.

The works do a very extensive custom refining business, treating mainly ore and matte from outside producers in the smelter, and Western blister copper in the electrolytic plant. The works handle all the bessemer copper from the Phelps-Dodge properties, and from the Old Dominion, Calumet & Arizona, East Butte, Granby and Ducktown companies, and others. The mining properties at Capelton, Quebec, were taken over by the Albert Copper Co.

NORTHERN ORE CO. **NEW YORK**

Address: Edwards, St. Lawrence county, N. Y.

Officers: T. I. Crane, pres.; W. D. Blackmer, mgr.

Inc. in New York and operated as a close corporation.

Property: 650 acres of mineral-bearing territory located along a belt of limestone at the contact with gneiss. The formation is cut by various veins and lenses of zinc-pyrite ore. Four of these orebodies are being developed and worked.

Development: by 900′ vertical shaft and 700′ incline (dip 50°), connected on the 400′ level.

Equipment: includes hydro-elec. power with auxiliary steam-elec. generating plant of 500 h. p. Each shaft is equipped with hoisting plant and ore bins. Surface tramming to the concentrator is done with a gasoline locomotive. A central electrically driven compressor supplies air for both mines. The concentrating mill consists of standard crushing and tabling machinery. The mixed zinc-pyrite concentrate made on the tables is separated into a high-grade zinc blende concentrate and pyrite, both of which products are shipped.

Production: 125 to 200 tons of crude ore per day. Shipments amount to 1,000-1,200 tons zinc concentrate and 500-600 tons pyrites per month.

ST. LAWRENCE PYRITES CO. **NEW YORK**

Offices: 41 Broad St., New York, and DeKalb Junction, St. Lawrence county, N. Y.

Officers: Rudolf Metz, pres.; F. T. Rubidge, v. p. and gen. mgr.; W. J. Kingsbury, sec.; R. M. Atwater, Jr., treas.; O. F. Pattberg, supt.

Property: located in DeKalb Twp., St. Lawrence county, includes the Stella mines, and is one of the four largest pyrite mines in the U. S.

Ore: pyrite, occurring in lenses or veins in gneiss and schist. The oerbodies strike and dip in the same general direction as the gneisses, strike N. E., and dip 20° to 30° N. W. The walls are not sharply defined; the average assay is about 21% sulphur.

Development: by 2 shafts 1,600′ apart on parallel deposits. The north shaft, the Stella, is idle; here the orebody extends 400′ along the strike, averages 10′ in thickness and has been worked to a depth of 900′ on the dip. The operating shaft, the Anna, opened by levels 50′ apart vertically, has an orebody opened for 1,500′ on the strike, and average thickness of 20′. The ore is put through a crusher at the shaft before sending to the mill.

Equipment: includes a 700-ton mill with gyratory crushers, trommels, rolls, jigs, and tables. In cold weather the concentrates, to prevent freezing, are dried in a Ruggles-Coles cylindrical dryer. Concentrate assaying 44% sulphur, is sold to sulphuric-acid manufacturers and to paper mills. Power is electrical, obtained from a hydro-electric company for about $30 per h. p. per year. The property was thoroughly described in E. & M. Journal, April, 1913, p. 689.

Production: approximately 150,000 tons ore per year, yielding about 60,000 tons concentrates.

ST. NICHOLAS ZINC CO. **NEW YORK**

Practically dead. **Former office:** 37 Wall St., New York City.

Inc. in Delaware. **Cap.,** $1,000,000; $1 par. Stockholders authorized the issuance of $70,000 five year 1st. mortgage 6% bonds, June, 1918. The company came to grief in 1918 and the president W. J. Pierce leased the holdings to the Summitville Ore Concentrating Co., Inc., presumably without consulting the wishes or interests of the stockholders. The Summitville company of which Pierce was an officer, filed an execution for $44,616 against the Nicholas property with the sheriff of Sullivan county on March 14, 1918, and despite the efforts of a Stockholders Protective Committee, with offices at 2711 Grand Central Terminal Bldg., New York City, the Leasing company seems to have retained ownership of the mine.

Property: owned 1,050 acres between Summitville and Mamakating, Sullivan county, 90 miles N. W. of New York City.

Geology: fissure vein in sandstone or "grit" beds, which have been tilted to form the Shawangunk range. Fissure dips with slope of hill and bedding of the grits to N. W. about 45°. Ore is chiefly lead and zinc sulphides, with a little copper.

Development: upper workings opened vein 300′ below its outcrop and lower tunnel 800′ lower, a total of 1,100′. Vein is from 1 to 8′ thick and ore 8″ to several feet, averaging 2′ in upper workings.

Kirby Thomas, who reported on the mine in 1916, estimated 8,000 tons

of developed ore, 10,000 tons of probable ore and 58,000 tons of prospective ore.

Equipment: 100-ton concentrating mill erected April, 1917.

SUMMITVILLE ORE CONCENTRATING CO., LTD. **NEW YORK**

Address: Samuel Droshnicop, pres., 530 McDonough St., Brooklyn, N. Y.

Property: owns the former holdings of the St. Nicholas Zinc Co., at Summitville, Sullivan county, originally taken over early in 1918 under a leasing agreement.

Through clever manipulation the minority stockholders of the old company were eventually deprived of their property. No report issued and presumably no work being done. See St. Nicholas Zinc Co.

TOTTENVILLE COPPER CO., INC. **NEW YORK**

Leo Lowenstein, pres.

Works at Tottenville, Staten Island, N. Y. Has an extensive copper refinery for the production of ingot copper, brass, and bronze alloys, copper bands and white metal.

Annual capacity, 200,000,000 lb. Brand is known as "C. T. C." copper.

UNITED METALS SELLING CO. **NEW YORK**

Office: 42 Broadway, New York.

Officers: John D. Ryan, pres., T. Wolfson, v. p.; C. W. Welch, sec.-treas.; with Wm. Rockefeller and C. F. Kelley, directors. C. S. Henry & Co., Ltd., 12 Leadenhall St., London, E. C., Eng., European agts.

Inc. Jan. 29, 1900, in New Jersey. **Cap.**, $5,000,000; shares $100 par; dissolved in 1915 and reorganized March 15, 1915, in Delaware. Is controlled by the Anaconda Copper Mng. Co., through ownership of entire share capital.

The company does a general commission business in metals, mainly in copper, and is the largest copper broker in the world, being the sales agent for the Anaconda Copper Mng. Co. and affiliated corporation, and for a number of other producers, having the marketing of upwards of 600,000,000 lb. of copper yearly.

WITHERBEE, SHERMAN & CO. **NEW YORK**

Offices: Port Henry, N. Y., and 2 Rector St., New York City. **Mine office:** Mineville, N. Y.

Officers: Lewis W. Francis, pres.; Moses Taylor, v. p.; Geo. C. Foote, v. p.-mgr., with W. C. Witherbee, E. S. Peasley, C. H. McCullough, directors. R. E. Rogers, sec.-treas.; A. M. Cummings, supt.

Founded 1849. **Inc.** 1901. **Cap.**, $3,000,000; $100 par; all outstanding; no funded debt. Regular dividends paid. Annual meeting 1st Wednesday in March.

Property: magnetite mines in Essex and Clinton counties, and 4 mills (dry magnetic concentration) with a total annual capacity of 1,000,000 to 1,250,000 tons per year, the concentrates averaging 64-66% iron.

Company also owns 7,500 acres of ore land on the north shore of Cuba, which are not being operated (1919).

NORTH CAROLINA

Companies are arranged in alphabetical order.

ASHBORO COPPER MINING CO. **NORTH CAROLINA**

Dead. Formerly operated the Scarlett mine N. of Ashboro, Randolph county, N. C., which see. Described in Vol. XII.

BLUE WING MINING CO. **NORTH CAROLINA**

D. M. Hill, sec., 60 Federal St., Boston, Mass.

Company voted to sell all its assets and go out of business, 1917. Fully described in Vol. XII.

CAROLINA COPPER CO. **NORTH CAROLINA**

Office: 15 Atwater St., West Detroit, Mich. Mine near Cullowhee, Jackson county, N. C.

Officers: at last accounts, Lewis C. Waldo, pres. and treas.; S. H. Knight, v. p.; Geo. E. Berriman, sec., with S. H. Knight, Geo. W. Clark and F. W. Olds, directors.

Inc. Oct. 12, 1901, in Michigan. **Cap.**, $2,500,000; $25 par; issued, $1,585,000.

Property: 1,450 acres, freehold, including the Wayehutte mine, shows 4 veins, 27′ estimated average width, carrying mainly chalcopyrite, with estimated average values of 3% copper, 4 oz. silver and $1 gold per ton, opened by a 55′ shaft and a 200′ tunnel. Lands also include an undeveloped water power. Regarded as promising if worked under proper direction.

COPPER KNOB MINE — **NORTH CAROLINA**

Owned by Monaton Mining Co., which see.

CULLOWHEE MINING & REDUCTION CO. — **NORTH CAROLINA**

Idle. Cullowhee, Jackson county, N. C.

Offices: at last accounts, S. B. Ezell, pres.; D. D. Davies, v. p.; Thos. A. Cox, sec. and managing director; Chas. Davies, smelter supt.

Inc. 1905, as successor of Cullowhee Copper Co.

Property: 1,300 acres, 12 miles from Sylvia, nearest rail point, shows a considerable body of sulphide ore, claimed to average about 5% copper and $4 gold per ton, probably correct for small lots of ore, but cannot be realized from a large tonnage.

Equipment: includes hoists and an air compressor, with steam and water power, latter with a plant 3 miles from works. The 30-ton smelter, near Sylvia, blown in January, 1909, with semi-pyritic smelting, suspended operations late 1910, and probably will remain idle until rail connections are secured.

GARDNER-HILL MINING CO. — **NORTH CAROLINA**

Company's gold-copper property, 9 miles from Greensboro, N. C., reported sold May, 1919, to H. K. English, of Knoxville, and to be reopened after an idleness of over 50 years.

GOLD HILL CONSOLIDATED CO. — **NORTH CAROLINA**

Office: Room 309, No. 42 Broadway, New York. Mine at Gold Hill, Rowan county, N. C.

Inc. as successor of Gold Hill Copper Co., a notorious promotion of the late Walter George Newman, known to have caught many Wall Street operators. New company, under same management, became bankrupt and property sold at auction, January 27, 1910, for $45,000. Company does not own the adjacent Union Copper mine.

Property: consisted of 1,050 acres in Rowan and Stanley counties, the Gold Hill mine, where gold was discovered in 1799. Gold quartz veins were discovered 1831, and in 1845 this mine was the largest gold producer in the United States.

Development: by 2 shafts of 615′ and 830, and 2 lesser shafts. The mine was operated in 1913 and part of 1914. Shipments to the Perth Amboy smelter returned 1.5% copper and about $3 gold per ton, with small silver values. Copper occurs in minute particles of chalcopyrite in hard quartz schist and recovery by wet concentration is not commercially profitable.

Equipment: includes ten 100-h. p. boilers and a 10-stamp mill.

This company and its companion, the Union Copper Mining Co., enjoyed decidedly checkered careers. Operations conducted on a considerable scale, 1901-1903, were unsatisfactory and failed to show up the much advertised orebodies. A receivership ensued which was ended early 1906, but a receiver was again appointed, August, 1906, for the old company, on the application of Newman, on claims aggregating $352,000. In June, 1915, the Court again appointed a receiver for the property, which has been shut down and apparently abandoned by the company.

Mr. Newman evidently used this property solely for stock-jobbing purposes. The mine is considered worked out and low grade, but worthy

of some drilling in depth. At best the company could never have paid honest dividends on its capitalization, and under the late management was not regarded as worthy of any confidence whatever.

MOGUL MINING CO. **NORTH CAROLINA**

Dead. See same title under Nevada.

Property: had a 10-year lease on the Mint Hill mines, Union county, 18 miles from Charlotte, N. C., which was relinquished, 1917. Also controlled the Proskey-Regent mine at Rawhide, Nev., by ownership of the Proskey-Regent Mines Co. See Seminole-Regent Mining Co., Nevada.

MONATON MINING CO. **NORTH CAROLINA**

Hopkins, Ashe county, N. C. J. B. Shale, pres., 301 W. 108th St., New York City, D. W. Lloyd, mgr., Garren, N. C.

Owns the old Copper Knob mine, 160 acres, freehold, also 90 acres miscellaneous lands, said to show a 30″ fissure vein in hornblende slate, carrying carbonate and sulphide ores, mainly bornite. Carload shipments to A. S. & R. Co. of N. J. said to have averaged $15 per ton in gold, silver and copper. The slate wall rock also carries metal. Property was opened 1880. Has steam power, hoist, 2-drill air compressor and a 5-stamp mill.

SALISBURY COPPER CO. **NORTH CAROLINA**

Idle and probably dead. Mine near Gold Hill, Rowan county, N. C. T. B. Brown, pres.; W. S. Blackmer, sec.-treas.

Inc. 1904, in Arizona. **Cap.**, $100,000; shares $100 par.

Property: 50 acres, freehold, showing altered schists, carrying a fissure vein with N.-E. strike, and estimated at 4′ width. Developed by a 100′ shaft, showing chalcopyrite reported to carry copper and gold values. Ore can be treated by flotation and property probably worthy of careful prospecting.

SCARLETT COPPER MINE **NORTH CAROLINA**

Address: Frederick R. Thorns, owner, 112 Duane St., New York City. R. I. Dickens, supt., Ashboro, N. C.

Property: at Ashboro, Randolph county, N. C., formerly operated by the Ashboro Copper Mining Co.

Ore: is a sulphide, carrying principally copper and zinc, with iron, alumina, a trace of silver and gold, and occurs in contact and fissure veins, running N. 40° E., with dip of 35°. Pay shoot reported to be from 2 to 5′ wide.

Development: by 120′ vertical shaft and several tunnels, longest 220′.

Equipment: includes 25-h. p. hoist, compressor, pump and steam power. Prospecting and development work only done in 1917.Since presumably idle.

TWIN-EDWARDS COPPER MINE CO. **NORTH CAROLINA**

Greensboro, Guilford county, N. C. **Inc.** Sept., 1912. **Cap.**, $100,000; shares $100 par.

Owns sundry old properties, including the Twin mine, with an 18′ vein, which was worked previous to the Civil War. Property shut down many years, but company understood to be only dormant, not dead.

UNION COPPER MINE **NORTH CAROLINA**

Office: care Alfred Rossiter, administrator, 60 Broadway, New York. **Mine address:** Gold Hill, Rowan county, N. C. S. T. McKinney, mgr.

Lands: 550 acres, freehold, about 15 miles from Salisbury, in Rowan and Cabarrus counties, well watered and timbered. The property has schist, carrying 5 veins with average strike of N. 20° E. and practically vertical dip, and 2′ to 20′ width. Three veins carry copper ores, the other 2, reported to carry silver and gold ores, respectively, are but slightly developed. The copper veins are mineralized zones carrying lenticular shoots of ore, longest about 100′ in length.

In 1916, No. 7 and 12 shafts were unwatered to 140′ and work started on a shoot of 3% copper ore, which is 5′ wide and exposed for 250′. From December, 1916, to April, 1917, ore was shipped from shaft and dumps. Three drill holes near the Big Cut and No. 5 shafts cut 4% sulphide ore.

Development: is on the Big Cut copper vein, trenched at intervals for a distance of about 1 mile, and having 10 shafts, deepest 650′; these shafts

show a vein 20′ in width. The Big Cut vein shows oxidized ores and a little native copper in the upper workings, succeeded by chalcopyrite, with quartz gangue. Sampling by Dr. A. R. Ledoux, many years ago gave average of 4.40% copper, 4 oz. silver and 40c to $1.20 gold per ton. No. 7 shaft, of 200′ depth, shows a vein 4″ wide at surface and 3 to 4′ wide on the bottom level, where the ore is claimed to average 4.5% copper. There are 14 shafts all told, and about 5,000′ of workings. The property has been claimed, in the press, to have produced about $1,000,000 worth of gold in early days.

One vein is said to carry zinc ore of low value, but is little developed.

Equipment: machinery plant is extensive and includes a small experimental flotation plant.

Buildings include a machine shop, smithy, engine-house, boiler houses, office buildings, 50-room hotel, dwellings and stable.

OKLAHOMA

(For map of the Tri-State region, see page 875.)

(Companies are arranged alphabetically.)

The Miami zinc-lead field is the newest great mining region of the United States.

The following excerpts from a report on the district by the R. W. Hunt Company, give an excellent idea of its salient features.

The Miami zinc-lead fields lies in Ottawa county, the extreme northeast county of the state of Oklahoma, and extends into Cherokee county, Kansas. As now developed, it is 3 miles wide and 5 long. The Oklahoma towns in the field are Commerce, Quapaw, Century, Cardin, Tar Creek, and Picher. Baxter, Kansas, is at the north edge of thefield. The Oklahoma portion of the field is in Township 29 N., Range 23 east, Ottawa county. The Kansas portion of the field is in Township 35, Ranges 23-24, Cherokee county.

Geology: the mineralization of the Miami field occurs in trough deposits of zinc and lead ores, found in the Grand Falls cherts of the Boone limestone series at various depths below surface from 100 to 300 feet. Beneath these cherts a very compact limestone forms a floor which water does not easily penetrate.

Water carries zinc and lead in solution until it reaches the faults in the overlying cherts. It rises through these fault cracks and penetrates through the fractured and bedded cherts, depositing lead and zinc in them. The greater the fracturing of the cherts, the greater the deposit of metal, both as to quantity and value. The Miami or main fault of the district runs northeast-southwest through the district from Baxter, Kansas, to Commerce, Oklahoma, and represents a throw of about 15 feet. Cross faults and fractures extend from this to East and West at varying angles. The principal orebodies are formed along these cross fractures and in the ground on both sides of them for a few hundred feet.

The main fault was sufficiently open to permit constant circulation of water, while the side fractures retained water in a quiet state more favorable to precipitation of metal from the solutions contained. The northwest-southeast side fractures have the best ore bodies so far discovered.

The proven porton of the Miami field is within a limited area of about five miles long by about three miles wide, in which small area are over 150 concentrating mills. This remarkable development all occurred practically within three years. Nearly 700 churn drill rigs were in use in 1918 and from 400 to 500 new holes are finished weekly.

Developments in the field generally show two principal sheets or beds of ore; the upper at a general depth of 150 to 200′, and the lower between 250 and 300′, each bed of ore being from 15 to 30′ thick, and in some instances twice this thickness. It appears certain that the orebodies will prove to be much more extensive, and especially much richer than drilling indicates, as actual

Note: Above properties described under Oklahoma, page 1270.

operations in this district have demonstrated that when the mines are opened by shafts and drifts the ore is from 50 to 100% richer than shown by assays of drillhole samples.

Many operating mills in Miami are producing better than 10 tons of concentrates from each 100 tons of mine ore. This is locally termed 10% recovery. It is probable that the field as a whole will average 8% recovery, though some mills are actually recovering better than 15% in concentrates. This is proving to be one of the richest lead and zinc fields in the world, and, as its production increases, will force the closing of leaner mineralized districts.

Prospecting is done by means of churn drill holes; Keystone type of drill rigs are used. A 300′ hole costs from $450 to $500, and is drilled in from 10 to 14 days. Samples are taken every few feet of the entire cuttings from the mineralized area passed through, which are assayed for zinc and lead.

The ordinary amount of drilling on 40 acres is from 10 to 30 holes. Old operators in the district are satisfied if they find two or three holes near each other carrying good ore, and will not drill further under such conditions, but sink shafts and build mills at once.

Shafts are sunk to the bottom of the orebody; the ore is mined, using the room and pillar system; trammed to shaft; hoisted to mill bins, crushed by rock breakers and rolls, and concentrated in jigs and on tables, so that the crude mine ore is reduced to a concentrate containing about 60% metallic zinc and 80% metallic lead. This is bought by smelters in the bins at the mills, and there is no further expense.

The entire process of mining and milling is extremely simple and cheap, and does not require expert labor.

Mining and milling machinery is standardized and largely made in Joplin. It is not high priced and can be obtained quickly. Wages are on a sliding scale, depending on prices of concentrates, ranging from $3 per day at $50 per ton, to $4.50 per day at $100 per ton.

Division of costs, so far as obtainable, indicate: Labor, 50%; supplies, 30%; power, 15%; general expense, 5%.

Average of Miami, in 1917, costs were:

Crude Ore:

Mining, milling, general for 100 tons mine ore.....$160

Concentrates:

If 10 tons concentrates produced, cost per ton.....$16
If 8 tons concentrates produced, cost per ton.....$20

As examples of what has been done in the Tri-state field, the campaigns being conducted by some of the larger operators may be mentioned. **The Eagle-Picher Lead Co.,** on first entering this field, is reported to have expended a prospecting fund of approximately $100,000 merely in its exploratory work. The blocking out of its orebodies after discovery involved as much if not more than the original expenditure. The investment of this concern prior to the beginning of its production period was near $750,000. This concern now has the largest single production of any company in the district.

The Commerce Mining & Royalty Company, the pioneer prospecting and development company of that field, has never ceased drilling since its original strike of ore in 1905 in the old Commerce camp. Its drills are kept going constantly, and its expenditure in exploratory work has reached extremely large proportions.

The Church & Mabon interests have conducted some of the largest prospecting undertakings in the field, and as a criterion of how thoroughly their work has been done, may be mentioned that upon one forty-acre tract alone, 80 drill holes have been put down. This concern has developed a large number of forty-acre tracts, many of which have proved to be some of the best producers the district has yet known.

The Miami Zinc Syndicate has leases aggregating 4,000 acres, north of the Kansas and Oklahoma State line and west of Baxter Springs, Kansas, and

conducted upon it a drilling campaign, with only a small part of the acreage tested out.

The largest undertaking, however, that has been started is that of the **Chanute Spelter Company**, which has to its credit approximately 16,000 acres of ground and whose operations promise to be the most extensive of the entire district. From 20 to 30 drills are kept at work doing exploratory and development work. The field of its operations extends from the Kansas-Oklahoma line north and northwestward to Asbury, Missouri. Ranking close behind the Chanute Spelter Co. is the **Waco Mining Co.**, with 7,100 acres in leases and fees, and P. B. Butler, with 6,500 acres in leases. These large holdings, principally in the Kansas field, are being systematically developed on a large scale. Others who have done a large amount of exploratory and development work are Frank Danglade, T. J. Franks, J. G. Marcum, Vinegar Hill Zinc Co., N. B. Gatch, H. Barndollar and many others.

In 1919 the State produced over 189,000 tons, the largest zinc output ever made by any one State; 85% of it is from the Miami field. Detailed figures were 344,062 tons of blende, 43 tons of calamine, and 43,448 tons of galena, all valued at $17,875,970.

Production figures (U. S. Geol. Survey) are as follows:

	1917	1918
Crude ore, tons	3,523,200	5,754,700
Lead concentrates, tons	32,775	69,912
Value	$3,301,534	$6,190,431
Zinc concentrates, tons	159,656	300,702
Value	$10,762,324	$15,182,135

In calculating the weekly outputs of mines it may be stated that $55 is a fair price for blende, and $80 to $100 for lead.

The mine owners of the State are indifferent and unresponsive to requests for information, so in many cases only the address can be given; this treatment is in marked contrast to the kindly co-operation of the operators of all other mining districts.

ACME LEAD & ZINC CO. **OKLAHOMA**

Address: John Wingfield, Picher, Okla.

Officers: C. C. Cole, pres.; J. R. Cole, Jr., sec.-treas.; L. Lockey, supt.; and John Wingfield, mill supt.

Inc. March 15, 1917, in Oklahoma. **Cap.**, $200,000; $1 par.

Property: 40 acres at Picher, containing zinc-lead ore.

Development: by 170′ and 210′ shafts.

Equipment: mills of 500 and 600 tons capacity. Lack of water has prevented regular operations.

ADMIRALTY ZINC CO. **OKLAHOMA**

(See this title in Kansas companies.)

Office: W. B. Shackelford, gen. mgr., Quapaw, Okla. O. F. Brinton, mine and mill mgr.

Property: 4 mines, 120 acres at Douthat, Okla. Shafts are down 220′ and open the usual type of 6 to 16% blende and galena ore. Four mills are treating 1,400 tons daily. A 500-ton (in 10 hours) plant was erected by lessees in 1918 to dress tailing from one of the dumps. Assays showed up to 5% zinc and lead. Equipment includes rolls, jigs, sludge-tables, and flotation plant.

Production: a normal weekly yield is 76 tons of blende, 60% metal, and 170 tons of lead, 80% metal.

ALAMO LEAD & ZINC CO. **OKLAHOMA**

Address: J. T. Burgher, supt., Quapaw, Okla.

Property: is N. W. of Quapaw. A 200-ton mill was erected in 1918.

ALEXANDER LEAD & ZINC CO. **OKLAHOMA**

Address: G. M. Ramsey, mgr., Tar River, Okla. M. F. Bayless, pres.

Property: is near the Larsh mine. A 500-ton mill was erected in 1918.

ALLIED LEAD & ZINC CO. **OKLAHOMA**

Address: Quapaw, Okla., but letters returned marked "unknown" in 1919. Reported, at last accounts, that the 250-ton mill was to be remodeled.

AMALGAMATED ZINC & LEAD CO. **OKLAHOMA**

Address: H. L. Huddleston, Miami, Okla.

A 250-ton mill was planned, at last accounts.

AMERICAN EXPLORATION CO. **OKLAHOMA**

Address: M. D. Draper, mgr., Tar River, Okla.

Company has two mines. No details available.

AMY T. MINING CO. **OKLAHOMA**

Address: Ed. Ballinger, supt., Miami, Okla.

Company proposed building a 200-ton mill, at last report.

ANNA BEAVER MINING CO. **OKLAHOMA**

Address: Tar River, Okla.

Property: mine and 2 mills in the Tar River field. Cages are used instead of buckets for hoisting, which is an innovation here. Mine is a steady producer, yielding over 50 tons of blende per week early in 1920.

ASSOCIATED LEAD & ZINC CO. **OKLAHOMA**

Address: T. Ricks, Quapaw, Okla. Company has a lease on a tract in the town of Quapaw. A mill was erected in 1918.

ATOKA MINING CO. **OKLAHOMA**

Address: E. M. Applegate, supt., Miami, Okla.

Property: a lease on 40 acres west of Picher, on which 12 drill-holes exposed good ore at 240'. A 300-ton mill was to be built in 1919, and hand jigs erected to treat a tailing dump.

AURORA MINING CO. **OKLAHOMA**

Officers: T. S. Adams, pres.; J. E. Turner, v. p. and mgr.; and A. L. Crutchfield, sec.-treas.; all of Holdenville, Okla. J. W. Hale, supt.

Property: in the Leadville district, E. of Quapaw.

Development: shaft sunk to open ore shown by drill at depth of 65 to 95'. Assays averaged 19.7% blende and 1.9% lead.

Equipment: 150-ton mill driven by 100-h. p. gas engine, and compressor.

BAKER MILLING, SMELTING & REFINING CO. **OKLAHOMA**

John Baker, pres., writes that he holds the charter, keeping it in force for the present, with no stock for sale. See Vol. XI, Copper Handbook.

BARTLESVILLE ZINC CO. **OKLAHOMA**

Subsidiary of American Metal Co., Ltd., 61 Broadway, New York, which owns 100% of the $500,000 capital.

Works: 2 zinc smelters at Bartlesville and one at Blackwell, Okla., on which $2,500,000 has been spent. One of the smelters was formerly owned by the Lanyon Starr Smelting Co., which was merged into the Bartlesville Zinc Co. The plants include the following:

	Bartlesville No. 1	Bartlesville No. 2	Blackwell
Furnaces	6	9	12
Retorts in each	576	576	800
Total retorts	3,456	5,184	9,600
Monthly ore capacity, total tons	....	14,000	....
Monthly spelter output, tons	....	5,000 to 6,000	....

At Bartlesville, one plant produces 350 tons of zinc oxide monthly, the other plant yielding 100 to 150 tons of zinc dust. At both places is a clinkering plant that treats the residue from the retorts, making it available for blast-furnaces. The clinker carries precious metals, mainly silver.

BEST MINING CO. **OKLAHOMA**

Organized in March, 1918, with capital of $200,000, by S. H. Lester, M. J. McLaughlin, and H. B. Callahan, of Shawnee, Okla.

BETHEL MINING CO. **OKLAHOMA**

Address: W. C. Miller, or J. A. Worley, Miami, Okla.

Property: the Bethel, Domado, and Croesus leases near Miami, 3 mills and a tailing plant.

Production: weekly production normally is 140 tons of blende (60% metal); but was 334 tons in third week of February, 1920.

BEULAH B. MINING CO. OKLAHOMA

Address: Picher, Okla.

Operates in the Picher district. A concentrating plant was erected in 1918 and regular shipments made.

BEULAH LEAD & ZINC CO. OKLAHOMA

Address: J. R. Cole, Tar River, Okla.

BIG CHIEF MINING CO. OKLAHOMA

Address: Picher, Okla.

Officers: R. E. Stafford, pres.; H. H. Halsell, mgr.

Property: 40 acres and 250-ton mill. Mine was developed by A. E. Bendelari of the Eagle-Picher Lead Co., producing 33 tons of blende weekly early in 1920.

BIG EIGHT MINING CO. OKLAHOMA

Property: at Miami, but letters returned unclaimed in 1919. Two shafts were being sunk, at last accounts.

BIG JIM MINING CO. OKLAHOMA

Address: G. W. Nesmith, supt., Commerce, Okla.

Officers: G. L. Benson, pres.; and C. R. Home, sec.

Property: 40 acres at Douthat, Okla., where one hole has been drilled in each acre, showing good ore. In January, 1919, ore was also found at 114'. A 200-ton mill was proposed.

BIG SEVEN LEAD & ZINC CO. OKLAHOMA

Address: Commerce, Okla., but letters returned in February, 1919. Company was constructing a surface tram to connect its mines with the mill and mines of its Queen City property, at last accounts.

BIG THREE MINING CO. OKLAHOMA

Address: Quapaw, Okla.

Officers: Seth Conrad, pres.; V. Jenson, v. p.; Ira Edwards, sec.; C. C. Atterbery, supt.

Property: 160 acres N. W. of Quapaw. On 80 acres 26 holes exposed ore carrying from 5 to 20% blende. Another 40 acre tract was sold to Howard Paschal, of New York, for $75,000, plus 2½% royalty.

BIG VEIN LEAD & ZINC CO. OKLAHOMA

Incorporated with capital of $250,000 in March, 1918, by W. A. Dotty, of Miami; G. B. Crumbine and J. A. Utterback, of Oklahoma City.

BIG V MINING CO. OKLAHOMA

Address: C. S. Voorhees, supt., Quapaw, Okla.

Property: S. E. of Quapaw. A 250-ton mill was erected early in 1919.

BILHARZ MINING CO., O. M. OKLAHOMA

Address: Victor Rakowsky, Commerce, Okla.

Company has 3 mines, the Shorthorn, Chapman and Bluebird, and 3 mills, shut down at mid-1919 on account of the market, but reopened, the weekly output being 370 tons of blende and 33 tons of lead early in 1920.

BILLIKEN MINING CO. OKLAHOMA

Address: John Aycocks, pres. and mgr., St. Louis, Okla.

Property: a lease on ground adjoining that of the St. Louis M. & S. Co. In March, 1918, the U. S. Paymaster mill, near Joplin, Mo., was moved to the mine.

BLACK EAGLE MINING CO. OKLAHOMA

Address: W. M. Garred, supt., St. Louis, Okla. Company operates in the St. Louis district. A mill was erected and shipments made in 1918.

BLACK HAWK LEAD & ZINC MINING CO. OKLAHOMA

Address: Jack Williams, Picher, Okla.

Officers: J. Younts, pres.; Jack Williams, sec.-treas.; R. C. Ulmer, supt.

Cap., $250,000.

Property: a lease on Walker land, S. E. of Picher. Drilling revealed

ore from 218 to 248′ depth. A concentrating plant erected and shipments begun in 1918. In February, 1920, weekly yields were 29 tons of blende.

BLUE BONNET MINING CO. **OKLAHOMA**

Address: W. H. Logan, mgr., Hockerville, Okla.

Property: in southern portion of the Hockerville field, also the mine and mill of the Central Zinc & Lead Co., at Tar River, and another mine N. E. of Picher, both purchased in June, 1919.

Equipment: at Hockerville, a 250-ton mill driven by gas engines, originally by steam and electric power. The daily output averaged 55 tons of concentrate in 1919.

BLUE GOOSE MINING CO. **OKLAHOMA**

Address: Picher, Okla.

Production: 30 tons of galena (80% metal) weekly, at last report.

BON AMI MINING CO. **OKLAHOMA**

Address: Miami, Okla. In Nov., 1918, a 150-ton mill was to be built.

BREWSTER MINE **OKLAHOMA**

Owned by Federal M. & S. Co. of Idaho.

Address: 120 Broadway, New York; and Baxter Springs, Kan. P. W. George, supt.

Property: in St. Louis district, was bought for $125,000. Drilling since March, 1919, has revealed a large body of zinc ore, and $94,403 was spent on a mill, employing flotation process.

Production: 130 tons of blende per week early in 1920.

BUFFALO MINING CO. **OKLAHOMA-KANSAS**

Address: F. R. Bouldin, pres.; C. B. Ward, sec., Miami, Okla.

Property: a lease N. of Quapaw, Okla., and another W. of the Blue Mound in Kansas. Two mills were erected in 1918.

CANTON MINING CO. **OKLAHOMA**

Address: Box 511, or Room 317 Hancock Bldg., Miami, Okla.

Officers: J. L. Eggert, pres.; J. C. Abbott, v. p.; W. O. Johnston, sec.-treas.-mgr.

Inc. April, 1917, in Oklahoma. **Cap.,** $75,000.

Property: 40 acres at Lincolnville, Okla

Development: the deposit is 35 by 1,320 by 1,320′, and is worked by 4 shafts, 75′ deep.

Equipment: gas engines, compressor, drills, and 500-ton (24 hours) mill. Developing.

CARNEGIE MINING CO. **OKLAHOMA**

Address: P. L. Bucy, Bartlesville, Okla.

Property: a lease near Douthat, on which the 300-ton mill bought from the National Zinc & Lead Co., of Webb City, Mo., was re-erected.

CARTHAGE MINING CO. **OKLAHOMA**

Address: Emma R. Knell, Carthage, Mo.

Cap., $32,000; shares $100 par; $16,000 paid in.

Property: 20-acre lease in the N. E. Oklahoma zinc field.

CENTRAL LEAD & ZINC CO. **OKLAHOMA**

Address: W. A. Geissing, mgr.-sec.-treas., Tar River, Okla.

Property: in the Picher-Century-Tar River area. Shaft sunk to 350′, the deepest in the district, and mill was making two cars of lead concentrate and one of zinc, at last accounts. The mine was reported taken over by the Blue Bonnet interests in June, 1919.

CENTURY MINING CO. **OKLAHOMA**

Address: Carl Scott, or J. C. Trout, supt., Century, Okla.

Property: 40-acre lease S. E. of Douthat and E. of Century. A large deposit of ore was first entered at depth of 55′. A 150-ton mill was planned, at last accounts.

CHICAGO-MIAMI LEAD & ZINC CO. **OKLAHOMA**

Address: Bob Eitle, Picher, Okla.

CHOCTAW CHIEF LEAD & ZINC CO. **OKLAHOMA**

Address: Geo. Sullivan, Lincolnville, Okla.

Property: the Sullivan and Williams lease at Hockerville. Ore, 15′ thick, assaying 8 to 17% blende and lead, was opened, a 250-ton mill erected and shipments made in 1918.

CLIMAX MINING CO. **OKLAHOMA**

Address: Grant Mans, supt., Cardin, Okla.

Property: 40-acre lease N. W. of Cardin and 3 miles W. of Picher. Shaft cut ore at 230′ in October, 1918, and a 150-ton mill was planned.

COMMERCE MINING & ROYALTY CO. **OKLAHOMA**

Address: J. F. Robinson, Picher, Okla.

Property: company is one of the largest operators in the region, including the Blue Goose, and Cactus mines at Commerce, the Beaver and Webber at Treece, Kansas, the Pelican mine and mill at Picher, and the Bennie, Jay Bird, Grace Walker, and Wilbur at Tar River.

No details of operations are available.

COMMONWEALTH LEAD & ZINC CO. **OKLAHOMA**

Address: L. N. Dana, supt., Miami, Okla.

Property: a lease near Picher. Drilling revealed 12% ore at depth of 235′. Two shafts were sunk, and a 500-ton mill erected. This plant was burned in June, 1918.

CONSOLIDATED LEAD & ZINC CO. **OKLAHOMA**

Address: Picher, Okla.

Property: S. E. of Picher. Water was troublesome in 1918. The mill includes sludge-tables, Dorr thickeners, and a flotation plant.

CONSOLIDATED ZINC & SMT. CO OF OKLAHOMA **OKLAHOMA**

Address: E. H. Squire, mgr., Commerce, Okla.

Property: the Emma Gordon mine at Commerce, formerly a rich producer. Company was reorganized in March, 1919.

CONSTITUTIONAL LEAD & ZINC CO. **OKLAHOMA**

Address: Walter Eberlein, Picher, Okla.

Property: a lease at Picher, developing and shipping, at last accounts.

CORTEZ MINING CO. **OKLAHOMA**

Address: Jefferson City, Mo.

Officers: Houck McHenry, pres.; Charles Tweedie, v. p.; H. B. Church, Jr., sec.-treas., with Cortez F. Enloe, A. W. Happy, G. E. Haigh, D. M. Oberman, C. C. Carson, W. T. Paylor, H. L. Grigsby, and W. T. Landrum (supt.), directors.

Inc. 1917, in Oklahoma. **Cap.,** $140,000; $10 par; 7,000 outstanding.

Property: 40 acres at Picher, Okla. The deposit is a dissemination of galena and blende in flint and limestone.

Development: by 260′ shaft and 400′ of workings. Water was troublesome during 1918.

Equipment: hoist, compressor, pump, gas power, and 200-ton mill, started in February, 1919.

Production: 105 tons of blende per week in February, 1920.

COSMOS MINING CO. **OKLAHOMA**

Address: W. B. Campbell, Hockerville, Okla.

Property: formerly known as the Lucky Tiger, S. E. of Hockerville. A 300-ton mill, employing flotation, was started in October, 1918. The ore is easily mined, as one machine-man and a helper broke down 1,159 cans of 1,000 lb. capacity each in one week of March, 1919. By the end of 1919 company had 2,500 tons of concentrate on hand. The first year's run averaged 12% zinc and lead.

Production: 120 tons of blende per week in February, 1920.

CROESUS MINING CO. **OKLAHOMA**

Address: W. E. Broach, Tar River, Okla.

Production: normally about 40 tons of galena (80% metal) per week.

CRYSTAL MINING CO. OKLAHOMA

Address: B. B. Dancey, pres., Picher, Okla.

A 250-ton mill was planned in 1918.

DALLAS-PICHER LEAD & ZINC CO. OKLAHOMA

Company had a lease on the Southland mine at North Century, but forfeited it for non-working. Mine now operated by Oko L. & Z. Co.

DANIEL BOONE MINING CO. OKLAHOMA

Incorporated in March, 1918, with capital of $150,000, by J. E. Jenkins, of Springfield, Mo., and A. Avery, of Oronogo, Mo., to operate at Quapaw.

DEFENDER MINING CO. OKLAHOMA

Address: J. H. Wright, Joplin, Mo.

Property: between Cardin and Commerce. The 350-ton mill at the Wayland mine, Galena, Mo., was moved to the Defender in July, 1919. Conditional sale of mine made to A. M. Gaines in August. Rich ore is available for the mill.

DESPERATION MINING CO. OKLAHOMA

Formerly the Tiger L. & Z. Co.

Address: Charles Von Weise, or Mark Kirkpatrick, Ardmore, Okla. R. F. Glenn, supt.

Property: near the Harrisburg mine, west of Tar River. Drilling revealed three orebodies at depths of 150, 250, and 320'. The 350-ton mill was treating 8% ore in 1919.

Production: 42 tons of blende and 42 of lead per week early in 1920.

DEW DROP MINING CO. OKLAHOMA

Address: Picher, Okla. Operates on Eagle Picher Lead Co. land.

Production: normally about 43 tons of blende (60% metal) weekly.

DIAMOND JOE MINING CO. OKLAHOMA

Address: W. J. Strong, mgr., Lincolnville, Okla.

Property: S. E. of Hockerville, Okla. A 200-ton mill is yielding high-grade zinc concentrate.

DOMADO LEAD & ZINC CO. OKLAHOMA

Address: W. E. Broach, Tar River, Okla.

DOROTHY BILL MINING CO. OKLAHOMA

Address: J. R. Cole, supt., Tar River, Okla.

Property: a lease W. of Picher. Rich lead-zinc ore was opened at depth of 184' in September, 1918, a large mill erected, and shipments made.

DOUTHAT MINING CO. OKLAHOMA

Address: G. F. Dike, mgr., Commerce, Okla.

Property: between Cardin and Commerce. Some rich ore was opened in 1918, and hand-jigs were used to dress it, but a 200-ton mill was to be built at last report.

DUDLEY MILLING CO. OKLAHOMA

Address: C. Theuer, supt., Douthat, Okla.

Works: a plant, treating tailings from Admiralty No. 2 mine, equipped with gas engine, rolls, jigs, etc.

DULUTH-MIAMI MINING CO. OKLAHOMA

Offices: 819 Insurance Bldg., Oklahoma City, Okla.; 110 Sherman Bldg., Duluth, Minn.

Officers: G. W. Knox, pres.; E. P. Kreimer, v. p.; E. J. O'Rourke, sec.; E. L. Fogarty, treas., with John Lingelbach, J. B. Enfield, and Frank Makowski, directors.

Cap., $250,000; $1 par.

Property: 30 acres at Quapaw, Ottawa county. By May, 1919, a shaft had been sunk to the ore, and several drifts driven. Ore assays up to 38% blende. A mill is to be built at an early date.

DUNCAN LEAD & ZINC CO. OKLAHOMA

Incorporated with capital of $200,000 by W. E. Williams, J. H. Goodnight, and W. M. Lockett, of Duncan, Okla.

EAGLE-PICHER LEAD CO., THE **OKLAHOMA-MISSOURI**

Office: Continental & Commercial National Bank Bldg., 208 S. La Salle St., Chicago, Ill.

Officers: O. S. Picher, pres.; Fred'k Hertenstein and H. G. Clopper, v. p.'s; Jos. Hummel, Jr., sec.; T. S. Brown, Jr., treas., with J. B. Swift, chairman, F. L. Perin, J. E. Webb and S. M. Evans, directors.

Inc. June, 1916, in Ohio. **Cap.,** $9,000,000 com., and $1,000,000 6% non-cumulative preferred; $100 par; $8,000,000 common., and $1,000,000 preferred outstanding. Preferred dividends payable quarterly; initial dividend of 1½% paid July 12, 1916. Central Trust & Safe Deposit Co., Cincinnati, transfer agent. Annual meeting in January.

Company is a consolidation of the Eagle White Lead Co., of Cincinnati, Ohio, and the Picher Lead Co.

The Eagle Picher Lead Co. is the third oldest corroder of white lead by the Dutch process in the United States, having been established in 1843 as the Eagle White Lead Co., and in continuous operation ever since. Company is a manufacturer of carbonate of lead, dry and in oil; white and blue sublimed (sulphate of) lead; oxides of lead for battery, glass, rubber, and paint-makers; and also mines and smelts zinc and lead ores.

Operations in the Picher field started on March 15, 1916. Company owns some of the best mines in the State, and has 9 modern mills at work. The central power plant contains the largest air-compressor in the district, of 4,000-cu. ft. capacity.

Works: are situated at Joplin and Webb City, Mo.; Galena, Kan.; Picher, and Henryetta, Okla.; Cincinnati, Ohio, and Newark, N. J., and Hillsboro, Ill., the last acquired from Robert Lanyon Zinc and Acid Co. in July, 1919.

Production: normally 1,300 tons of blende (60% metal) per week.

The output of both galena and sphalerite by the Eagle Picher Lead Co. is much larger than that of any other operator in the Miami district. Flotation units have been installed at nearly all the plants and the concentrate recovered by that process has materially added to the production. The estimated capacity of the concentrating plant is 6,400 tons in 24 hours. The ore is mainly derived from levels between 250 and 270'. There is also a large production from ground leased to the Big Chief Mining, Dewdrop Mining, Keltner Mining, Ohimo Mining, Piokee Mining, St. Joe Mining, Vantage Mining, National Lead & Zinc, and White Mining companies, all separately described.

EARLY BIRD LEAD & ZINC MINING CO. **OKLAHOMA**

Address: Charles Neal, Treece, Kan.

Property: lease on Cooper land, near Tar River. Rich ore was opened at 185' in depth and a mill built.

EIGHT FRIENDS MINING CO. **OKLAHOMA**

Probably dead. Reported to have taken over the Denver-Miami mine, near Miami, in 1917. Letters returned unclaimed in March, 1919.

ELCOSA MINING CO. **OKLAHOMA**

Address: Tar River, Okla.

Officers: M. Dawedoff, pres.; R. S. Sampson, Oklahoma City, v. p.; W. C. Greening, Oklahoma City, sec., with Messrs. Tolliver and Martin, directors.

Cap., $200,000.

Property: a 40-acre lease W. of Tar River.

Development: drilling exposed zinc-lead ore at depth of 180 to 215'. Shafts were to be sunk and a mill erected at last report.

ELEVEN O'CLOCK MINING CO. **OKLAHOMA**

Address: Quapaw, Okla.

Officers: Roy Nelson, pres.; A. A. Peniger, v. p.; John Pew, sec.; C. B. Ranisey, treas.; J. A. Yearly, mgr.

Property: 20-acre lease on the A. W. Abrams' land, 2 miles N. of Quapaw.

Development: drilling finished late in 1917, shafts and mill were to be started in 1918. No recent report available.

ELLSWORTH MINING CO. **OKLAHOMA**

Incorporated in January, 1918, by Lloyd Weber, J. W. Brown, of Tulsa, Okla.; and A. B. Ellsworth, of Joplin, Mo., with capital of $150,000.

EMMA GORDON MINING CO. **OKLAHOMA**

Address: Miami, Okla.

ESSENTIAL PRODUCING CO. **OKLAHOMA**

Address: C. H. Hemmenway, mgr., Miami, Okla.

Company was organized in January, 1918, to drill leases, operate mills, and a smelter, etc. A 150-ton mill was secured in the Lawton-Waco district, Mo. Rich ore was reported cut by drilling between Hockerville and St. Louis, Okla. Company also owns 600 acres of oil leases in the Chelsea-Nowata field.

FARMERS' LEAD & ZINC CO. **OKLAHOMA**

Address: Lincolnville, Okla.

Property: the Katy mine in the Quapaw district, under development, and small shipments made in 1918.

FARMINGTON MINING CO. **OKLAHOMA**

Address: T. McCarthy, Picher, Okla.

FEDERAL LEAD & ZINC CO. **OKLAHOMA**

Address: Century, Okla.

Officers: H. L. Bolen, pres.; J. P. Whatley, v. p.; Verne Thompson, sec. and mgr.; A. M. Brannon, treas.; H. M. Martin, mill supt.

Inc. in Okla. **Cap.,** $40,000.

Property: 20 acres at Tar River and 40 acres at Quapaw, thoroughly developed in 1917-18. A 300-ton mill erected and regular shipments made.

FEDERAL MINING & SMELTING CO. **OKLAHOMA**

Address: 120 Broadway, New York, and P. W. George, Baxter Springs, Kan. See Brewster mine.

F. AND F. MINING CO. **OKLAHOMA**

Address: Oklahoma City, Okla.

Officers: Oscar H. Dietz, pres.; J. N. Dyer, v. p.; with George Frederickson, J. N. Dodson, and F. D. Bearley, directors. R. E. Finerty, sec.-treas.; Floyd Thompson, supt.

Inc. 1918, in Oklahoma. **Cap.,** $100,000; $100 par; all issued.

Property: 100 acres, one mile W. of Quapaw. A new mill was completed in May, 1919.

FIRST NATIONAL MINING CO. **OKLAHOMA**

Address: Quapaw, Okla.

Property: N. W. of Quapaw, Okla. Two shafts are down to ore at 145'. Rich ore was treated in the Red Rose mill in 1919.

FOCH MINING CO. **OKLAHOMA**

Address: A. E. Bendelari, mgr., and C. Funk, supt., Picher, Okla.

Property: a 40-acre lease, one mile W. of Picher, developed by 240' shaft, and equipped with 250-ton mill. Idle in 1919.

FORT WORTH LEAD & ZINC CO. **OKLAHOMA**

Address: E. T. Renfrow, Miami, Okla.

Property: a lease S. of Picher. Two shafts opened an orebody 35' thick. A 200-ton mill was built and shipments started late in 1918.

FOUR MILE MINING CO. **OKLAHOMA**

Address: J. M. Asbury, pres., Sayre, Okla.; P. B. Smith, gen mgr., Oklahoma City.

Property: a 40-acre lease on the Minnie Trinkle land in western portion of N. E. Oklahoma field. Late in 1917, drilling was reported to have cut rich ore.

GALENA MINING & DEVELOPMENT CO. **OKLAHOMA**

Property is at Century, Okla.

GOLCONDA MINING CO. **OKLAHOMA**

Organized in March, 1918, with capital of $15,000, by J. M. Imrie, E. E. Chivers, and O. C. Lashier, of Ardmore, Okla.

GOLDEN EAGLE MINING CO. **OKLAHOMA**

Letters returned in 1919. W. R. Housely, pres.

Has a property near Miami on which a 250-ton mill was under construction, 1918, and active underground development work carried on. Small shipments were made.

Probably idle, 1919, on account of depressed metal markets.

GOLDEN ROD MNG. & SMELTING CORP'N **OKLAHOMA**

Address: F. C. Wallower, mgr., Tar River, Okla., or Joplin, Mo.

Property: several mines, including the Dallas-Picher, near Tar River, Okla.; also 4 mills, No. 4 being of 1,500 tons capacity in 20 hours. In No. 5 tract, drilling is said to have blocked out 1,500,000 tons of zinc-lead ore, assaying from 30 to 40% blende and galena. The latest mill employs the best practice, including flotation.

Production: in 1918 was 13,696 tons of zinc and 2,260 tons of lead concentrates. Weekly output in February, 1920, was 310 tons of blende.

This is one of the big producers of the Tri-State region.

GOLDEN SPIKE MINING CO. **OKLAHOMA**

Organized in February, 1918, with capital of $125,000, by R. H. Drenna, F. E. Herrin, and O. D. Halsell, of Oklahoma City.

GOLDEN STATE MINING CO. **OKLAHOMA**

Address: John Gifford, mgr., Baxter Springs, Kan., or Picher, Okla.

Property: a 40-acre lease N. E. of Picher, in which good ore was opened at depth of 200'.

GOOD CHANCE MINING CO. **OKLAHOMA**

Organized January, 1918, with capital of $30,000, by George Ostrander, of Miami; R. W. Eastman, and H. H. Sherman, of Alva, Okla.

GOODEAGLE MINING CO. **OKLAHOMA**

Address: T. Chapman, Commerce, Okla.

GRANBY CONSOLIDATED MINES CO. **OKLAHOMA**

Address: W. G. Wilkerson, supt., Granby, Mo. Mine presumably near Miami, Okla.

GREAT WESTERN LEAD & ZINC CO. **OKLAHOMA**

Organized April, 1918, with capital of $100,000, by M. B. Rook, of Miami; Edward Kesler, of Carter, and J. G. Wherry, of Commerce, Okla.

GREENBACK MINING CO. **OKLAHOMA**

Address: T. C. Greenback, supt., Miami, Okla.

Property: at Quapaw, where water has been troublesome. Hand-jigs used at this mine, but a 200-ton mill to be erected

GREENFIELD LEAD & ZINC CO. **OKLAHOMA**

Organized in March, 1918, by J. E. Ross, J. C. Collier, and J. W. Baker, of Greenfield, Okla.

GREENING MINING & SMELTING CO. **OKLAHOMA**

Subsidiary of the Hare M. & M. Co., which see for officers.

Property: at Quapaw. A mill was erected for both mines, and shipments started in 1918.

GREEN ZINC CO. **OKLAHOMA**

Address: Miami, Okla.

GUENING MINING CO. **OKLAHOMA**

Address: J. Pulver, supt., Douthat, Okla.

Company planned a 250-ton mill, at last report.

HANOVER LEAD & ZINC CO. **OKLAHOMA**

Organized December, 1917, with capital of $160,000, by J. J. Strong, C. W. Rice, and Rudolph Johnson, of Cushing, and J. T. Dickinson, of Edmond, Okla.

HARE MINING & MILLING CO. **OKLAHOMA**

Address: Picher, Okla.

Officers: Alfred Hare, pres. and gen. mgr.; J. D. Carruthers, v. p.; W. F. Hearne, sec.; A. E. Fritsche, treas.

Property: one mile W. of Picher. Also owns control of the Greening M. & S. Co., and bought the Jack Rabbit mine for $35,000. Good ore was opened in all mines, and a 200-ton mill erected. Is one of the large producers in the southwestern part of the Picher camp.

HARRISBURG MINING & MILLING CO. **OKLAHOMA**

Address: F. C. Wallower, Tar River, Okla.

Production: 280 tons of blende per week in February, 1920.

HAWKINS LEAD & ZINC CO. **OKLAHOMA**

Address: Quapaw, Okla.

Officers: Lee Hawkins, pres., J. A. Henry, v. p.; H. H. Hawkins, sec.; James Duffy, treas.

Property: operating in the Sunnyside district, N. of Quapaw, on land of the Crescent L. & Z. Co. A modern mill was erected, part of it to treat an old dump of zinc-lead tailing, and small shipments made in 1918.

HAWK MINING CO. **OKLAHOMA**

Address: Miami, Okla.

HAYNES MINING CO. **OKLAHOMA**

Address: J. Hawthorne, Commerce, Okla.

HEALDTON MINING CO. **OKLAHOMA**

Address: Cardin, Okla.

Cap., $100,000. Incorporated by W. A. Rodgers, John Mulkey and H. S. Cox, of Ardmore, Okla. A mill was to be built, at last report.

HIDDEN TREASURE MINING CO. **OKLAHOMA**

Address: John Grifford, mgr., Baxter Springs, Kan.

Property: N. E. of Picher. Two shafts are in ore, and the new mill of the Melrose company, between St. Louis and Quapaw, was moved and re-erected at the mine in June, 1919.

HOMESTAKE MINING CO. **OKLAHOMA**

Operating in the Hockerville district and small shipments reported in 1918.

HOPE LEAD & ZINC CO. **OKLAHOMA**

Address: W. Benton, supt., Hockerville, Okla.

Property: at Hockerville, Okla. In Aug., 1919, company was to move the Scott Eagle mill from Quapaw to the new mine at Hockerville.

HOPKINS MINE **OKLAHOMA**

Address: C. C. Whittier, Picher, Okla.

HUTTIG LEAD & ZINC CO. **OKLAHOMA**

Address: R. M. Simrall, 328 Frisco Bldg., Joplin, Mo.

Property: operates a lease on the Brewster land N. E. of St. Louis, Okla. Company was the second largest producer in the district in 1918, ore coming from the 225 to 265′ levels. The 200-ton mill was burned in August, 1918, but was replaced by the Inspiration company's old mill in November, 1919.

Production: weekly output in February, 1920, was 43 tons of blende.

IMPERIAL DEVELOPMENT CO. **OKLAHOMA**

Address: Miami, Okla., but letters sent there returned, March, 1919. Property is in the Osage tract, where water causes much trouble.

INDIAN CHIEF MINING CO. **OKLAHOMA**

Address: B. C. Clark, pres.; J. L. Sullivan, supt., Miami, Okla.

A 300-ton mill was to be built, at last report.

INDIAN QUEEN MINING CO. **OKLAHOMA**

Address: T. P. Turner, mgr., Hockerville, Okla.

Officers: W. W. Hanlan, pres.; E. A. Gualtney, v. p.; T. L. Ripley, sec.; W. W. Champion, treas.; J. E. Ernhart, gen. mgr.

Property: a lease S. W. of Hockerville, adjoining the Lucky O. K. and Blue Bonnet mines. A mill was erected and shipments begun in 1918.

INSPIRATION MINING CO. **OKLAHOMA**

Address: Yates Hotel, Joplin, Mo.

Property proved of no value, and mill was removed to the Huttig mine in 1919.

INTERSTATE LEAD & ZINC MINING CO. **OKLAHOMA**

Organized January, 1918, with capital of $40,000, by L. G. Sims and L. M. Linebaugh, of Vinita, Okla., and S. P. Strong, of Dallas, Texas.

Property is a tract four miles W. of Picher, on which a 200-ton mill was to be built, at last report.

IOWA MINING CO. **OKLAHOMA**

Address: A. F. Place, pres., Garden Grove, Iowa; F. R. Hobart, mgr., Baxter Springs, Kansas.

Cap., $100,000.

Property: a lease on 40 acres of the Fred Gillmore tract, just across the State line from Baxter Springs. Ore occurs at depth of 138′. Seventeen drill-holes show good ore, suitable for hand-jigging.

JEFFERSON MINING CO. **OKLAHOMA**

Address: A. B. Clark, pres., St. Louis, Mo., or E. S. Perry, mgr., Miami, Oklahoma.

Property: a lease on ground near Quapaw which showed ore horizon at 230′ in depth, with a face of 12′ of stoping ore. The 300-ton mill, erected February, 1919, yields up to 30 tons of concentrate per shift. A year later the yield was 160 tons per week.

KANOK METALS CO. **OKLAHOMA**

Address: A. M. Gaines, Box 1576, Picher Okla.

Property: a lease S. of Picher; and others S. E. of Douthat; 2 miles W. of Badger, Kansas; and 1 mile N. of the Blue Mound in Kansas. Ore is mined from less than 200′ depth, and a large quantity has been developed.

Equipment: 2 mills were in operation in 1918 and two more were contemplated. The ore yielded 10% blende and lead.

KANSAS LINE MINING CO. **OKLAHOMA**

Address: G. Meese, supt., St. Louis, Okla., but letters returned in 1919.

Property: near the Kansas State line, just N. of St. Louis, Okla. High-grade lead ore was being hand-jigged in March, 1919, and a mill was proposed at last reports.

KEENO MINING CO. **OKLAHOMA**

Address: T. Horsley, mgr., Miami, and C. Lyons, supt.

Property: a lease in which 21 holes showed rich lead-zinc ore. A 220′ shaft was reported in ore in 1918.

KELTNER MINING CO. **OKLAHOMA**

Address: F. W. Evans, mgr., Box 1526, Picher, Okla.

Property: a 40-acre lease E. of Picher, on Eagle Picher Lead Co. ground. Drills passed through 21′ of ore, assaying up to 25% blende and galena. Two shafts were sunk in 1918 and a third shaft, N. E. of the mill, was down 125′ in May, 1919. The 400-ton mill has been in operation since mid-1918, and early in 1920 the weekly output was 44 tons of blende.

KENTEX MINING CO. **OKLAHOMA**

Address: S. C. Kennedy, mgr., Quapaw, Okla.

A mill costing $100,000 was erected and shipments made in 1918.

KING BEE MINING CO. **OKLAHOMA**

Address: Peoria, Okla., but letters sent company returned from there in 1919.

A 200-ton mill was to be ordered in July, 1918, but apparently no mine development was done, nor mill erected.

KING BRAND MINING CO. **OKLAHOMA**

Address: D. M. Oberman, Jefferson City, Mo. Wesley Landrum, supt.

A 200-ton mill was under construction in 1919.

KITTY MINING & MILLING CO. **OKLAHOMA**

Address: Tar River, Okla.

Production: 170 tons of blende per week in February, 1920.

KUSA SPELTER CO. **OKLAHOMA**

Address: Kusa, Okla. Owns a zinc smelter at Kusa, and a zinc mine in the Lake Creek district of Blaine county, Idaho.

LACLEDE LEAD & ZINC CO. **OKLAHOMA**

Address: O. Weisgerber, Tar River, Okla.

Property: a producing mine in the Tar River-Douthat area, with a weekly output of over 30 tons.

LANYON STARR SMELTING CO. **OKLAHOMA**

Dissolved. Fully described Vol. XII.

LARSH LEAD & ZINC CO. **OKLAHOMA**

Address: Harry Larsh, Box 593, Miami, Okla.

Property: N. E. of Commerce. Ore occurs from a depth of 215 to 265′, and is high-grade. In 1918, the mill was reported making 22 tons of blende concentrate and 3 or 4 tons of galena concentrate daily.

LA SALLE MINING CO. **OKLAHOMA**

Address: W. L. Kirby, supt., Picher, Okla.

Property: N. of Picher. Hand-jigs were used prior to the erection of a 500-ton mill in December, 1918. The jig product paid for the mill.

L. C. H. CORPORATION **OKLAHOMA**

Address: Peoria, Okla.

In July, 1918, a 200-ton mill was erected.

LEAD BOY MINING CO. **OKLAHOMA**

Address: W. R. Womach, supt., Picher, Okla.

Property: Lead Boy mine on Crescent L. & Z. Co. land, in the Sunnyside field. The 250-ton mill was remodeled and enlarged in 1918 and shipments made. Mine has been under lease to W. R. Womack and C. M. Evans since July, 1919.

LENNAN ZINC & LEAD CO. **OKLAHOMA**

Property: a lease on the Commerce Mng. & Royalty Co.'s land at the N. E. end of the town of Commerce. Equipped with concentrator.

Producing since 1914. Production in 1918 came from the old workings down to 375′, which was the deepest mining in the district.

LEONORA MINING CO. **OKLAHOMA**

Address: C. Chamberlain, Joplin, Mo.

Property: formerly the Lucky Five mine, 1 mile S. of Picher, Okla., thoroughly drilled, a shaft sunk, and mill under construction in March, 1919.

LIGHTFOOT O. & M. CO. **OKLAHOMA**

Address: William Lightfoot, mgr., Miami, Okla. A mill was to be erected, at last accounts.

LINCOLNVILLE LEAD & ZINC CO. **OKLAHOMA**

Address: T. H. Newborn, pres., Miami, Okla.

Property: a lease between Lincolnville and Sunnyside, on which considerable drilling has been done, shaft sunk, and mill erected.

LION MINING CO. **OKLAHOMA**

Address: Picher, Okla.

Production: about 106 tons of blende (60% metal) per week.

LITTLE JEWEL MINING CO. **OKLAHOMA**

Address: Lincolnville, Okla.

Property: the Miami Sunrise, S. E. of Quapaw. Ore is mined at a depth of 85′. The mill contains crusher, rolls, and 6 hand-jigs, and the concentrate shows the ore to carry 15% mineral in equal portions of zinc and lead. Developing.

LOGAN & CO., W. & H. **OKLAHOMA**

Address: F. Sleck, mgr., Picher, Okla.

In August, 1919, the old Coronet mill north of Blue Mound in Kansas was to be moved to the mine at Picher.

LONE STAR LEAD & ZINC CO. **OKLAHOMA**

Organized with capital of $200,000 by B. C. Clark, Purcell, Okla.; C. A. Clark, Oklahoma City, and R. I. Tibbs, Maypearl, Texas.

LORANE MINING & ROYALTY CO. **OKLAHOMA**

Organized in March, 1919, with capital of $40,000, by Ray Thompson, C. C. Moses, J. T. Dewberry, and J. T. Gephart, of Miami, Okla.

LOST TRAIL MINE **OKLAHOMA**

Property: on land of the Commerce M. & Royalty Co., at Commerce, is one of the oldest producers in the field. New shaft sunk, mill re-started, and shipments made in 1918.

LUCKY BILL MINING CO. **OKLAHOMA**

Address: Tar River, Okla.

Producing 44 tons of blende weekly early in 1920.

LUCKY DOZEN LEAD & ZINC CO. **OKLAHOMA**

Property: N. W. of St. Louis, Okla. Ore was opened at 195′ in October, 1918, and hand-jigs installed to treat the ore.

LUCKY JEM MINING CO. **OKLAHOMA**

Address: W. C. Booman, mgr., Miami, Okla.

A 200-ton mill was planned in 1919.

LUCKY JOE MINING CO. **OKLAHOMA**

Address: J. P. Matthews, Quapaw, Okla. Mail unclaimed at Miami in March, 1919.

A 200-ton mill was erected, at last report.

LUCKY KID MINING CO. **OKLAHOMA**

Address: J. G. Marcus, mgr., Tar River, Okla.

Property: at Douthat, has two mills whose normal weekly production is 40 tons of blende (60% metal) and 40 tons of galena (80% metal).

LUCKY STRIKE LEAD & ZINC CO. **OKLAHOMA**

Address: J. C. Austin, Picher, Okla.

Property: 1 mile E. of Picher, S. of St. Louis. Drill-holes exposed ore, shafts were sunk, and a 200-ton mill erected. This mill was burned in November, 1918, and property went into hands of a receiver. In May, 1919, drilling operations were resumed.

LUCKY SYNDICATE CO. **OKLAHOMA**

Mill at Douthat was burned in June, 1918, but was, it is said, re-built later in year.

MAHUTSKA MINING CO. **OKLAHOMA**

Office: 608 Frisco Bldg., Joplin, Mo. J. H. Capelli, mgr.; W. L. Kepner, supt. Controlled by R. Y. Ramage interests.

Inc. May 9, 1917, in Oklahoma. **Cap.,** $150,000.

Property: 40 acres at Picher, Okla. **Development:** by 3 shafts, 250′ deep. Ore carries 7% zinc and 3% lead. A feature of the deposit is the occurrence of rich ore in the caves opened in mining.

Equipment: 500-ton mill, in 70 hours' test run in April, 1919, dressed 1,300 tons of "dirt", yielding 185 tons of lead and 99 tons of zinc-concentrates. The company is a large producer of both galena and sphalerite concentrate.

MARY ANN MINING CO. **OKLAHOMA**

Address: Box 624, Joplin, Mo.

Officers: A. J. Roth, pres.; R. V. Newton, v. p.; F. H. Kissling, sec.; Carl C. Smith, treas., with W. H. Johnson, Clyde Riggs, Ned Cotton, G. O. Foster, and George Darsee, directors.

Inc. in Oklahoma. **Cap.,** $350,000; $1 par.

Property: 40 acres near St. Louis, just S. of the Kansas line, on which zinc-lead ore occurs in limestone and flint.

Development: by 192′ shaft. Extensive drilling was done in 1919 to keep development ahead of ore extraction and keep the 300-ton mill fully supplied.

Production: 240 tons of blende weekly in February, 1920.

MAURICE MINING CO. **OKLAHOMA**

Address: Douthat, Okla.

A 300-ton mill was to be put up, at last report.

MAURINE MINING CO. **OKLAHOMA**

Address: J. R. Cole, Quapaw, Okla.

MAXINE MINING CO. **OKLAHOMA**

Address: W. C. Miller, supt., Tar River, Okla.

Property: a tract S. E. of Picher on which 26 drill-holes showed good ore at depth of 205′, the ore being 35′ thick. A 400-ton gas-driven mill was planned, at last report.

McCURDY BROS. MINING CO. **OKLAHOMA**

Address: D. McCurdy, supt., Quapaw, Okla.

Property: between Picher and Quapaw. Rich ore was opened, and a 250-ton mill built in 1918-19.

MEDICAL MINING CO. **OKLAHOMA**

Address: E. S. Lain, pres., or S. B. Bobo, v. p., Baxter Springs, Kan.

Property: 40-acre lease of the Tucker-Jane tract, near the Indian Queen mine, W. of Quapaw. A 250-ton mill was planned in 1918, as drilling in 25 holes had opened good ore.

MELROSE MINING CO. **OKLAHOMA**

Address: Quapaw, Okla.

Property: 1 mile N. of Quapaw. Drilling exposed ore from 138 to 210′ deep. One shaft is down 170′, part of the way in a soft, black shale. No. 2 shaft is being sunk. Equipped with a 300-ton mill.

METALS MILLING CO. **OKLAHOMA**

Address: Tar River, Okla.

Production is normally 65 tons of blende (60% metal) per week.

MIAMI-ADA MINING CO. **OKLAHOMA**

Address: Quapaw, Okla., but letters returned unclaimed in March, 1919.

Officers: G. M. Ramsay, pres.; J. M. Taylor, v. p.; Orville Sneed, sec.-treas., with J. R. Phagan and Ed. Guin, directors.

Property: a lease near Quapaw; also the Phillips zinc mine near Yellville, Ark. Drills at the former passed through 42′ of ore, beginning at 190′ depth; while drifts in the Phillips were in ore. A mill was to be erected at each mine, at last accounts.

MIAMI METALS CO. **OKLAHOMA**

Address: W. J. Briggle, mgr., Douthat, Okla., but mail returned in 1919. J. L. Sadler, supt.

Property: the Southeast Missouri lease at north Picher, to which the Buffalo mill was moved in October, 1918.

MIAMI MINING CO. **OKLAHOMA**

Address: J. P. McNaughton, supt., Miami, Okla.

A 400-ton mill was built in July, 1918.

MIAMI NATIONAL LEAD & ZINC CO. **OKLAHOMA**

Address: H. C. Austin, mgr., Miami; and O. L. Parry, pres., 110 W. Grand St., Oklahoma City, Okla.

Inc. in 1917. **Cap.,** $200,000.

Property: 1,000 acres and an 80-acre millsite in the Miami district. A 200-ton mill at Badger and a 150-ton mill at Peacock were erected in mid-1918.

MIAMI ROYALTY CO. **OKLAHOMA**

Address: Miami, Okla.

A 300-ton mill was planned in 1918.

MIAMI SUNRISE MINING CO. **OKLAHOMA**

Now the Little Jewel Mining Co., which see.

MIAMI VOLUNTEER MINING CO. **OKLAHOMA**

Address: Claude Hollman, supt., Commerce, Okla.

Property: operates on Sarah E. McBee land, near Hockerville, in the Commerce field. **Development:** by winze to depth of 330′; 8% blende and 8% galena ore was opened at depth of 290′. Two mills were operating during first quarter of 1918, and one mill after that period.

MIAMI WONDER MINING CO. **OKLAHOMA**

Address: F. D. Whitney, pres., Picher, Okla.

Property: S. E. of Picher. Rich ore was opened at depth of 208′. A mill erected and shipments made in 1918.

MIAMI ZINC & LEAD CO. **OKLAHOMA**

Address: Miami, Okla.

Property: operates on the Sarah E. McBee land, in Miami district. Workings at a depth of 330′ are deepest in the field. Three electrically-driven mills turn out over 200 tons of concentrate per week.

MINT MINING CO. **OKLAHOMA**

Address: Julius Labsap, supt., Miami, Okla.

Property: lease N. of Picher, in which 5 drill-holes showed good ore. A 75-ton mill was to be erected in 1918.

MIO MINING CO. **OKLAHOMA**

Address: W. J. Briggle, Joplin, Mo.

Property: the W. F. White mine and flotation mill at Picher, taken over in July, 1919.

MISSOURI MULE MINING CO. **OKLAHOMA**

Address: Ed. Standefer, Picher, Okla.

Developing and producing at last account.

MOGUL MINING CO. **OKLAHOMA**

Address: A. E. Dunlap, mgr., Miami, Okla.

Cap., $250,000.

Property: a 20-acre lease E. of Picher; also operates west of the town. Drilling exposed from 4 to 51% ore, at 180′ and 212′ depth, and a shaft was sunk late in 1918. Hand-jigs were formerly used to dress the ore, but a new mill was started in November, 1919. In 1920 the output exceeds 30 tons of blende per week.

MONTREAL MINING CO. **OKLAHOMA**

Address: C. F. Dike, mgr., Douthat, Okla.

A partnership operating a mine S. of the Kansouri mine, which is in the Treece district, Kansas. The weekly output in 1918 was 330 tons of blende, 60% metal, and the same early in 1920. This mine was the largest shipper of sphalerite in the district.

MOUNT NEBO LEAD & ZINC CO. **OKLAHOMA**

Address: J. E. Turner, mgr., Peoria, Okla.

Development: 3 shafts open ore at a depth of 130′ to 176′. A 200-ton mill erected in 1918, includes 100 h. p. steam engine for mill, 80 h. p. engine for compressor, crusher, 4 sets of rolls, 3 jigs, and 5 tables.

MUSKOGEE LEAD & ZINC CO. **OKLAHOMA**

Address: J. C. Isbell, mgr., Quapaw, Okla.

Property: 60 acres, just W. of Quapaw. Ore was encountered at 165′ and 180′, but water was so troublesome that company joined with the Imperial Development, St. Louis, and Big Three companies to drain the ground. A 10″ Texas pump is working in the Muskogee, while the Imperial also has one besides two 12″ and one 14″ Pomona pumps. The Muskogee shaft was cemented, and a depth of 200′ attained. A mill was planned.

NEVER SWEAT MINING CO. **OKLAHOMA**

Address: Miami, Okla.

NEW CHICAGO MINE **OKLAHOMA**

Address: A. M. Gaines, Tar River, or Picher, Okla.

Mine is completely equipped and a good producer.

NEW STATE MINING CO. **OKLAHOMA**

Address: Homer Seals & Co., Commerce, Okla., or Joplin, Mo.

Property: operates the New State mine on McBee land at Commerce. Galena and sphlarerite ores are reported mined at the 110′ level and treated in the 75-ton mill.

NIANGUA MINING CO. **OKLAHOMA**

Address: Ray Munson, mgr., Picher, Okla.

Officers: E. S. Warner, pres.; R. W. Smith, v. p.; W. S. O'Bannon, sec.-treas.

Cap., $100,000. Company has no debt. Work in 1918 was principally development and construction, but since mill was placed in operation in February, 1919, earnings have been $8,000 per month.

Property: lease of 20 acres on Tar River, midway between Picher and Cardin. The royalty is 17½%. In August, 1919, the M. & M. mine was acquired at a cost of $150,000.

Geology: orebodies lie on three levels—145′, 179′, and 200′. At 149′ level ore is all lead; at 170′ horizon, ore is mixed lead and zinc, the latter predominating, and on the 200′ level ore is 75% lead. About 30% of the ore is of disseminated type in flint and lime-breccia; remainder is lump ore in broken flint. Ore now being milled assays 6.5% lead and 4% zinc.

Development: 2 shafts to 200′ level, all ore now being hoisted from this level.

Equipment: mill treats 250 tons, in 10 hours. It includes a 500-ton ore bin, 18-in. crusher, 42-in. rolls, with 36 in. return rolls, 2 rougher Colley type jigs, one cleaner and one sand jig, same type, one 36 in. high-speed rolls for re-crushing, and 10 tables. The recovery is 82%.

Power furnished by 150- h. p. gas engine; hoist and drills are operated by air furnished by three 400 cu. ft. gas-driven compressors.

Production: 110 tons of blende per week.

OHIMO MINING CO. OKLAHOMA

Address: Lindsey Allington, Miami, Okla.

Property: a tract northwest of Picher.

Development: by 2 shafts. Crude ore is mined at level between 220′ and 265′, the ore is concentrated in a 250-ton mill built in 1918, with a recovery of 10% as concentrates. The weekly output is over 100 tons of blende.

OKLAHOMA WOODCHUCK ZINC LEAD CO. OKLAHOMA

Office: 25 Broad St., New York, N. Y.

Officers: C. C. Burger, pres.; R. M. Atwater, Jr., v. p.; L. E. Whicher, treas., with D. T. Rosen and Herman Aaron, directors. H. Pelz, sec.; H. I. Young, mgr., Mascot, Tenn.

Inc. May 5, 1915, in Delaware. **Cap.,** $1,000,000; $10 par; all outstanding. Notes authorized and outstanding, $250,000.

Company received from ore sales, $367,971; operating expenses for year ended April 30, 1919, totaled $258,324; net income was $84,470, which was charged against depreciation and depletion.

Property: leases just east of the Meridian mine, Tar River, Ottawa county. Mine contains a chamber deposit of zinc and lead sulphides, assaying 10 to 30% zinc and 3 to 10% lead. A peculiarity of the mine is the exudation of tarry matter from the rock.

Development: by shafts to a depth of 250′. **Equipment:** includes a 500-ton mill with flotation unit.

Production: 1917, 8,001,400 lb. zinc, and 5,588,200 lb. lead; 1918, 15,267,400 lb. zinc, and 1,079,100 lb. lead. Concentrates for 1918, averaged $50.20 zinc and $68.82 lead per ton. In February, 1920, the weekly output was 130 tons of blende.

OKLA LEAD & ZINC CO. OKLAHOMA

Address: T. P. Lennan, Tar River, Okla.

OKO LEAD & ZINC CO. OKLAHOMA

Address: John Reno, Century, Okla.

Property: the Southland mine at North Century, lease formerly held by the Dallas Picher Lead & Zinc Co., but forfeited for non-working. The Lennan mill at Commerce was moved to the mine, and was yielding over 40 tons of blende weekly in 1920.

OLD RELIABLE MINING CO. OKLAHOMA

Address: V. E. Conkle, Tar River, Okla.

Developed and small shipments made in 1918.

OMAHA LEAD & ZINC CO. OKLAHOMA

Address: care A. E. Bowers, Lincolnville, Okla.

ONTARIO SMELTING CO. OKLAHOMA

Address: C. V. Jones, pres. and mgr., Joplin, Mo.

A lead smelter, at Hockerville, in the Oklahoma section of the Tri-State region. Plant has been working since March 15, 1918. It consists of baghouse, motor-room, and furnace-room, all of brick, concrete, and steel; also a refinery of frame construction. Five Newman furnaces have a capacity of 1,600 tons of "Ontario" lead per month.

OTTAWA METAL CO. OKLAHOMA

Address: Picher, Okla.

A 175-ton mill was planned in 1918.

OZARK LEAD & ZINC CO. OKLAHOMA

Address: St. Louis, Okla.

Reported that a mill was put up a year before any development was done, and the little exploration done up to July, 1919, failed to find ore.

PALATIVE LEAD & ZINC CO. **OKLAHOMA**

Address: E. L. Warner, mgr., Peoria, Okla.

A 250-ton mill planned at last accounts.

PICHER-OKLAHOMA MINING CO. **OKLAHOMA**

Address: R. P. McReynolds, mgr., Picher, Okla.

A mill was purchased and erected on a lease S. of the Golden Rod mine in June, 1918.

PIOKEE MINING CO. **OKLAHOMA**

Address: Picher, Okla. Operates a lease on Eagle Picher Lead Co. land.

The normal production is 40 tons of blende (60% metal) per week.

PIONEER LEAD & ZINC CO. **OKLAHOMA**

Address: Harry G. Larsh, Commerce, Okla.

Officers: Harry Larsh, pres. and mgr.; J. L. Wilken, treas.; S. P. Larsh, sec.; C. M. Britt, supt.

Property: a 40-acre lease near the Bluebird mine of the Bilharz company, in Tar River area. Drilling opened 15 to 42% ore.

Equipment: a mill was erected in 1918, and mine has been a steady producer. In June, 1919, there was 2,000 tons of concentrate on hand. In February, 1920, the weekly output was over 40 tons.

PITTSBURG-MIAMI LEAD & ZINC CO. **OKLAHOMA**

Address: C. C. Whittier, Picher, Okla.

The 500-ton mill was burned in February, 1920, but is being re-built.

PORTLAND LEAD & ZINC CO. **OKLAHOMA**

Company has a lease near St. Louis, Okla., on which it sank a shaft that cut the orebed at 131′. At last report company expected to put up a mill.

POTOSI ZINC CO. **OKLAHOMA**

Address: F. E. Blunt, Picher, Okla.

PRAIRIE LEAD & ZINC CO. **OKLAHOMA**

Address: Commerce, Okla.

Officers: C. O. Bedwell, pres.; Lester Eads, sec.-treas.; C. G. Giles, supt.

Property: a tract E. of Quapaw, on which at depth of 81′, a drift shows ore to be 18′ thick for a distance of 300′ and drill holes show the ore horizon to vary between 62′ and 112′ below the surface. The 150-ton mill on the Crescent lease, E. of Quapaw, had a 3,000 ton dump to treat while mine development was underway.

PREMIER ZINC CO. **OKLAHOMA**

Address: A. M. Gaines, Tar River, Okla.

Property: a lease on Tri-State company ground on South Main street, Picher; said to be one of the richest tracts in the district.

Development: drilling revealed ore at 193′ to 230′ depth. Caves of rich ore are found frequently. Two shafts were sunk.

Production: in August, 1918, 11,150 tons of ore hoisted in twenty-five 10-hour shifts yielded 520 tons of zinc and 385 tons of lead concentrates. In the first half of 1919 the output was 5,502 tons of blende and 1,471 tons of galena. Regular dividends are paid.

PRODUCERS LEAD & ZINC CO. **OKLAHOMA**

Address: George Brown, mgr., Picher, Okla.

Officers: F. W. Hemme, pres.; A. C. Black, v. p.; I. G. Conkling, sec.-treas.

Dividends amount to $35,000.

Property: leases in the Picher district. Shafts were sunk to open 6 to 30% ore found by drills, and a 300-ton mill erected. A recovery of 7% lead and zinc is made.

PRUDENTIAL MINERAL CO. **OKLAHOMA**

Address: St. Louis, Okla.

A 250-ton mill was planned at last report.

QUAPAW JACK LEAD & ZINC CO. **OKLAHOMA**

Address: B. W. Ward, Quapaw, Okla., supt. in 1918. In July, 1918,

company built a 200-ton mill and small shipments were made, but the slump in prices closed this and many other small plants at the time the armistice was signed.

QUAPAW MINING CO. **OKLAHOMA**

Address: Quapaw, Okla.

Property: an 80-acre lease near Lincolnville station, S. of Quapaw. Royalty paid the land-owners is 5%.

Development: drilling revealed a deposit 20′ thick at depth of 100′. A 250-ton mill was to be built, at last accounts.

QUEBEC MINING CO. **OKLAHOMA**

Address: Tom Shelton, mgr., Douthat, Okla.

Mining and milling with production of lead and zinc concentrates began in September, 1918. In February, 1920, the weekly output was over 40 tons.

QUEEN CITY MINING CO. **OKLAHOMA**

Address: Commerce, Okla.

RAINBOW LEAD & ZINC CO. **OKLAHOMA**

Address: Ed. Dunkin, Quapaw, Okla.

Officers: F. E. Herring, pres.; O. D. Halsell, v. p.; R. H. Drennan, sec.-treas.

Inc. in Oklahoma. **Cap.,** $100,000.

Property: E. of Picher and N. W. of Quapaw. Ore is found at 165′ depth, and is from 20′ to 35′ thick. A 300-ton mill was built.

RAMAGE MINING CO. **OKLAHOMA**

Address: John Capelli, Douthat, Okla.

Operates a mine and a 250-ton mill in which flotation was tried in 1918. Weekly production averages 90 tons of blende, 60% metal, when operating normally.

RED EAGLE MINING CO. **OKLAHOMA**

Address: Ira D. Guthrie, mgr., Baxter Springs, Kan.

Property: 40-acre lease at Sunnyside, S. E. of Baxter and E. of Quapaw. Lead ore extends from depth of 70 to 80′, and zinc ore from 80 to 92′. A 100-ton mill was erected, whose operation showed the ore to average 10% blende and galena.

RED GRANITE COPPER & WATER POWER CO. **OKLAHOMA**

Address: W. E. Hudson, mgr., Tulsa, Okla.

Property: a lease near Spavinaw, Mayer county, Okla. While prospecting for zinc a pyrite deposit was found, at depth of 20′, assaying 52% sulphur. A mill costing $25,000 was to be built, at last report.

RED ROSE MINING CO. **OKLAHOMA**

Address: W. D. Adkins, Quapaw, Okla.

A 200-ton mill was erected in 1918.

RED SKIN MINING CO. **OKLAHOMA**

Address: Harry Myers, Picher, Okla.

REPUBLIC MINING CO. **OKLAHOMA**

Address: W. J. Scafe, mgr., Joplin, Mo.

Officers: W. H. Langford, pres.; F. J. Huttig, v. p.; F. Huttig, sec.

Cap., $250,000.

Property: a lease on the Wright land near Tar River, Okla. Two shafts are in rich ore to 224′ depth. A 250-ton mill is operating.

RICH STRIKE MINE **OKLAHOMA**

Address: A. O. Baker, supt., Quapaw, Okla.

Reported drilling, shaft sinking, and a mill erected in 1918.

ROYAL MINE **OKLAHOMA**

Address: Picher, Okla.

Operated intermittently. Normal production 60 tons zinc ore weekly.

SAFEGUARD MINING CO. **OKLAHOMA**

Address: Commerce, Okla.

A 200-ton mill was planned at last report.

ST. JOSEPH MINING CO. **OKLAHOMA**

Address: E. F. McClellan, Box 564, Picher, Okla. Operates a lease on land of Eagle Picher Lead Co. Weekly output is 70 tons of blende.

ST. LOUIS LEAD & ZINC CO. **OKLAHOMA**

Address: George Lumick, supt., Quapaw, Okla.

Property: S. W. of Quapaw. Drilling has proved ore and shafts have been sunk. The mill near Quapaw was moved to the Jefferson mine south of St. Louis, Okla., late in 1918. Gas-driven compressors are at work.

ST. LOUIS SMELTING & REFINING CO. **OKLAHOMA**

Subsidiary of National Lead Co., and of St. Louis Smelting & Refining Works of National Lead Co., a branch of National Lead Co.

Address: J. A. Caselton, 2nd v. p., 722 Chestnut St., St. Louis, Mo.; and C. E. Schwarz, supt., Miami, Okla.

Property: 160 acres of leased property at St. Louis, Okla., on which two 400-ton modern mills are erected. Also 1,240 acres of partly developed ground about 3 miles E. of St Louis, Okla.

More than half of all the crude ore mined in the territory E. of Picher was treated in the mills of this company, which are regarded as the best in the district. Ore was hoisted from 4 shafts from levels between 232 and 245′.

Production: over 600 tons of blende weekly early in 1920.

SAMBO MINE **OKLAHOMA**

Address: Walter Peltier, Lincolnville, Okla.

Reported purchased in August, 1918, by C. H. and W. S. East, of Lima, Ohio, and Walter Peltier, of Miami, Okla.

Property: 40 acres of land and a mill adjoining Nemo and Moran properties at Lincolnville. Mine has 5% ore, between 75′ and 100′ levels. Mill enlarged to 500 tons daily and shipments made.

SANTA FE MINING CO. **OKLAHOMA**

Address: A. J. Davidson, mgr., Hockerville, Okla.

Operates a 400-ton mill, driven by 15, 37½, 50, and 100 h. p. oil engines; operations show a recovery of 10% zinc and lead. Weekly output is about 50 tons of concentrate.

SCOTT EAGLE MINING CO. **OKLAHOMA**

Address: Commerce, Okla.

SILVER CROWN MINING CO. **OKLAHOMA**

Address: J. W. Thomas, supt., Peoria, Okla.

Company took over and was drilling the Gebo mine, at last accounts.

SILVER FOX LEAD & ZINC CO. **OKLAHOMA**

Address: Frank Childers, Picher, Okla.

SINDEN ZINC CO. **OKLAHOMA**

Address: W. B. Shackelford, Tar River, Okla.

SKELTON MINING CO. **OKLAHOMA**

Address: Frank Childress, mgr., Douthat, Okla.

Property: 3 mines at Douthat, and 2 at Tar River, with 7 mills.

Production: the mills dress about 1,000 tons of ore per shift. Company is second largest producer in Oklahoma.

The total weekly output was 750 tons in February, 1920.

SOUTHEAST MISSOURI MINING CORP. **OKLAHOMA**

Address: O. C. Whitener, pres., Picher, Okla.

In 1918, two shafts were sunk, to open a 35′ face of ore exposed by drills at depth of 185′, and a 300-ton mill erected.

SPELTER MINING CO. **OKLAHOMA**

Address: J. J. Gurlach, Quapaw, Okla.

Cap., $150,000.

Property: a lease on Abrams' land E. of Quapaw. Eight drill-holes found ore, one lot assaying 38%. A 200-ton mill was planned before the metal market broke in 1919.

STANDARD ZINC LEAD MINING CO. **OKLAHOMA**

Office: 314 Frisco Bldg., Joplin, Mo. J. F. Haley, gen. mgr.

Property: at Tar River, Okla.

Development: two 220′ shafts were sunk during 1918-19, opening a thickness of 30′ of unusually rich ore of indefinite length. High-grade lead ore has

also been developed from which a concentrate is made that assays up to 85% Pb.

Equipment: a 300-ton mill, completed in Feb., 1919, and operating regularly since.

Production: 33 tons of blende and 44 tons of lead per week early in 1920.

TAR RIVER MINING CO. **OKLAHOMA**

Address: W. C. Miller, Douthat, Okla.

TEXAS MINING CO. **OKLAHOMA**

Address: given as care of T. P. Turner, mgr., Picher, Okla., but mail sent there was returned.

Property: 2 miles E. of Picher. Rich ore—20 to 30% blende—was opened at 176′ depth, and a mill erected in 1918. Water has hampered development. Weekly output is over 40 tons of blende.

TIGER LEAD & ZINC CO. **OKLAHOMA**

Reorganized as Desperation Co., q. v.

TRIANGLE MINES CO. **OKLAHOMA**

Address: Commerce, Okla.

Officers: N. C. Barry, pres.; E. H. Hoffman, v. p.; K. N. Sween, treas.; J. D. Bomford, sec.-mgr., with A. E. Turner, directors.

Property: near Commerce. Two shafts were sunk and a 300-ton mill erected in 1918. Oil engines are used to generate power.

TRI-STATE COMPANY **OKLAHOMA**

Address: Picher, Okla.

Company has over 1,000 acres under lease in Oklahoma. Two mills, the Premier and Blue Bonnet, are at work.

TULSA-SAPULPA-MIAMI ASS'D MINES CO. **OKLAHOMA**

Address: H. R. McCreary, sec., Tulsa, Okla.

Property: leases around Wyandotte, S. W. of Miami, Okla. Drilling was completed and shaft sinking started in June, 1918. A 200-ton mill was to be built, at last report.

UNDERWRITERS LAND CO. **OKLAHOMA**

Address: Box A-32, Picher, Okla.

Officers: Geo. H. Worthington, pres.; Andrew Squire, v. p.; Alvin Good, sec.-treas., with Warren S. Hayden, F. N. Bendelari, A. E. Bendelari, Harry W. Davis, directors. F. N. Bendelari, mgr.

Inc. 1901, in Delaware. **Cap.,** $1,000,000; $1 par; all outstanding. Annual meeting in February. No bond issues. Transfer office, 1015 Hippodrome Bldg., Cleveland, Ohio; registrar, the Citizens Savings & Trust Co., Cleveland, Ohio.

Dividends: 6% in 1917; 13% in 1918.

Property: 208 acres owned in fee in Jasper county, Mo., and 160 acres under lease in Ottawa county, Okla.; also lease on 40 acres of the Portis land, south of the Underwriters No. 1, drilled by 43 holes.

Development: the workings at No. 1 mine at Commerce are at a depth of 160′; those of No. 2 mine at Picher, 235′; and of No. 3 mine at Douthat, 245′. At Commerce, in No. 1 mine, mineralization is along lines of brecciated rock, or "water-courses," forming a series of lodes separated by barren intervals, 8′ to 30′ wide. Vugs of rich blende and galena ore are often encountered.

Equipment: includes mills at each of the three mines. The concentrates carry 62% Zn. and 82% Pb. A fourth mill was planned for No. 4 shaft in August, 1919.

Production: normal output over 500 tons of zinc concentrate weekly.

This company is the second largest zinc producer of the Miami field, its Underwriter No. 2 and No. 3 mines opened in the Whitebird land in 1918, yielding rich ore at levels 230 to 246′ below the surface. The mills have flotation units and handle 550 tons daily of the ore yielding 12% in high-grade concentrate.

UNITED STATES SMELTING CO. **OKLAHOMA**

Address: U. S. S. R. & M. Co., 120 Broadway, New York; or D. D. Muir, Tar River, Okla.

Property: a majority interest acquired in 1916 in the Ritz mine, 60

acres, near Cardin. Drilling cut good ore from 280 to 312' depth. The Ravenswood mill was moved from Joplin, Mo., to this mine. Developments in 1917 and 1918 were favorable.

Production: in 1918, the weekly output was about 300 tons of blende (60% metal).

Company also owns a zinc smelter at Checotah, Okla., acquired in 1916. It uses natural gas for fuel, but failure of the supply resulted in its being shut down in June, 1918.

VANTAGE MINING CO. **OKLAHOMA**

Address: R. B. Sharp, Tar River, Okla.

Property: operates on land of Eagle Picher Lead Co., in Picher district, producing 30 tons of blende weekly, early in 1920.

VELIE MINES CORPORATION **OKLAHOMA**

Address: Frisco Bldg., Joplin, Mo., or Frank Weeks, Tar River, Okla.

Company operates the Lion and Panther mines, both producing in 1918, and 2 mills.

VICTOR MINING CO. **OKLAHOMA**

Address: Picher, Okla.

Operates a lease on Eagle Picher Lead Co. ground.

VICTORY MINING CO. **OKLAHOMA**

Address: A. E. Bendelari, Picher, Okla. W. N. Corbett, supt. A partnership.

Property: a 20-acre lease, 1 mile E. of Picher, developed by 250' shaft. Shipments, over 40 tons weekly in 1920.

WALKER MINING CO. **OKLAHOMA**

Address: Miami, Okla.

WALKER MINING & DEVELOPMENT CO. **OKLAHOMA**

Address: Dr. C. V. Warner, Picher, Okla.

WAR BABY LEAD & ZINC CO. **OKLAHOMA**

Address: Seneca, Mo.

Officers: J. E. Morse, pres.; C. T. Jobes, v. p. and mgr.; C. J. Twohy, sec.-treas., also directors. F. C. Reutledge, supt.

Inc. Nov., 1917, in Oklahoma. **Cap.**, $100,000; $1 par; all issued. Transfer office, 616 Security Bldg., Oklahoma City. Annual meeting, third Tuesday in November.

Property: 2 leases in Peoria district, Ottawa county, Okla. The deposit is a blanket conglomerate in limestone, the ore assaying 4% lead and 8% zinc.

Development: by 117 and 127' shafts, and 300' drift. Mining is by underhand and bench stoping.

Equipment: 22-h. p. hoist, pump, etc. Figures as to ore reserves, production, and financial results are confidential.

WARD MINING & MILLING CO. **OKLAHOMA**

Address: W. F. Fox, Lincolnville, Okla.

WAXAHACHIE MINING CO. **OKLAHOMA**

Address: Alfred Hunsicker, Lincolnville, Okla.

Production in 1920, over 30 tons per week.

WEAVER MINING CO. **OKLAHOMA**

Address: Commerce, Okla.

WELCH MINING CO. **OKLAHOMA**

Address: Miami, Okla.

WEST VIRGINIA LEAD & ZINC CO. **OKLAHOMA**

Address: Parkersburg, W. Va.

Inc. May, 1918, by Chas. Heinselman, A. D. Sees, A. A. Haught, and H. B. Reid.

Property: at Sunnyside, adjoining the Lead Boy, in the Quapaw district. Drill holes said to show good ore, and a mill is to be built.

WHITE BIRD MINING CO. **OKLAHOMA**

Address: T. Stoars, Picher, Okla.

Production: 430 tons of blende per week early in 1920.

WHITE MINING CO.; WM. FOSTER **OKLAHOMA**

Address: Picher, Okla.

Operates a lease on land of Eagle Picher Lead Co.

WINGFIELD MINING CO. **OKLAHOMA**

Office: Webb City, Mo. Charles T. Orr, pres. and gen. mgr.; Jas. B. Millar, treas.

Operated in conjunction with Athletic Mining & S. Co. and Bertha A. Mining Co.

Property: at Quapaw, Okla., carries high-grade zinc ore, and has a 1,200-ton mill (per 24 hours). See above named companies.

WOLFTON MINING CO. **OKLAHOMA**

Address: Henry Gneissing, supt., Picher, Okla.

Cap., $200,000. Company had a 60-acre lease on the Whitebird land E. of Picher, and planned to erect two 500-ton mills.

ZINC LEAD CORPORATION **OKLAHOMA**

Address: C. C. Whittier, Picher, Okla.

Erected a concentrating plant in 1918 and regular shipments being made.

OREGON

Oregon is not a great metal-producing State, possibly because its mineral districts are as yet but slightly developed, owing largely to inadequate transportation facilities. Most of the mines are in Baker county, whose ore deposits yield 90% of the gold and most of the other metals mined in the State. During 1917 copper production increased 500,000 lb. to 2,935,000 lb., while gold decreased by $200,000 to $1,270,000.

A preliminary estimate of the metal production in 1919, made by Charles G. Yale, of the U. S. Geological Survey, shows a decrease in the gold and lead produced, but an increase in the silver and copper. The output of gold in 1918 was $1,270,465 and the estimated output in 1919 is $1,072,661, a decrease of about $197,804. The output of silver in 1918 was 107,323 fine ounces, valued at $107,323; in 1919 it was 211,523 fine ounces, valued at $234,790. The output of copper in 1918 was 2,451,016 pounds, valued at $605,401; in 1919 it was 2,638,714 pounds valued at $501,355, an increase in quantity of 187,698 pounds and a decrease in value of $104,046. The output of lead in 1918 was 10,601 pounds, valued at $753; the output in 1919 was 2,000 pounds, valued at $114, a decrease in quantity of 8,601 pounds and in value of $639.

There are only about a hundred producing metal mines in Oregon and six of these produce 80 per cent. of the total output of all the metals mined in the State, and one of them produces 25 per cent. of the total value of the metals produced. These six mines are those of the Baker Mines Co., Cornucopia Mines Co., Homestead-Iron Dyke Co., and the Commercial Mining Co., all in Baker county, and the Queen of Bronze Mining Co., in Josephine county. The only placer mine in this group is the Powder River Gold Dredging Co.

The larger copper companies of the State show some increase in output during the year, notwithstanding unfavorable conditions. Though less ore has been produced in Oregon during the last two years than in 1917, the average value of all the metals mined and treated has increased about 90 cents per ton.

The mines are described under the names of the individuals or corporations owning them, given in alphabetical sequence.

ALICE MINE **OREGON**

Owner: Gustav Pinson, Prairie City, Ore.

Property: 2 claims, near Prairie City, Grant county; said to show irregular deposits of soft gold-silver ore in fissure vein. Orebody dips 50° E.

Development: by 180′ tunnel.

ALMEDA MINES CO. **OREGON**

Offices: 1014 Board of Trade, Portland, Ore., and Opera House Block, Grants Pass, Ore.

Officers: S. C. Spencer, pres.; L. E. Crouch, 1st v. p.; Nat P. Ellis, 2nd v. p.; H. E. Thurman, sec.; C. M. Huddle, treas.

Inc. July 28, 1916, in Oregon. **Cap.**, $3,500,000; shares $1 par; 3,000,000 shares common, 500,000 shares preferred. Successor to Almeda Consolidated Mines Co. Annual meeting, second Tuesday in April.

Property: 17 lode claims, 340 acres, also 500 acres placer ground, in Josephine county, about 26 miles from Grants Pass, and 17 miles from Merlin, nearest railway station on the Southern Pacific, with daily stage line to Almeda. Lands include a 200-acre town site.

The quartz claims are in three groups known as the Almeda, on the north side of the river and the Rocky Gulch and Rand groups on the south side of the river.

The Almeda group consists of 3 claims developed by 5 tunnels and a 535′ shaft, with about 2 miles of underground workings. Orebody estimated by the management to show approximately 2,000,000 tons blocked out for production.

Considerable development work has been done on the Rocky Gulch and Rand groups by tunnels and crosscuts. The main vein is said to be 10′ to 20′ wide on the slate hanging wall, ore being strongly auriferous and slightly argentiferous chalcopyrite. Paralleling the main vein is a body of low-grade ore 20 to 30′ wide, highly silicious, mainly chalcopyrite with occasional bornite, giving promise of greater values at increased depth.

Equipment: consists of a 100-ton blast furnace for matting, distillate engines to develop 225 h. p., compressors, motors, boilers, complete laboratory and all necessary buildings. The 17-mile mountain road from Merlin to the mine is in good condition and motor trucks operate over it the entire year.

The mines are not being operated owing to litigation between factions of the stockholders and the directorate.

AMALGAMATED MINES CO. **OREGON**

Office: Baker, Ore.

Officers: W. F. Downie, pres.; W. Burnham, sec.; G. J. Burnham, treas.

Cap., $1,000,000; $1 par; 800,000 issued.

Property: 21 quartz claims in Eagle Creek district, Baker county. Developing.

AMERICAN ALMADEN QUICKSILVER & GOLD MINING CO.

Last address: 100½ Fourth St., Portland, Ore.

Officers: W. B. McKinney, pres., E. N. Wheeler, sec.-treas.

Cap., $1,500,000; $1 par; all issued.

Property: 3 claims in Sec. 20, T. 14 S., R. 20 E., 11 miles from Howard, in the Ochoco district, Crook county, developed by tunnels. Ore contains cinnabar in altered andesite.

AMERICAN EXPLORATION CO. **OREGON**

Address: John Hampshire, pres., Grants Pass, Ore.

Inc. 1916, in Oregon. **Cap.**, $1,000,000.

Reported to have bought the Queen of Bronze mine in 1916, formerly owned by the Takilma Sm. Co., and the Waldo copper mine, in September, 1917, for $135,000.

Company dissolved, 1918, and holdings taken over by the John Hampshire Co., which see.

BAKER MINES CO. **OREGON**

Described in Vol. XIII. Operated a lease on the Last Chance mine of the Cornucopia Mines Co., which see.

BALD MOUNTAIN MINING CO. **OREGON**

Address: Geo. N. Putnam, pres., 35 Congress St., Boston, Mass.

Inc. March, 1916. **Cap.**, $100,000.

Property: Bald Mountain mine, on the N. E. extension of the Ibex vein, in Cracker Creek district, Baker county; reported consolidated with the Ibex mine, which see.

BEN HARRISON MINE **OREGON**

Property: 10 claims, 7,000′ above sea level, in Grant county, 23 miles by

road west of Whitney, and 28 miles by road from Sumpter, the nearest railroad stations.

Ore: occurs in the Ben Harrison vein, strike N. 3° E., dip 67° E., which varies in width from 18″ to 21′, with an average stoping width, where opened, of 77″. The vein is a brecciated replacement in granodiorite. Ore minerals are pyrite, stibnite, chalcopyrite, sphalerite, pyrargyrite, and stephanite, with gold of about equal value to the silver in the ore.

Development: by adits, the lowest at the 600′ level. Several hundred feet of drifting has been done on the various levels and in 1915 there was said to be above the 500′ level, 87,000 tons of ore blocked out on 3 sides, with an average value of $10 per ton.

Equipment: includes 20-stamp mill, tube mill, classifiers, vanners, and flotation unit.

See Mineral Res. of Ore, Vol. 1, No. 4, p. 29.

Operated under option, 1917-18, by E. H. Dewey, Nampa, Ida., but option relinquished, April, 1918, after expenditure of $50,000. Several cars of gold-silver ore were sent to smelter during 1919.

BLACK BUTTE QUICKSILVER MINING CO. **OREGON**

Office: New York Block, Seattle, Wash.

Officers: John N. Powell, pres.; Marion T. Edwards, sec.; W. B. Dennis, Carlton, Oregon, managing agent.

Inc. in Washington. **Cap.**, $5,000,000; shares $100 par; fully issued.

Property: 1,040 acres, patented, in Sec. 16, 17, 9, 8, T. 23 S., R. 3W, Lane county, Ore., about 17 miles by wagon road from Cottage Grove, said to carry a low-grade cinnabar deposit. Developed to depth of 900′.

Equipment: includes a 40-ton retort. Production not reported. About 30 men employed at last accounts.

BLUE BIRD MINING CO. **OREGON**

Office: 67 N. Third St., Portland, Ore.

Officers: at last accounts, S. M. Carter, Blue River, Ore., pres.; F. W. Brooke, sec.; C. Marco, treas.

Cap., $100,000; $1 par; fully issued.

Property: Blue Bird mine, 7 unpatented claims, in Sec. 28, T. 15 S., R. 4. E., 6 miles from Blue River, Linn county, said to carry a deposit of oxidized ore, containing gold and silver values and some iron pyrite. Developed by 500′ and 220′ tunnels and several crosscuts. Is a prospect.

BLUE MOUNTAIN MINING CO. **OREGON**

Office: C. L. Arzeno, pres., gen. mgr., 9 E. Fifth St., Covington, Ky. **Mine office:** Sumpter, Baker county, Ore.

Inc. in Arizona. **Cap.**, $2,000,000; $1 par; 1,373,999 issued. Authorized $50,000 6% bonds; $47,500 outstanding. Annual meeting fourth Friday in April. In May, 1919, the Imperial Eagle M. Co. was organized to liquidate the outstanding bonds and other indebtedness of the Blue Mountain company and eventually take over its holdings.

Fully described in Volume XIII.

BLUE RIBBON MINES GROUP **OREGON**

Y. B. Tardiff, owner, Pendleton, Ore.

Property: 4 unpatented claims, 1 mile E. of the Buffalo-Monitor group in Granite district, Grant county, said to carry 4′ quartz vein in slate and granite, the ore assaying $18 per ton in gold and silver.

Development: by 1,030′ tunnel and 1,635′ of drifts with 500 tons of ore reported blocked out. Expended $1,200 in 1918.

BOLEN CREEK MINING CO. **OREGON**

Address: P. J. Neff, Medford, Ore.

Inc. Nov., 1919, in Arizona. **Cap.**, $150,000.

Property: a gold placer on Sucker creek, in Holland district of Josephine county, 30 miles W. of Medford. Mine is fully equipped.

BOULDER CREEK GOLD MINING CO. **OREGON**

Mail returned from former office: 80 Sixtieth St., Portland, Ore.

Officers: R. D. Hewitt, pres., Agness, Ore.; John Gardner, sec.-treas.
Cap., $25,000; $100 par; $21,076 outstanding.
Property: an extensive bar known as the Star group of mining claims, about 240 acres in Sec. 25, T. 34, R. 13 W., Ophir district, Curry county, on which $4,800 has been spent in the following improvements: 4,800′ ditch, sawmill, dam, 1,000′ of piping and 800′ pipe giant. Results of operations not reported.

BRADEN MINE **OREGON**

Operated by C. R. Ray, of Medford, Ore., at last accounts.
Property: S. E. ¼ section 27, T. 36 S., R. 3 W., 3 miles from Gold Hill Jackson county, opened up about 30 years ago. Largest production for any one year was $30,000 in 1907.
Ore: gold in 2′ vein, strike N. 30° E., dip 25° S. E. Vein filling is quartz and sulphides. Ore assays about $9 gold per ton.
Development: several thousand feet of drift tunnels, longest over 1,200′. For geology, see U. S. G. S., Bull. 546, p. 39.

BRIGHT CARBONATE MINING CO. **OREGON**

Office: 118 East Webb St., Pendleton, Ore. Geo. Darveau, pres.; John Seibert, sec.-treas.
Cap., $60,000; par $1; all outstanding.
Property: 3 claims in the Greenhorn range, Grant county, at an elevation of 7,250′, is reported to carry a quartz vein in granodiorite, containing mainly gold and silver values. Mine but slightly developed and still in the prospect stage.

BUFFALO MONITOR MINE **OREGON**

Operated under lease by Wm. Narkaus, at last accounts. Mine, about 5 miles from Granite, in Grant county, reported to have 3 veins, carrying pyrite, chalcopyrite, tetrahedrite, galena and stibnite; the main or Monitor vein is said to be 50′ wide. Production to date amounts to $75,000. The lessee installed compressor and air drills.

BURNT RIVER DREDGING CO. **OREGON**

Address: 506 Oregonian Bldg., Portland, Ore. O. E. Tisch, pres.; D. D. Wallace, sec.-treas.
Cap., $250,000; par $1; 39,125 outstanding.
Property: 680 acres, known as the Pomeroy dredging ground, 8 miles S. of Durkee in Baker county.

CANYON MOUNTAIN MINING CO. **OREGON**

Address: Jackson Chambers, pres., Canyon City, Ore.
Cap., $1,000,000; $1 par; 876,392 issued.
Property: Mountain View mine, 1¼ miles S. E. of Canyon City, Josephine county, said to carry free milling gold.
Development: by 500′ tunnel. Inactive since 1914.

CHETKO COPPER CO. **OREGON**

Idle. **Office:** Ashland, Ore. Mine near Kerby, Josephine county, Ore.
Officers: C. W. Evans, pres and gen. mgr.; C. C. Hicks, v. p. and supt.; A. E. Shepard, sec.-treas.; Theo. R. Heintz, mgr.
Inc. Aug. 10, 1905, in Arizona. **Cap.,** $1,000,000; $1 par; issued, 730,516.
Property: 36 claims, 720 acres, fairly timbered, and 2 water rights, in Curry county, about 70 miles from Grant's Pass, the nearest railroad point. Said to show 8 orebodies, one reported by company as of 240′ average width, traceable 1¼ miles, carrying native copper in schist, also covellite, bornite and chalcopyrite, of 9% average copper tenor, with $4.75 gold per ton.
Development: by shafts of 45′, 34′ and 80′, and by 6 tunnels, of 30 to 230′ length, with 969′ of workings, estimated by company to show 600,000 tons of ore, with 115,000 tons blocked out for stoping, which figures are regarded as excessive. Closed down, 1918.

COLUMBIA GOLD MINING CO. **OREGON**

Operated the Columbia gold mine, near Sumpter. Company sold its entire property, 1917. Fully described in Min. Resources of Oregon, Vol. 2, No. 4.

COMMERCIAL MINING CO. **OREGON**

Address: 214 Chamber of Commerce Bldg., Portland, Ore.

Cap., $1,750,000; $1 par; 1,666,000 issued.

Property: the Rainbow mine covering the Rainbow vein, a brecciated zone, 5′-50′ wide, made of rock fragments cemented by quartz.

Development: by 400′ shaft with 1,700′ of drifting on vein on 200′ level.

Equipment: 15-stamp mill, with tube mill, Dorr classifier and thickener, etc. The mill is reported to make a recovery of 95%. (See Min. Resources of Oregon, December, 1916, Vol. 2, No. 4, p. 66.)

Production: previous to 1911, the mine produced $242,000. During 32 months ending December 1, 1915, the U. S. Sm. M. & R. Co. extracted 95,747 tons of ore averaging $12 per ton and representing $1,083,360 in bullion.

CONTINENTAL MINING CO. **OREGON**

W. W. Robbins, pres.; E. J. River, sec.-treas., 1308 Sixteenth St., Spokane, Wash.

Property: 23 miles from Sumpter, Baker county, said to show a vein 18-36″ wide with 4-16″ of high-grade gold-silver ore.

Developed to depth of 400′. A 20-ton flotation plant was erected in 1919.

COPPER DYKE MINING CO. **OREGON**

Office: Homestead, Ore.

Officers: Wm. S. Kuhn, pres., Amer. Nat'l Bank Bldg., San Francisco, Cal.; A. S. Humphreys, sec.-treas. Herbert Stone, mgr.

Inc. Oct. 13, 1917, in Washington. **Cap.**, $100,000; par 10c; none issued.

Property: Macdougal group, 80 claims, 19 patented, 1,600 acres on Snake river, 5 miles N. of Homestead, Baker county, said to show a fissure vein in porphyry, with strike N. 20° W., dip 75° E., containing copper, silver and some gold. Copper occurs as chalcocite and bornite. Mill ore runs 3 to 6% copper, shipping ore 20 to 50% copper.

Development: by 200′ incline shaft and 6 tunnels having a total length of 3,340′. **Equipment:** includes steam power, air compressor, etc.

Geology fully described in Min. Res. of Oregon, Vol. 2, No. 4, p. 146.

COPPER KING MINING CO. **OREGON**

H. W. Webber, mgr., Placer, Ore.

Property: 8 claims, near Placer, Josephine county, reported under development, 1918-19.

CORNUCOPIA MINES CO. **OREGON**

Officers: Robt. M. Betts, pres.-mgr., Cornucopia, Ore.; J. P. Walsh, v. p.; W. H. Richardson, sec.-supt.; Jos. B. Thomas, treas., 132 E. 19th St., New York City.

Cap., $1,000,000; $10 par; all outstanding.

Property: the Union-Companion mine at Cornucopia, Baker county, Ore., 25 miles from a railroad. Gold was discovered in this district in 1880, and in 1895 the Union-Companion claims, although but slightly developed, were sold for $60,000, and a 20-stamp mill built.

The vein is said to be traceable on surface for 6,800′ with strike of N. 20° E., dip of 45° W., and 2-5′ wide, maximum width 20′. Wall rock is granodiorite and schist. Vein material is massive white quartz containing 3 to 5% of pyrite, which carries the gold. There is some silver sulphide present, also appreciable quantities of chalcopyrite, arsenopyrite and blende. Ore ranges in value from $10 to $20 per ton. Company also owns the Last Chance mine at Cornucopia, formerly operated under lease by the Baker Mines Co.

Development: by incline shafts, with the 800′ the lowest level, said to show 4 ore-shoots having an average width of 3′ and an aggregate length of 1,200′.

Mill: 20 stamps, weight 850-lb. each, making 98 drops per minute through 7″. Ore is crushed in a 4-lb. KCN solution. Stamp duty is 4½ tons per stamp. Fine grinding is done in two 5′x22′ tube mills, each driven by a 75-h. p. motor. The cyanide plant is equipped with Dorr thickeners, 3 Pachuca tanks, and 2 continuous revolving drum filters. An extraction of 87 to 89% of gold and silver is obtained. Average consumption of supplies per ton of ore is cyanide, 1.4 lbs.; lime, 3 lbs.; zinc dust, 0.9 lb. Power is furnished by the company's hydro-electric plant, 2 miles from the plant. Current is transmitted

at 6,600 volts and transformed to 2,200 volts for use. Cost of treatment is said to be $2 per ton. Production estimated at $1,000,000 in gold annually up to time of the war. Operations have since been curtailed. See Min. Res. of Oregon, Vol. II, No. 4, p. 74. Company is reported to be doing extensive experimental work on its low grade ores with the object of building a new and large mill if tests are successful.

DOROTHEA GOLD MINES CO. **OREGON**

Address: 122 Oregon Terrace, Medford, Ore.; and J. F. Reddy, Grants Pass, Ore.

Officers: J. F. Reddy, pres.; Lincoln McCormick, sec.; Mary F. Reddy, treas.

Inc. 1916, in Oregon. **Cap.,** $50,000; $1 par; all issued.

Property: 200 acres, 120 patented, on Coyote creek, Josephine county, Ore.

Claims show a contact deposit between serpentine and diorite; the mineralized zone is 2 to 12′ wide dipping 20°, with N.-S. course, the ore containing 30% chromic oxide. Ore shoot is said to be 200′ long and 5′ wide, and to average $5 per ton.

Development: by 500′ crosscut tunnel and 300′ drift on vein, workings amounting to 1,000′ to depth of 170′. Reserves given by company as 8,000 to 10,000 tons.

Equipment: includes a 5-stamp mill and concentrator, expected to make a 65% concentrate. Concentration of low-grade chrome ores is increasing, as less than 40% grade has a narrow market.

ELDORADO COPPER MINING CO. **OREGON**

Address: Andrew Laidlaw, Columbia Bldg., Spokane, Wash.

Incorporators: Andrew Laidlaw, S. W. Miller, C. P. Ritter, F. W. Beyer and Henry Banfield.

Inc. 1916, in Washington. **Cap.,** $2,000,000; $1 par. Company organized to take over the Banfield mine, 32 miles east of Riddle, Ore., on the S. P. railway. The price is said to have been $300,000, partly in stock.

Property: 9 claims, formerly owned by the Douglas-Umpqua Mng. Co., said to show nine veins, 3 of which have been developed. Ore estimated to average 4% copper with slight gold and silver values.

Development: by 6 tunnels, lowest 900′ below surface, with about one mile of workings, estimated by management to block out 300,000 tons of ore. This is an old mine which has been under development for 16 years.

EMPIRE GOLD DREDGING & MINING CO. **OREGON**

Office: 250½ Third St., Portland, Ore.

Officers: W. F. Burrell, pres.-mgr.; O. L. Kennedy, sec.-treas.; Chas. H. Timms, supt.

Cap., $100,000; $100 par; $72,000 issued.

Incorporated to rework placer ground in John Day Valley and Canyon Creek, Grant county, credited with past production of $15,000,000 in gold.

Equipment: 6 cu. ft. bucket dredge.

EQUITY COPPER & GOLD MINING CO. **OREGON**

Mine P. O.: Prairie City, Ore.

Officers: Rev. W. J. Hughes, pres.-treas.-gen. mgr.; C. F. Godwin, v. p.; Mrs. Kate Palmer, sec., with E. T. Johns, E. J. Hughes, August J. Smith and H. J. Smith, directors.

Inc. 1901, in Oregon. **Cap.,** $150,000; 10c par. Paid one dividend of $3,000.

Property: 6 claims, unpatented, 88½ acres, with a 5-acre millsite in the Quartzburg district, 7 miles N. of Prairie City, Grant county. Reported to show several veins, 3 of which are developed by tunnels and are traceable ½ mile. The sulphide ore is estimated by company to average 1.5 to 3% copper with lead, zinc and silver values.

Development: by 3,000′ of tunnels to depth of 375′. **Equipment:** includes 5-stamp amalgamating and concentrating mill, crusher, tables and 3 slime tables.

Total output to date $125,000. Mine worked in a small way by lessees from 1903-1914. Greater depth and more adequate equipment necessary.

EUREKA MINING, SMELTING & POWER CO. **OREGON**

Idle. P. O. Box 63, Clarkston, Wash. W. E. Howard, sec.

Property: 40 claims, patented, at Imnaha, Wallowa county, Ore. Secretary reports, property idle for many years, awaiting railway facilities.

FLAGSTAFF MINE **OREGON**

J. H. Sullivan, supt., Baker, Ore.

Property: in Virtue district, 6 miles N. E. of Baker, Baker county. **Ore:** occurs in quartz fissure veins, with values in small high-grade shoots. The main or Big Ledge vein, 5-8′ wide, runs N. 15° W. with dip of 60° E. and is said to average $16 per ton in gold.

Development: 5,000′ of workings with 760′ three-compartment shaft.

Equipment: 20-stamp mill, cyanide plant, steam power.

Property controlled in Boston, operated intermittently by lessees.

FREELAND CONS. MINING CO. **OREGON**

Dissolved, March 25, 1914.

Property now owned by Cons. Copper Mng. & Power Co., which see. Fully described in Vol. XII.

GIRAFFE MNG. & MLG. CO. **OREGON**

Officers: at last accounts, G. Cartright, pres.; A. O. Weatherman, sec.; Grace Nichols, treas.

Cap., $150,000; $1 par; 75,000 issued.

Property: 7 gold claims in Mormon Basin, Baker county, said to show ore occurring in a narrow mineralized porphyry dike cutting argillite, with intrusive bodies of serpentine and dikes of basalt. At 85′ depth, gold bearing ore assaying about $4 per ton was reported cut.

Development: by shaft and tunnel.

GOLCONDA MINE **OREGON**

R. J. Rowan, lessee.

Property: 2 chrome claims, 6 miles N. E. of Takilma, Josephine county.

Ore: occurs in lens shaped masses in serpentine, 33′ thick with N. 15° E. course and dip of 65° E. As usual, with chrome deposits, they are irregular in shape and variable in quantity, but geologic conditions are considered favorable.

In 1918, property was equipped for extensive development, and a production of 5,000 tons of concentrates annually was contracted for with the Atlantic Ore & Alloys Co. of Philadelphia.

Production: 2,000 tons of ore averaging 40% chrome oxide in 1916. In 1918 shipments amounted to 450 tons in May; 1,035 tons in June, and 1,500 tons in July.

GOLD BAR MINE **OREGON**

Property: placer claims in the Agness district, Illahe, Curry county. Worked intermittently since 1856, but regularly only since 1911. Reported sold 1918, to Seattle, Wash. people, who are said to be operating 3 giants and a steam-shovel. Bedrock is black shale; gravel is 9′ thick with 4′ of overburden. Yields have been fair. Property has plenty of water for washing.

GOLD CREEK MINING & MILLING CO. **OREGON**

Address: Salem, Ore.

Officers: Otto Hansen, pres.; W. I. Staley, sec.-treas.

Cap., 3,500,000 shares; $1 par.

Property: 17 claims, 16 miles N. E. of Gates, on S. P. R. R., N. Santiam district, Marion county, said to show massive pyrite, chalcopyrite, galena, and sphalerite, in a vein in andesite.

Development: 1,500′ crosscut tunnel and 1,000′ of drifting on orebodies.

GOLDEN CHARIOT MINING & MILLING CO. **OREGON**

Address: Sumpter, Ore.

Officers: Chas. Wiedemann, pres.; O. E. Conner, Jr., mgr.; Rose Rennekamp, sec.

Inc. in Oregon. **Cap.,** $350,000; $1 par.

Property: 400 acres at 4,500′ elevation, 2½ miles from Sumpter, is

said to show a fissure vein in limestone. The gold-bearing ore is reported to occur in shoots, 6′ wide on the 210′ level.

Development: to 300′ by vertical shaft, to be sunk another 200′. Core drilling to 500′ below 210 level; winze below reported in free milling ore.

Equipment: includes 50-h. p. friction hoist, steam-driven compressor, and pumps. A 50-ton mill is to be installed in 1920.

GOLDEN EAGLE MINING CO. **OREGON**

Office: The Dalles, Ore., J. S. Fish, pres.; J. C. Hostetler, sec.-treas.

Cap., $441,000; $1 par.

Property: 8 claims in Greenhorn district, Baker county, Ore. Past production, $75,000. Claims said to show a number of non-persistent fissures; only three of them ore-bearing. No. 2 vein has been followed to depth of 200′, and besides free gold, the ore contains some galena and copper.

Development: by tunnels aggregating 2,600′, to depth of 175′; also shaft 75′ below lowest tunnel. Work to be resumed in 1920.

GOLDEN GATE MINING CO. **OREGON**

Office: 145½ S. Main St., Marion, Ohio.

Officers: M. F. Douce, pres.; J. F. Lust, treas., both of Marion, Ohio; G. L. Bender, sec., Greenhorn, Ore.

Cap., $1,500,000; shares $1 par; 135,000 shares issued.

Property: 2 miles N. of Greenhorn, Grant county, Ore., said to show a quartz vein in greenstone, pinching and widening to 48 inches.

Development: 2 tunnels on vein; upper 800′ long, lower with other workings, 2,400′. Best ore found near mouth of lower tunnel. Two shoots said to be 225′ and 60′ long with maximum width of 20″; a third is 200′ long and up to 42″ wide. Ten stamps crushed ore in 1915, but operations were unprofitable, and in 1917 mine was closed down and equipment sold.

GOLDEN RULE CONSOLIDATED M. & M. CO. **OREGON**

Office: Salem, Ore.; C. L. Johnson, sec. **Cap.,** $500,000; shares 5c par.

Property: 26 claims, 15 miles S. E. of Disston, Bohemia district, Lane county, Ore. Idle.

GOLDEN STANDARD MINING CO. **OREGON**

Former office: 308 Commercial Block, Portland, Ore.

Officers: at last accounts, K. K. Kubli, pres.; E. B. Wilson, sec.; E. J. Kubli, treas.

Cap., $100,000; $1 par.

Property: 82 acres (known as the Kubli) in Gallo Creek district, Jackson county, said to show a 1 to 18″ quartz vein opened for 200′, carrying rich ore.

Equipment: 2 -stamp mill and concentrator. Idle.

GOLD HILL MANGANESE CO. **OREGON**

Address: Grants Pass, Ore.

Inc. 1918. **Cap.,** $1,000,000.

Property: 4 claims, on Shan creek, 6 miles from Rogue river, Josephine county. Ore: gold-bearing quartz said to run 24-44% manganese. To be developed and equipped with stamp-mill, etc.

GOLD HILL QUARTZ MINING CO. **OREGON**

Office: Medford, Ore.

Officers: C. R. Ray, pres.-treas.; E. W. Liljegran, sec., at last report.

Cap., $60,000; $100 par.

Property: some claims, 2 miles S. E. of Gold Hill, Jackson county, Ore. Little has been done, save assessment work.

GOLD & PLATINUM MINES CO. **OREGON**

Office: Grants Pass, Ore. I. F. Peck, pres.

Inc. 1916. **Cap.,** $1,000,000; $1 par.

Property: 1,280 acres of placer claims on Cave creek, Josephine county, for which dam, flume, sluice-boxes, etc., have been constructed.

GOLD STANDARD MINING CO. **OREGON**

Office: Ashland, Ore.

Officers: P. S. Casey, pres.; F. G. McWilliams, sec., at last report.

Cap., $82,000; par $1.

Property: 30 acres, 2½ miles W. of Jacksonville, Jackson county, Ore. Vein supposed to be extension of adjoining Opp mine. No recent returns.

GREENBACK GOLD MINING & MILLING CO. **OREGON**

Address: Placer, Josephine county, Ore. Mr. Childers, mgr. Owned by R. C. Robinson, Parish, N. Y.; and leased to W. L. Holmes of Buffalo, and H. L. Holmes of Geneva, N. Y.

Property: 1½ miles N. of Placer, which is 8 miles from Leland (nearest railroad), in Greenback district, said to show a vein of quartz, calcite, and pyrite in greenstone, cut off by serpentine to the east. Ore averages 20″ in width, assaying $8 per ton in upper levels.

Development: since 1897 opened by 12 levels to 500′ vertical depth. Above No. 9 most of the ore has been stoped. A winze opened the ore below No. 9.

Equipment: largest plant in southern Oregon, consisting of 40 stamps (motor driven), 3 crushers, 12 concentrators, cyanide annex, 7,000′ aerial tram, and compressor.

Developing at last accounts.

GREYBACK COPPER MINES **OREGON**

Address: Selma, Ore. John Hampshire, mgr.

Property: 20 claims, 13 miles E. of Selma, in the Waldo district, Josephine county, Ore., purchased in June, 1917, by Twohy Bros. Co., railroad contractors of California and Oregon.

Development: 700′ of tunneling has, it is said, proved existence of a large copper deposit.

JOHN HAMPSHIRE COMPANY **OREGON**

Address: John Hampshire, Grants Pass, Ore.

Inc. 1918. Succeeds the American Exploration Co. and owns holdings of the Waldo Sm. & Ref. Co. and the Takilma Sm. Co.

Property: Queen of Bronze mine and Waldo mine, near Takilma, Waldo district, Josephine county. Geology fully described in Min. Res. of Oregon, Bull. 2, No. 4, 1916, pp. 184-230.

Equipment: includes smelter with 125-ton water jacket blast furnace and 50-ton Waldo mill. Both properties are old producers.

HECLA CONS. MINING CO. **OREGON**

Former office: Baker, Ore.

Officers: J. L. Rand, pres.; M. E. Brooks, sec.-treas.

Cap., $1,000,000; par $1; all issued.

Property: 11 claims, about 9 miles from Joseph, Wallowa county.

Ore: chiefly galena and sphalerite with some pyrite, occurs in small lenticular bodies less than 1′ wide and 2-3′ long. Some lead carbonate and occasional copper staining also occurs. Presumably idle.

HEPPNER MINING CO. **OREGON**

Office: Heppner, Ore. **Officers:** D. B. Stalter, pres.; J. O. Hager, sec.; S. A. Wright, treas.

Cap., $1,000,000; 10c par; $97,458 issued.

Property: 13 claims, in New Eldorado district, Grant county, about 18 miles from Austin, the nearest shipping point. Claims show over a dozen quartz veins from 1-20′ wide, that carry free gold and some pyrite near the surface. No recent returns.

HIDDEN TREASURE GOLD MINING CO. **OREGON**

Known locally as I. X. L. mine.

Officers: F. T. Kelly, pres.; N. M. Kelly, sec.

Cap., $1,250,000; $1 par; 1,090,600 issued.

Property: 11 claims, near Greenhorn, Grant county, reported to show 3 veins carrying gold ore. Developed by 2 shafts. Idle since 1915.

HIGHLAND MINE **OREGON**

Address: Baker, Ore.

Formerly owned by Highland Gold Mines Co. and worked by Highland

Dev. Co.; latter company dissolved January, 1917. Mine sold to National Mines Co. in February, 1920.

Property: 6 claims, in Rock Creek district, Baker county, Ore., 14 miles from Haines, the shipping point. Claims show 4 ore shoots carrying lead-silver-gold values.

Development: by 6 tunnels with about 5,000′ of work.

Equipment: 100-ton mill, including flotation plant, in which average recovery has been 2 oz. silver and 0.25 oz. gold per ton. Tailings reported to contain $1.80 to $2.20 per ton in gold and silver.

Production: from 1905 to Apr., 1914, was 6,322 tons of ore and concentrates, yielding $311,552. Reported shipping ore and concentrates in 1920.

HOMESTEAD-IRON DYKE MINES CO., INC. **OREGON**

J. R. Buchanan, gen. mgr., care of Goodrich, Lockhart Co., No. 60 Broadway, New York. D. M. Goodrich, pres.; Chas. C. Goodrich, sec.-treas.

Cap., 1,000 shares, all issued.

Operates property of Iron Dyke Copper Co., which see.

Production about 50 tons per day in 1919, producing 1,000 tons of concentrate a month.

HYDRO SIXES MINES CO. **OREGON**

Office: 57 Post St., San Francisco, Cal.

Officers: W. J. Bell, pres.; G. W. Root, sec.; C. J. Pease, treas.

Cap., $70,000; $1 par; all issued.

Property: 1,200 acres placer ground between Otter and Elephant Rock Creek, just below the forks of Sixes River, Curry county. Company uses water under 150′ head, from Big Otter Creek.

Employed 50 men at last accounts. Company spent $100,000 improving and equipping property.

IBEX MINE **OREGON**

Address: Sumpter, Ore.

Property: near Granite Creek, Cracker Creek district, Baker county, 8 miles N. W. of Sumpter, Ore.

Development: the work done in the past 15 years consists of about 8,000′ of tunnels, etc., with 3,000′ of it on the gold bearing vein. The vein averages 5′ in width, but has a maximum of 25′. It occurs entirely in argillite, contains sulphides, and is generally low-grade.

IMNAHA MINE **OREGON**

Address: S. L. Winchester, Imnaha mine, Joseph, Wallowa county, Ore.

Property: 25 miles N. of Homestead and 40 miles E. of Joseph, the railroad terminus.

Development: 4,000′ of tunnels, etc. Vein said to be 3½′ wide. Reserves estimated at 50,000 tons of gold ore.

Equipment: 10-ton mill driven by water-power. No recent returns.

IMPERIAL EAGLE MINING CO. **OREGON**

Address: 9 E. 5th St., Covington, Ky. **Mine office:** Sumpter, Ore.

Officers: C. L. Arzeno, pres.-mgr.; Fred A. Salmer, v. p.; Alvin Davidson, sec.-treas., with B. Moeller, Chas. J. Summers, Frank C. Marty and John Arzeno, directors. John S. Schmidt, supt.

Inc. May 8, 1919, in Oregon, to take over the holdings of the Blue Mountain Mining Co. and the Imperial Mining Co. **Cap.,** $500,000; 2,000 7% pfd. shares, par $100 and 300,000 com. shares, par $1; subscribed for, $460,000; actually issued (July, 1919) $99,200. Company reports $40,000 in treasury. Annual meeting, second Tuesday in March.

Property: 23 patented claims, 25 acres, in Cable Cove district, Baker county, 10½ miles N. W. of Sumpter.

Ore: occurs in fissure veins in diorite, running E.-W. and dipping in opposite directions. Values are mainly gold, silver, and lead, with a little copper and zinc. Mill ore said to average $5.30, and shipping ore $30 to $40 per ton. Reserves were estimated by management at 67,364 tons opened up, valued at $670,000.

Development: by 16 tunnels to depth of 690′.

Equipment: amalgamating-concentrating mill of 125 tons daily capacity, steam power, 6-drill compressor being installed.

Production: steady shipments have been made for several years, but roads are poor, hampering operations. Company will eventually absorb the Blue Mountain M. Co.

IMPERIAL MINING CO. **OREGON**

Described in Volume XIII. Reorganized 1919, as Imperial Eagle Mining Co., which see.

IRON DYKE COPPER CO. **OREGON**

Office: Homestead, Baker county, Ore.

Officers: F. F. Curtze, pres.; F. A. Brevelier, sec.; A. A. Claus, treas.; J. R. Buchanan, mgr.

Inc. in Pennsylvania. **Cap.,** $500,000; par $1; 380,000 issued. Erie Trust Co. holds title by trust deed and bond. Worked by Homestead-Iron Dyke Mines Co., Inc., a Goodrich-Lockhardt subsidiary.

Property: a copper deposit discovered 1897, about 2,000′ from railroad at Homestead. Lower tunnel, 300′ above town, is about 1,300′ long, cutting the orebody at 800′ in and connected by raise with 3 tunnels above. The mine has several thousand feet of workings. The lower tunnel shows massive chalcopyrite and pyrite ore about 6′ wide, said to extend upward to the upper tunnel. Ore said to contain $2 to $3 gold, 3 oz. silver and 4% copper per ton. Reserves said to be proven by diamond drilling, are estimated to amount to 500,000 tons of a gross value of $10,000,000.

Reopened 1915, after years of idleness, and is largest copper producer of the State. A wide body of 4% ore, with good precious metal content, was opened at a depth of 850′.

A 125-ton concentrating plant commenced work in September, 1916, using flotation as part of the process with a 93% recovery claimed. Concentrates aggregate about 1,000 tons a month, and are hauled by team, as R. R. tunnel, burned out in 1918, has not been reopened. About 90 men employed.

Mine is a steady producer and apparently has promising future.

KOEHLER MINE **OREGON**

Address: A. Koehler, Baker, Ore.

Property: in the Virtue district, 4½ miles from Baker, was a producer of high-grade antimony ore in 1915. Has a well-defined vein, up to 10′ in width, carrying massive and disseminated stibnite, together with gold values.

Output to date is said to be $15,000, and mine still contains considerable ore.

LAST CHANCE MINE **OREGON**

Owned by Cornucopia Mines Co., which see.

LEWIS & CLARK M. & M. CO. **OREGON**

Officers: Dr. F. M. Brooks, pres., Oregonian Bldg., Portland, Ore. Thos. Skaife, sec.; M. Palmer, treas.

Cap., $100,000; shares 10c par; 710,000 issued.

Property: 5 claims in North Santiam district, Marion county, about 18 miles N. E. of Gates, on a branch of the S. R. Ry. Developed by tunnel said to show veins 1-5′ wide in andesite. Ore contains copper and iron sulphides, gold and silver in zinc.

Working on a small scale.

LINCOLN MINES CO. **OREGON**

Office: Albany, Ore.

Officers: A. M. Hammer, pres.; J. D. McLain, sec.; J. McChesney, treas., all of Albany.

Cap., $250,000; $25 par; all issued. Is the successor of the Albany M. & M. Co.

Property: 8 claims, known as the Albany mine, in Quartzville district, Linn county, about 23 miles from Gates. **Ore:** lead-zinc sulphides with gold values occur near the surface in veins in andesite. Veins are said to be shear zones up to 50′ wide with lenses of sulphides on the foot or hanging walls and distributed through the zone.

LISTEN LAKE GOLD MNG. CO. **OREGON**

Officers: F. W. Thomas, pres, Fargo, N. D.; C. I. Flynn, sec.

Cap., $500,000; $10 par; all issued.

Property: 4 quartz claims and the McNamee placer about 6 miles from Austin on the Sumpter Valley railroad, in Greenhorn mining district, Baker county, Ore.

Development: by 120′ shaft, under water below 10′ from surface.

LUCKY BART GROUP **OREGON**

J. H. Beeman, Gold Hill, Jackson county, Ore., owner and mgr.

Property: 11 claims, partly patented, 220 acres in Sardina mining district, near Gold Hill, said to carry veins averaging 2′ in width. Ore is free milling, running from $5-$100 and said to average $50 per ton. Developed by 2,000′ tunnel to depth of 190′.

Equipment: includes 40-h. p. steam plant, 10-stamp concentrating mill. Concentrates said to average from 3-5 oz. gold and silver. Mine has been operated more or less regularly for many years.

MANGANESE METALS CO. **OREGON**

Inc. October, 1917.

Property: Tywell mine on Tywell ranch, 5 miles S. W. of Lake creek, Jackson county.

Exploratory work reported to have exposed a face of ore averaging 20% manganese for 10′ in height and 150′ in length. **Ore:** occurs as pyrolusite and psilomelane disseminated through a bed of volcanic tuff breccia from 3-100′ thick, lying between flows of basalt.

Equipment: includes 20-ton concentrating mill, concentrates produced said to average 45% Mn. The shipping point is Eagle Point, 17 miles distant.

Early in 1918 Victor Rakowsky took a lease on the Tywell and adjoining prospects, but extensive churn-drilling failed to prove sufficient ore of commercial grade to warrant erection of the proposed 500-ton mill.

MOUNTAIN GEM MINING & DEVELOPMENT CO. **OREGON**

Address: Joseph, Ore.

Officers: Harry Dawson, pres.; T. F. Tomkins, sec.-treas.

Cap., $200,000; 10c par; $124,211 issued.

Property: the Gem mine, 11 claims in Wallowa district, 10 miles from Joseph, Wallowa county.

Geology: ore occurs in a contact zone between grano-diorite and limestone with calcareous schists, the values being in pyrite, chalcopyrite and molybdenite.

Development: by crosscut tunnel. Output in 1915 was 14 tons of $30 ore.

NEW ELDORADO MINING & REDUCTION CO. **OREGON**

Office: Austin, Ore.

Officers: E. B. Reed, pres.; E. H. Saxe, sec.-treas.

Cap., $100,000; $1 par; 1,750 issued.

Property: known as the Pioneer, on the south slope of Greenhorn range, New Eldorado district, Grant county, said to show granodiorite cut by coarse-grained dikes of grano-diorite porphyry. The altered zone carries veins of bluish quartz from a few inches to 5′ wide, containing gold, a little antimony, blende, and low silver-gold values.

NORTH FAIRVIEW MINING CO. **OREGON**

Address: Herbert Leigh, 38 E. 6th St., Eugene, Ore.

Officers: G. W. McQueen, pres.; Herbert Leigh, sec.; Darwin Bristow, treas.

Cap., $300,000; par 10c; all issued.

Property: 15 claims N. of Fairview mountain, ½ mile from Bohemia, Lane county.

Geology: a mineralized fracture zone in andesite, 12′ wide, said to have been traced for over a mile.

Development: 2 tunnels, one 300′ long, 100′ below outcrop; the other 150′ long with depth of 450′. No recent returns.

OAK MINE **OREGON**

Address: G. A. Baker and Geo. Buell, owners, Grants Pass, Josephine county, Ore.

Mine is 6 miles E. of Hugo, in Grants Pass district, Josephine county. **Ore:** main vein is gold-bearing; also several small copper veins.

Development: by tunnel with total of 800′ of workings. Equipped with 20-h. p. gas engine and compressor.

OGLE MOUNTAIN MINING CO. **OREGON**

Office: 1003 Main St., Oregon City, Ore.

Officers: J. B. Fairelough, pres.; W. J. Wilson, sec.-treas.

Cap., $1,000,000; $1 par; all issued.

Property: 22 claims, 14 miles from Gates on the S. P. R'y, in the Ogle Creek mining district, Clackamas county.

Ore: low-grade ore which occurs in a well-defined fissure vein about 5′ in width. The average value is $5 per ton.

Development: by 1,460′ tunnel driven 560′ below the two old tunnels to cut the downward extension of the vein. Several small veins have been cut, but contain only very low-grade ore.

Company lost money building a mill which proved a failure, and has since done very little work.

OLD GLORY GOLD MINING CO. **OREGON**

William Stock, sec.-treas., Grants Pass, Ore.

Cap., $1,000,000; shares $1 par; 604,200 issued.

Property: the Old Glory mine, 4 lode and 2 placer claims, on Silver creek in western Josephine county, said to show a large lode of low-grade copper ore carrying gold and silver values. Property was to be equipped with machinery, but the death of the president delayed financing and development has been retarded.

OLIVE CREEK MINING CO. **OREGON**

Idle. **Office:** Baker, Ore.

Officers: Thos. M. Tobin, pres., 9332 So. Chicago Ave., Chicago, Ills.; S. A. Tobin, sec.; A. J. Weckler, treas.

Cap., $1,000,000; $1 par; all issued.

Owns the Olive Creek and Quartz gulch placers in Greenhorn mining district, Grant county, Ore.

OPHIR MAYFLOWER MINE **OREGON**

Idle. **Address:** A. J. Champion, Howard, Ore.

Property: 8 miles from Howard, in Ochoco district, Crook county, Ore., 41 miles from railroad at Redmond.

Geology: the rocks are andesite, occurring as flows interbedded with tuffs and breccias. Mineralization is in wide fracture zones of altered rock.

Development: by 1,400′ crosscut tunnel, and one 200′ above. Drifts follow the fracture zones. Ore is 1 to 6′ wide and 70′ long; shipments averaged $70 gold. A second shoot, 20′ long and 4′ wide, averaged $125 per ton. The values in the lower tunnel only carry about $3 per ton.

Equipment: includes a small amalgamating-concentrating stamp-mill.

OPP MINE **OREGON**

Address: J. W. Opp, Jacksonville, Ore.

Property: 373 acres, situated 1½ miles W. of Jacksonville, Jackson county, Ore.

Geology: three main veins from 2 to 4′ wide, occur in shale and andesite. Two ore shoots, one 300′, the other 150′ long, carry free gold with pyrite, the ore averaging $5 per ton.

Development: by 18 adits, with 7,000′ of workings. One crosscut is 850′, another 550′ long.

Equipment: 3,600′ tram, 6-drill compressor, 20-stamp mill, 125-ton cyanide plant, etc., credited with past production of $100,000.

OREGON GOLD MINES CO. **OREGON**

Last address: 1208 W. Monroe St., Chicago, Ill.

Inc. in Arizona. **Cap.,** $2,000,000; $1 par; 1,657,436 issued. Is a reorganization of the American Gold Fields Co.

Property: the Granite Hill mine, 9 miles N. E. of Grants Pass, Josephine county, active from 1902 to 1907 and credited with a production of $75,000.

Ore: quartz carrying chalcopyrite, galena and pyrite with gold values, occurs in veins in tonalite and greenstone. Main vein said to average 5′ in width and ore treated in 1907 averaged $5 per ton.

Development: by 430′ vertical shaft with total of 12,000′ of workings, now under water.

Equipment: includes 20-stamp mill, compressor, steam hoist, 5 machine drills and 150-h. p. electric motor. Idle since 1907.

OREGON-IDAHO INVESTMENT CO. **OREGON**

Baker, Baker county, Ore.

Officers: Jas. A. Howard, pres.; John Arthur, v. p.; Fred R. Mellis, sec.-treas.

Cap., $50,000; par $100. Is a close corporation organized as a developing and holding company. Operates a sampling plant at Baker.

Property: includes the Poorman group, 8 claims, 160 acres, surveyed for patent, on Balm Creek, 25 miles N. E. of Baker. The group shows a copper-bearing vein for 2,000′ that has a gossan cap 200′ wide in places.

Development: by an 800′ tunnel with several short crosscuts at depth of 100′, showing 2.5 to 3.5% copper, present as chalcopyrite.

Has a lease and bond on the Taber Fraction and has use of the Bourne Gold Mng. company's tunnels to operate the mine.

A flotation plant is to be erected in 1920.

OSCAR CREEK CONS. MINING CO. **OREGON**

Office: 1st Nat'l Bank Bldg., Grants Pass, Ore. **Officers:** Chas. Burkhalter, pres.-treas.; A. H. Gunnell, sec.

Cap., $250,000; $1 par; all issued.

Property: the Jewell & Moore group of 5 placer claims, 3 patented, also 3 additional unpatented claims and 92 acres of dump ground, 2 miles E. of Murphy and 10 miles S. of Grants Pass, Josephine county. Credited with past production of $40,000.

Equipment: includes 3 miles of ditches and 300′ flume line.

PACIFIC MOLYBDENUM MINES, INC. **OREGON**

Address: J. B. Philips, mgr., Greenhorn, Baker county. Mine reported to show an 8′ vein of molybdenum, running from 20 to 25%.

The mill was to be equipped with a 1,000-ton oil flotation unit at last report.

PEARL MINING CO. **OREGON**

Office: Central Point, Ore.

Officers: W. C. Leever, pres.; J. W. Merritt, sec.-treas.

Cap., $4,400; $20 par; all issued.

Property: the Buzzard mine, 10 quartz claims, in Elk Creek mining district, 27 miles N. E. of Trail, Jackson county.

Geology: ore deposit occurs in a N. W.-S. E. shear zone in andesite; the ore contains complex sulphides and is handjigged before shipment, 4 tons returning $2,100.

Development: by 1,600′ crosscut tunnel, total work 3,000′, to depth of 170′ on the vein. Mine worked under lease, by Paul Wright, of Trail, Ore., at last accounts.

POWDER RIVER GOLD DREDGING CO. **OREGON**

Office: Insurance Exchange, California St., San Francisco, Cal. **Operating office:** L. T. Roberts, supt., Sumpter, Ore.

Officers: W. P. Hammon, pres.; R. K. Barrows, v. p.; A. E. Boynton, sec.-treas.; with A. L. Dahl and F. J. Mott, directors.

Inc. Oct. 18, 1911, in California. **Cap.,** $500,000; $1 par; all issued. Annual meeting, fourth Monday in October.

Gross earnings in 1918 were $237,603, of which $233,307 was from the gold recovered. Operating costs were $135,260; sundry expenses, depreciation, min-

eral depletion, $86,353; leaving $15,989 profit from operations in Oregon, as compared with $314,990 for the previous year.

In 1919 the revenue was $232,839, of which $111,400 was profit. Current assets exceed liabilities by $320,338.

Dividends: aggregate $1.50 per share, or $750,000 to Sept. 30, 1919.

Property: about 1,500 acres placer ground, near Sumpter, Ore., half of which is considered payable. The gravel channel is from 300 to 2,000′ wide; it will average 1,000′ wide, 18 to 20′ deep, and the pay gravel rests on a soft, decomposed rock called "clay webfoot." Dredge digging may be termed tough, and as a result, the bucket-lips wear out in 5 months' use.

Equipment: consists of a dredge in Oregon that has yet from two to three years' work. A boat in Colorado, after digging 864,375 yds. of 7.69 cent gravel in 1919, at a loss of 3.18 c., was sold to Benjamin Griffith for $160,000, plus $24,000 for supplies.

Production: from Oregon properties, yielded $2,600,000 to September 30, 1919. Results for the past two years, ending September 30, are:

Year	Yards	Yield per yd., c.	Cost per yd.,c.	Daily yardage	Daily hours
1918-'19	1,805,582	12.90	6.73	4,960	19.38
1917-18	1,783,180	13.06	7.97	4,885	19.28

QUEEN OF BRONZE MINE **OREGON**

Described in Volume XIII. Owned by John Hampshire Co., which see.

QUEEN OF THE WEST MINES CO. **OREGON**

Office: 209 Pillsbury Bldg., Minneapolis, Minn. **Mine office:** Cornucopia, Ore.

Officers: A. Y. Bayne, pres.; Lewis W. Campbell, sec.; H. U. Maurer, treas.; R. G. Amidon, mgr.

Inc. in West Virginia. **Cap.,** $1,000,000; $1 par; 993,466 outstanding.

Property: 11 claims in the Cornucopia district, Baker county, developed by tunnels and equipped with 10-stamp mill, concentrating plant, 50-ton cyanide plant, 3,600′ aerial tramway, capacity 6 tons per hour, water power and air compressor.

Geology described in Min. Res. of Oregon, 1916., Vol. 2, No. 4, p. 186.

RAINBOW MINE **OREGON**

See Commercial Mining Co.

RAINIER MERCURY CO. **OREGON**

T. H. Ellis, pres.-mgr., Beagle, Ore.

Inc. 1918, and reorganized 1919 as War Eagle M. Co., which see.

RED BOY MINES CO. **OREGON**

Stock worthless as property was sold for $34,500 at sheriff's sale in 1916 and bid in by bondholders.

Reorganized June, 1916, as Red Boy Mng. & Dev. Co., which see.

RED BOY MNG. & DEV. CO. **OREGON**

Idle. **Address:** Fremont, Neb.

Officers: Ray Nye, pres.; L. A. Peckham, sec.; Paul Colson, treas.

Inc. June, 1916. **Cap.,** $250,000; $1 par; all issued. Is a reorganization of the Red Boy Mines Co.

Property: the Red Boy mine in Granite district, Grant county, credited with past production of $800,000. (The geology is fully described in Mineral Resources of Oregon, Vol. 2, No. 4, pp. 188-191.)

RED, WHITE AND BLUE MINE **OREGON**

Owned by Geo. H. Bodfish, Malheur, Oregon. Property at Malheur said to show a quartz vein, 8 to 10″ wide, carrying gold values that average $5 to $8 per ton. Developed by 134′ vertical shaft and equipped with steam hoist, pump and 6-stamp concentrating mill.

SAMPSON CO., LTD. **OREGON**

Promoted 1910 by F. Wallace White, 115 Broadway, New York, who is under indictment (since December, 1918) for misuse of the U. S. mails, charged

with misappropriation of $120,248 received from the sale of the valueless stock of the Sampson Co., Ltd.

Cap., $2,000,000 in bonds and $7,000,000 in stock.

Property: reported that company owned the Cracker-Oregon and Sampson groups on the North Pole Columbia Lode, Baker county, which are slightly developed prospects of doubtful value.

It is said that White bought control of the practically defunct Sampson Gold M. Co. for $5.000 and later sold the property to the Sampson Co., Ltd., for 200,000 shares of stock and a $100,000 cash compensation in the form of a promissory note, which he subsequently paid to himself out of the proceeds of stock sales. He repeatedly organized companies with valueless or mythical holdings and sold them to the Sampson Co., Ltd., for large sums, payable to himself in cash and stock, thus keeping control of the Sampson Co.

According to report, White is one of the most dangerous and brazen "fleecers of innocent investors" known, who worked his game openly and undisturbed under various names for eight years from a New York office. He is now under indictment and a fugitive from justice. The widely distributed stocks and bonds are valueless.

SANGER GOLD MINES CO. **OREGON**

Idle. **Office:** J. K. Romig, sec., Baker, Ore. F. W. Paine, pres., at last report.

Inc. in Oregon. **Cap.**, $2,000,000; $1 par; 1,295,146 issued.

Property: 600 acres of quartz and placer claims on W. side of Eagle Creek, in an area which has produced about $1,500,000, but where since 1900 there has been little work done.

Geology: quartz veins in a black clay slate. Ore contains 3% sulphides and is considered to be similar to many Californian gold quartz veins. Owing to older slates being fractured, cut by dikes, etc., prospecting is difficult.

Development: by tunnels and an incline shaft 400′ deep. In upper workings the vein shows ore 15″ wide, worth $20 to $25 per ton; in the lower, below the zone of oxidation, the ore is 24″ to 48″ wide, and assays $12 per ton. In 1916 several open cuts and short tunnels were driven to pick up the extension of the vein. Idle since that year.

SHORTY HOPE M. & M. CO. **OREGON**

Address: H. S. Sanford, pres., Ashland, Ore.

Cap., $1,000,000; par $1; 784,498 issued.

Property: 4 miles up Wagner creek from Talent, in Ashland district, Jackson county.

Development: by 1,480′ tunnel. **Equipment:** 10-stamp mill driven by water power.

Work appears to have been spasmodic, but results were not without promise.

SILVER KING MINING CO. **OREGON**

Address: Albany, Ore., or J. J. Langmack, Gerlinger Bldg., Portland, Oregon.

Officers: J. J. Langmack, pres.; E. E. Williams, v. p.; Wm. S. Risley, sec.-treas.

Inc. March, 1909. Reorganized and capital reduced under Oregon Blue Sky Law, June, 1914. Present capital, $500,000; $1 par.

Property: 12 claims covering 4 veins on Little North Santiam river, near Elkhorn, Oregon, in the Cascade Mts., 75 miles from Portland, and 17 miles from railroad. The veins occur in and follow shearing zones, and carry ore with gold, silver, lead, and zinc.

Development: by 2 shafts, 2 prospect tunnels, and a number of open-cuts on veins. The main working tunnel, over 100′ long, will be driven to cut the principal vein of the group at about 1,050′ from portal, at depth of over 900′ on vein below the prospect tunnels. Tunnel will drain mine and permit extraction of ore by gravity system. Average of samples from prospect tunnels show: gold, $1.20; silver, 15 oz.; lead, 3 to 4%; and zinc, 3 to 4%.

Work interrupted by the war is to be resumed.

SIXES MINING CO. **OREGON**

Offices: 741 West 3rd St., Salt Lake City, Utah, and 625 Market St., San Francisco, Cal.

Officers: L. R. Eccles, pres.; C. B. Edington, sec.; John Pingree, treas.; W. A. Bechtel, S. F. mining agent.

Inc. in Utah. **Cap.,** $1,125,000; $5 par; 157,900 issued; assessable. Assessment of 20c. per share levied March, 1918.

Property: an option on placer claims, 300 acres, owned by the Divelbiss family, on the Sixes River, Curry county, 11 miles from Port Orford. Ground contains considerable black sand which holds both gold and platinum, about 10% of the gravel value said to be in the platinum. Three distinct gravel channels are known, one of which is to be dredged, the others hydraulicked. For sluicing a 4½ mile flume is available.

SNOW CREEK MINING CO. **OREGON**

Officers: Henry B. Smith, pres., Bay City, Mich.; Fred D. Smith, v. p.; Ithaca, N. Y.; C. H. McColloch, sec.; R. J. Davison, treas., with J. H. Bowlby, directors.

Inc. June 25, 1914. Cap., $200,000; $1 par; outstanding, 132,000 shares.

Property: 5 claims, 85 acres, including the Snow Creek mine, formerly owned by Oregon Mines Exploration Co., near Greenhorn, Baker county. Ore carries gold, silver, lead in contact deposit, 3′ to 8′ wide; country rock is diorite and slate. Ore extracted in the past is said to have assayed $12 per ton in gold and silver and 5% lead.

Development: 225′ vertical shaft and tunnels, aggregating 1,315′. Claim 9,400 tons of ore blocked out.

Equipment: includes 10-stamp mill. Total output to date about $40,000.

Title was obtained by present company under foreclosure of mortgage. Plan sinking shaft 100′ deeper and developing.

SUMPTER GOLD DREDGING CO. **OREGON**

Address: Sumpter, Baker county, Ore.

In November, 1919, company purchased a boat from the Powder River Gold Dredging Co. for $160,000, arranged for electric power, and expected to start dredging in the spring of 1920.

TAKILMA SMELTING CO. **OREGON**

Office: 301 Mining Exchange Bldg., Colorado Springs, Colo.

Inc. in Colorado. **Cap.,** $250,000; $10 par. Owned a controlling interest in the Waldo Smelting & Mining Co. Fully described in Vol. XIII. Holdings sold to John Hampshire Co., which see.

THREELODES MINING CO. **OREGON**

Officers: C. E. Wickstrum, pres.; N. L. Townsend, sec., Medford, Ore.; George Lindley, treas.

Cap., $350,000; 35c par; all issued.

Property: 9 claims, and 9 others bonded, 2 miles W. of Gallice, Josephine county, said to have been exploited in recent years for tin, tungsten, molybdenum, and platinum.

TRI-STATE CHROME CO. **OREGON**

Controlled by Walter J. Nicholls, Sherwood Bldg., Spokane, Wash.

Acquired Jupiter mill between Canyon City and Prairie City, Grant county, early in 1918 and reported to have produced 8 tons of 40% chromium concentrate daily during part of the year.

TROUT CREEK M. & M. CO. **OREGON**

Office: Canyon City, Ore.

Officers: O. J. Darst, pres.; F. S. Slater, sec.-treas.

Cap., $100,000; $1 par; all issued and paid up.

Property: the Bullion Quartz mine near Burns, Harney district, said to show granite cut by large porphyry dikes. The ore carries gold, silver, lead and zinc.

Development: by tunnels and shaft. Shipments were made to Utah, by way of Crane, 22 miles from the mine, in 1916.

UNITED COPPER CO. **OREGON**

Office: 95 Union St., Seattle, Wash.

Officers: S. S. Fluhart, pres.; B. E. Fluhart, sec., Leland, Ore.; R. N. Leezer, treas. **Cap.,** $1,000,000.

Property: the Copper King mine, 18 miles east of Leland, Greenback district, Jackson county, said to show a fissure vein in andesite. Ore contains chalcopyrite reported to average 4% copper. A concentration mill was erected in 1916, and work continued until war conditions stopped operations.

UNITED COPPER GOLD MINES CO. **OREGON**

Idle. **Office:** Murphy Blk., Salem, Ore. Mine at Selma, Ore.

Officers: W. S. Low, pres. and gen. mgr.; E. O. Moll, v. p.; Daniel Webster, sec.; C. E. Lebold, treas., with W. C. Buckner, James Greig and H. Neugabauer, directors.

Cap., $500,000; $1 par; issued 219,654.

Property: 11 claims, in Illinois district, about 12 miles N. W. of Selma, Josephine county.

Geology: ore occurs in serpentine near porphyry and diorite contacts. A dark gossan sometimes stained with copper is underlain at 15′ depth by ore carrying 18% copper and 5 to 10 oz. silver and upwards of $1 gold, according to management.

Development: amounts to 1,000′, with a 500′ tunnel and 200′ crosscut, exposing 1,000 tons of ore. Property is 34 miles from S. P. R. R. Is regarded as a prospect which might be worked on a large scale were railroad transportation nearer.

UNITED GOLD MINING CO. **OREGON**

Office: 505 Hyde Block, Spokane, Wash. A. B. Lee, pres

Inc. in Washington. **Cap.,** $1,000,000; $1 par; 568,050 issued.

Property: the Cougar mine, 3 miles N. of Granite, Grant county, formerly owned by the Cougar Gold M. & M. Co.; also the Independence mine, 17 miles from Sumpter, Baker county.

Geology: at Cougar mine country rock is a black, silicious, and semi-slaty argillite. Gold occurs in pyrite and ore is not easily amenable to treatment. Three shoots of ore have been exposed.

Development: at Independence, by tunnels. In November, 1919, a shoot had been opened for several hundred feet and the mill was treating 50 tons of ore daily.

UTAH QUICKSILVER CO. **OREGON**

Described in Volume XIII. Succeeded 1918, by Rainier Mercury Co., which was reorganized 1919, as War Eagle Mng. Co., which see.

VANGUARD GOLD-COPPER CO. **OREGON**

Probably dead. Mine near Kerby, Josephine county, Ore. C. E. Phillips, mgr.

Inc. 1910. **Cap.,** $1,000,000; shares $1 par.

Property: 7 miles W. of Kerby, said to carry gold-copper ore. Idle.

VESUVIUS MINES CO. **OREGON**

Office: Eugene, Ore. **Mine office:** Bohemia, Ore.

Officers: E. M. Johnson, pres.; F. J. Hard, sec.-treas.

Inc. in Oregon. **Cap.,** $6,000,000; $1 par; 2,000,000 shares in treasury March, 1919.

Property: 50 claims, including the Vesuvius mine, 15 miles S. E. of Disston, Bohemia district, Lane county.

Geology: andesite flows interbedded with andesite tuffs, traversed by a fracture zone in which the ore occurs. Gold, silver, galena, chalcopyrite, pyrite and sphalerite are the ore minerals.

Development: by 20,000′ of workings with 3 tunnels, the main one 2,000′ long, said to disclose 18″ to 36″ of ore which assays from $7.50 to $20.64 per ton.

Equipment: includes a 10-stamp mill with tables for treatment of gold ores, steam plant, saw mill, etc. Concentrating plant for copper bearing ores to be installed.

VINCENT CREEK GOLD & COPPER CO. **OREGON**

Probably dead. **Former address:** Austin, Grant county, Ore.

Officers: Burton Miller, pres.-gen. mgr.; Ernest Blackwell, v. p.; Nellie H. Miller, sec.-treas., and J. S. Edwards, directors.

Inc. Dec. 5, 1907, in Oregon. **Cap.,** $200,000; $1 par; issued 100,002 shares.

Property: 6 claims, 100 acres, in the Greenhorn district, 5 miles N. W. of Austin, on the S. V. R. R., shows a strong vein, traceable 1,500′, said to average 15′ in width and 3.5% copper. The country is greenstone and copper mineral chalcopyrite.

Development: by a 25′ shaft and 215′ tunnel being driven 600′ with back of 400′. In February, 1916, a 20′ vein of copper ore was opened in this tunnel. There are 3 buildings. Mine has no power equipment.

VIRTUE MINES DEVELOPMENT CO. **OREGON**

Address: Baker, Ore.

Officers: J. K. Romig, pres.; M. Boswell, sec.-treas., at last report.

Cap., $1,500,000; $1 par; 1,384,075 issued.

Property: bonded in 1916 to G. W. Field & Co., of Boston, for $500,000, consists of 16 claims and placer ground, a total of 400 acres in the Virtue district, Baker county. From 1878 to 1898 the gold yield was about $2,189,000, the largest production being $259,000 in 1898. Mine was idle for nearly 15 years, but in 1917 it was reported working and electric power was installed. In 1920 the mine was worked by lessees.

Claims said to show quartz veins in serpentine striking N. W., dipping 45° to 80° S. W. and averaging 14″ in width. Ore carries gold and a little pyrite and chalcopyrite.

Equipment: includes hoist, boilers, 20 stamps, vanners, cyanide plant and electric power.

WALDO CORPORATION **OREGON**

Office: G. M. Esterly, mgr., Waldo, Ore.

Cap., $100,000; $100 par. Company has but two stockholders and no stock for sale.

Property: purchased 1916 for $140,000, includes the Cameron, Simmons and Logan placer mines covering 4,200 acres in Waldo district, Josephine county, which carries auriferous gravel 10′ to 25′ deep that lies on a bed rock of conglomerate and sandstone with some serpentine. Gravel worked thus far is reported to have yielded 12½c. per cu. yd.

Equipment: consists of 3 ditches, 25 m. in length, 6 giants and hydraulic plant.

Annual output averages $45,000 in gold dust and $10,000 in platinum. Considered a valuable property.

WALDO MINE **OREGON**

Described in Volume XIII. See John Hampshire Co.

WALDO SMELTING & REFINING CO. **OREGON**

Office: 301 Mining Exchange Bldg., Colorado Springs, Colo. **Mine office:** Takilma, Josephine county, Ore.

Inc. Dec. 3, 1901, in Colorado. **Cap.,** $3,000,000; par $100.

Property now owned by John Hampshire Co., which see.

WALLOWA COUNTY MINING & DEV. CO. **OREGON**

Address: J. A. Burleigh, Enterprise, Ore.

Officers: Jesse Walker, pres.; J. A. Burleigh, sec.; G. W. Williams, treas.

Cap., $200,000; $1 par; all issued.

Property: 14 claims, on Lick Creek, Wallowa county, said to show a 2′ vein in greenstone, limestone and argillite, cut by aplite dikes. **Development:** by 125′ shaft.

WAR EAGLE MINING CO. **OREGON**

Address: Medford, Ore.

Inc. 1918, to acquire holdings of the Rainier Mercury Co.

Officers: C. M. Kid, pres.; A. L. Hill, sec.-treas.; with Sam Bertelson, and Edward Skewis, directors.

Property: Bertleson group and 35 adjoining lode claims formerly owned by the Utah Quicksilver Co., 12 miles N. of Gold Hill, Jackson county.

Ore: occurs in an andesite fault breccia and is generally low grade. A 5½ vein was tapped in 1919, said to carry 3.5-4% cinnabar. **Equipment:** includes 12-pipe furnace.

Production: August 1, 1918, to Jan. 15, 1919, amounted to 17,425 lb. of metal. June, 1919, production was estimated at 100 lb. mercury per day. Plan erecting 500-ton furnace.

WEST COAST MINES CO. **OREGON**

Officers: W. J. Zimmerman, pres.; W. M. Cake, sec.; W. W. Elmer, mgr.

Cap., $1,500,000; $1 par; 890,000 issued.

Property: the Champion, Helena, and Musick mines, 47 claims, 12 miles S. E. of Disston, Bohemia district, Lane county. Mines under lease to H. C. Mahon, of Portland, at last accounts. The Champion is said to have yielded $1,700,000; the Helena, $150,000, and the Musick, $180.000.

Development: by tunnels. In the Champion the main lode is 3′ wide and at 200′ in depth and below, the principal ore minerals are pyrite, chalcopyrite, sphalerite; and galena. The other mines contain similar complex ores.

Equipment: includes 3,000′ aerial tram, 20 stamps, concentrators and hydro-electric power plant.

WEST SIDE GOLD & SILVER MINING CO. **OREGON**

Address: R. Baird, sec. and mgr., Yamhill, Ore.

Officers: J. A. Simmons, pres.; G. W. Perkins, v. p.; R. Baird, sec.; W. G. Busbee, treas., with C. C. Laughlin, N. H. Perkins, H. C. Gist, directors.

Inc. April, 1900, in Oregon. **Cap.,** 1,000,000 shares; 1c par; 814,307 outstanding. Annual meeting, first Monday in January.

Property: 3 patented claims, about 57 acres, at Greenhorn, Baker and Grant counties, under lease and bond to R. Baird, at last accounts. Minerals are gold, silver, copper, lead. A number of veins cutting through greenstone and schist run at right angles, the N.-S. veins dipping E., and E. W. veins south.

Alteration and faulting are considerable. Ores contain free gold sulphides in quartz and dolomite; cinnabar is also reported. Shipping ore is said to average about $60 per ton and milling ore $20.

Development: by several shallow shafts, comprises about 1,000′ of workings, greatest depth being about 40′.

Equipment: includes a small steam pump. About $10,000 spent in development to 1917. No recent returns.

WHITED MINING CO. **OREGON**

Address: Aldred Whited, Unity, Ore.

Inc. Nov., 1916, in Oregon. **Cap.,** $15,000; $1 par.

Property: 8 claims situated 5½ miles south of Unity, Baker county. Two veins show shoots of gold-bearing quartz, the largest one along the hanging wall of a porphyry dike.

Development: includes 2 crosscut tunnels with drifts on the veins. **Equipment:** 10-stamp mill with amalgamating plates and Wilfley tables. Was developing late in 1916. No recent returns.

PENNSYLVANIA

AMERICAN ZINC & CHEMICAL CO. **PENNSYLVANIA**

Subsidiary of American Metal Co., Ltd. **Office:** 61 Broadway, New York.

Cap., $2,500,000.

Works: at Langeloth, Pa., include a zinc smelter with capacity for treatment of 7,000 to 8,000 tons of zinc ores monthly, and production of 3,000

to 4,000 tons of spelter. Company also owns a sulphuric acid plant with a capacity of 7,000 to 8,000 tons monthly. This property represents an investment of over $4,000,000, and may be divided into the following subheads:

1. Zinc smelting plant. This consists of eight blocks of two furnaces each, each block containing 912 retorts, making a total capacity of 7,296 retorts. Each block is equipped with waste-heat boilers; the furnaces are fired by gas-producers, one producer to each block. The smelting plant has complete accessories, such as power-house, two steam-turbine generator units of 2,000-k. w. each, up-to-date machine-shop, carpenter-shop, and pottery plant.

2. Sulphuric-acid works. This department has a chamber-capacity of from 8,000 to 8,500 tons of 60° B. acid monthly, and also has a contact plant for the conversion of about 3,500 tons of 60° acid into 66° acid. The raw material used in the manufacture of sulphuric acid is zinc-sulphide ore, for the roasting of which four Hegeler kilns with necessary accessories are available. The kilns have a capacity of about 5,000 tons of ore monthly, which would correspond to approximately 5,000 tons of 60° acid. For the handling of the crude ore the works are equipped with modern drying and sampling plants, and storage-bins with a capacity of about 18,000 tons, with overhead cranes. The sulphuric acid plant is one of the most modern in the country, and can be expanded for the production of other acid-products whenever desired.

3. Coal mine. The company owns coal-mining rights over an area of 2,450 acres of the Pittsburgh and Rooster veins. It was estimated that there was a coal reserve in this tract of over 18,000,000 tons, from which only a little over 1,000,000 tons have been mined. Of the above acreage the company owns surface and mining rights on 723 acres and mining rights on the remainder. The mine is equipped to produce about 50,000 tons of coal monthly. The coal mine is subject to a mortgage of $476,000, against which there was on deposit with the Colonial Trust Co., of Pittsburgh, on December 31, 1918, a sinking-fund credit of $23,906.

4. The Langeloth Townsite Co. was incorporated for the purpose of taking over a block of real estate adjacent to the works of the American Zinc & Chemical Co., embracing about 400 acres, with the idea of developing it into a modern industrial town. The town-site has nearly 400 houses completed, some of which have been sold and others leased to the workmen on easy payments. Modern sewage, complete sanitary water-supply, first-class schools, and playgrounds have been provided.

5. For the convenience of the workmen, the company operates a general store under the name of the Langeloth Mercantile Co. The store-building is owned by the American Zinc & Chemical Co., which leases it to the Mercantile Company. The latter sells from $300 to $400 worth of merchandise per day, on which it attempts to make profit only sufficient to cover operating expenses.

6. By-products plants. The company owns and operates:

(a) A zinc-oxide plant with a capacity of about 500 tons monthly.

(b) A zinc-dust plant which produces from 150 to 200 tons monthly.

(c) A zinc-sulphate plant which has been running only intermittently, owing to lack of demand for this material.

AMERICAN VANADIUM CO. **PENNSYLVANIA**

Described in Volume XIII.

Merged 1919 into the Vanadium Co. of America, which see under Peru.

DONORA ZINC WORKS **PENNSYLVANIA**

Operated by the American Steel & Wire Co., a subsidiary of the United States Steel Corporation.

Works: at Donora, near Pittsburgh, Pa. Plant includes bins of 20,000 ton capacity, crushing plant for ore that requires reduction, 6 Hegeler 7-hearth roasting furnaces, mixing house, 10 Hegeler furnaces each contain-

ing 912 distillation retorts, pottery, power plant, and sulphuric acid plant. Furnaces are fired by producer gas.

EAGLE METALLIC COPPER CO. **PENNSYLVANIA**

Inactive. **Address:** care H. D. Deshler, Belvedere, N. J. **Branch office:** 208 Haas Bldg., Allentown, Pa. **Mine office:** R. F. D. 3, Fairfield, Adams County, Pa.

Officers: at last accounts, F. H. Cuyle, pres.; Dr. P. A. Stem, v. p.; A. L. Wickert, sec.; Thos. Zellner treas.; Owen H. Nagle, gen. mgr., with A. V. Diefenderfer, directors.

Inc. 1903, in New Jersey. **Cap.,** $500,000; $1 par, and reinc. Dec. 9, 1910, in Pennsylvania; $150,000 in treasury after raising $60,000 to build a smelter in 1911.

Property: 500 acres in Jacks Hollow, on the Maryland border, one-half mile from and crossed by the Western Maryland railroad, near Charmian.

Development: by open-quarry work from pit 200′ across, connected with smelter by 750′ aerial rope tram. The mine is apparently a large open-cut filled with water. Careful examination of exposed rock and surface material said to show no indication of copper whatever. It is also reported that a pile of crushed ore in smelter bins, 1915, did not contain the minutest particle of mineral. Samples of matte from furnace said to run 2% copper, which evidently came from the pyrite used for flux.

Equipment: includes a 250-h. p. steam plant, 150-h. p. engine and a 2⅝" core drill, with office and laboratory. Smelter built in 1911. Regarded as a valueless property.

NATIONAL COPPER MNG. & DEVEL. CO. **PENNSYLVANIA**

Out of business. Property, described in Vol. XII, is now owned by H. D. Deshler.

UNITED M., M. & COPPER SM. CO. **PENNSYLVANIA**

See description under Maryland.

VIRGIN COPPER CO. **PENNSYLVANIA**

Last address: 12 West Bldg., York, Pa. **Mine office:** Charmian, Franklin county, Pa.

Officers: John H. Dechert, pres.; Chas. E. Wills, v. p.; Clarence A. Wills, sec.; Harry S. Wiest treas.

Property: about 1 mile N. of Charmian, in the Blue Ridge mountains, near the Maryland state line, shows ore carrying native copper, with silver and gold values said to give assays of $25 to $600 per ton.

Development: by 215′ shaft sunk at 47°. Four diamond drill-holes, of 165 to 800′, were bored, 1907.

Equipment: includes small hoist and compressor. Is considered an unpromising venture. Idle.

PHILIPPINE ISLANDS

See ASIA in this book.

PORTO RICO TERRITORY

See WEST INDIES in this book.

SOUTH CAROLINA

KERSHAW MINING CO. **SOUTH CAROLINA**

Address: A. K. Blakeney, Kershaw, S. C., or J. H. Watkins, 200 Fifth Ave., New York City.

Inc. 1917.

Property: the old Haile gold mine, near Kershaw, Kershaw county, worked steadily for many years for its gold ores, and operated 1915-18 for pyrite.

Geology: rocks of the region are sericite and quartz-schists, formed from old volcanic tuffs and porphyry. Pyritization is widespread and deep-seated, the whole series of schists being more or less impregnated with pyrite, but along certain zones this mineralization is highly intensified, the schists in some bands holding so much pyrite that the rock runs 25 to 30% sulphur; wide belts carry 15 to 20% sulphur, and in a few spots pyrite occurs in lenses around which the schists are folded. The gold values vary with pyrite content.

Development: by extensive workings, open-pits, a 100′ shaft and 28 drill-holes, which prove the existence of a large quantity of ore carrying 25% sulphur.

Equipment: complete mining plant and 300-ton mill with crushers, rolls and jigs, producing a concentrate containing 47% sulphur.

SOUTH DAKOTA

Metal mining in the State is practically restricted to the gold mines of the Black Hills, in which silver and tungsten are important by-products. A little lead, tin, and various rare minerals of chemical importance are also mined.

Preliminary estimates of the U. S. Geol. Survey, indicate that gold mines in South Dakota produced $5,391,000 in 1919, as compared with $6,563,337 in 1918, and 114,000 ounces of silver as compared with 159,202 ounces in 1918. The ores shipped to smelters contained only nominal quantities of lead and copper.

The Homestake, Trojan and Mogul companies were the only large operators in 1919.

Our thanks are due to Mr. Otto Ellerman, State Inspector of Mines, for information concerning the mines described herein.

The companies are arranged alphabetically.

AMERICAN MINING CORPORATION **SOUTH DAKOTA**

Address: Deadwood, S. D. Owns the Bismarck mine at Flatiron, a gold-silver-tungsten producer. Mill and cyanide plant on the ground. Idle.

AMERICAN TIN & TUNGSTEN CO. **SOUTH DAKOTA**

Address: 50 Broadway, New York City.

Officers: Simon Lederer, pres.; Leo Bloch, v. p.; Robt. S. Williams, sec.; Chas. P. Bland, treas.

Inc. Jan., 1917, in Delaware. **Cap.,** $1,500,000; par $1; 1,200,000 issued. Listed on New York Curb; quoted at ⅝ January, 1920.

Property: the old Harney Peak tin mines and claims, in Pennington county, under lease to National Tin Corporation, this company to get 25% of net profits as royalty. Company shares have been extensively traded in.

ANACONDA GOLD MINING CO. **SOUTH DAKOTA**

Idle. **Address:** Metropolitan Life Bldg., Minneapolis, Minn. **Mine office:** Roubaix, S. D.

Officers: Martin H. Brede, pres.-mgr.; Daniel Lynch, v. p.; D. H. Dreessen, treas., with Adolph Carlson, G. G. Gustafson, H. M. Hokensen, Theo. Mahn, O. H. Carlson and G. A. Mattison, directors. C. D. Applin, sec.

Inc. in South Dakota. **Cap.,** $1,500,000; $1 par; half common and half preferred stock; 498,405 shares issued.

Property: 34 claims, patented, 685 acres, in Roubaix district, near Deadwood, carries gold-quartz ore in fissure veins running N. W.-S. E. with dip of 50° N. and said to average $8 per ton.

Development: 340′ shaft and crosscuts.

Equipment: steam power and compressor. Plan sinking 3-compartment shaft to depth of 700′, down 135′ May, 1917. Management endeavoring to raise $50,000 for further development work.

BISMARCK MINE **SOUTH DAKOTA**

Ed. Manion, supt., Deadwood, S. D.

A gold mine at Flatiron near Deadwood, Lawrence county, said to contain gold-silver ore of milling grade. Equipped with 200-ton cyanide mill.

Operated intermittently by lessees. Treated 5,120 tons of gold-silver ore, valued at $18,864 in 1918 and shipped 30 tons of tungsten ore worth $2,282.

BLACK HILLS COPPER CO. **SOUTH DAKOTA**

Idle. **Office:** Rochford, Pennington county, S. D.

Officers: E. A. Hoffman, pres.; George M. Thresher, sec.; John H. Kerr, treas.

Inc. June 2, 1900, in South Dakota. **Cap.,** $2,000,000; shares $1 par.

Property: 27 claims, 510 acres, in the Hornblende district, shows fissure veins in slate, with gossan capping, carrying carbonate and oxide ores. Orebody is said by company to average 20′ width, and to be more than a mile in length, opened by incline shafts and crosscut tunnels, giving a total of about 1,200′ of underground openings. Ores average, 1.5 to 3% copper, with small values in gold, silver and nickel. Has steam power, with 60-h. p. hoist, good for 1,500′, and 4 power drills. Property considered of doubtful value.

BLACK HILLS TUNGSTEN M. & M. CO. **SOUTH DAKOTA**

Dead. Property sold at sheriff's sale, August, 1917, to Elkhorn Tungsten Co., which see.

CAPITAL GOLD M. & M. CO. **SOUTH DAKOTA**

P. A. Griswold, pres.; R. M. Harrot, sec.-gen. mgr.

Reorganized 1917, in South Dakota. **Cap.,** $1,500,000.

Property: 60 acres, in Deadwood gulch, adjoining the Trojan mine and said to carry ore assaying from $3 to $12 per ton. Development was to be started in 1919.

COLUMBIA MINING CO. **SOUTH DAKOTA**

Idle. **Address:** Richard Blackstone, Lead, S. D.

Inc. in South Dakota. **Cap.,** $500,000; 300,900 shares issued.

Property: a group of claims at Keystone, Pennington county. Gold ore worth $65 per ton said to have been shipped, from a quartz vein in diorite and schist, strike N. 56° E. dip 80°.

Development: 225′ shaft and 300′ of drifts.

CUMBERLAND MINING CO. **SOUTH DAKOTA**

Jas. Graham, receiver, Hill City, S. D.

Property: the J. R. mine, long idle owing to differences among the stockholders which ended in a receivership, January, 1919.

CUSTER PEAK COPPER CO. **SOUTH DAKOTA**

Office: Roubaix, S. D. Burt Rogers, sec., Black Hills Trust & Sav. Bank Bldg., Deadwood, S. D. D. Grupe, pres.; John O'Brien, v. p.-supt.; with John Plunkett, directors.

Cap., $1,500,000; $1 par; assessable; 100,400 shares outstanding.

Property: the Jungle mine at the southeast base of Custer Peak, showing a porphyry dike cutting schist with 5′ of copper ore on both walls. The Jungle mine was acquired in 1918.

Development: includes 65′, 90′ and 300′ shafts, showing a 12′ vein of 4% copper ore. The older holdings of the company, 1½ miles from the Jungle mine and S. W. of Deadwood, are said to carry average values of $6 per ton in oxidized ore to depth of 100′, changing below to pyrite and chalcopyrite, showing on the 200′ level, a vein of 85′ width, assaying about 1% copper with $1.60 in gold.

Equipment: includes hoist, air compressor, pump and steam power. A new 50-ton dry concentrator was reported in operation, May, 1919, at the Jungle mine.

CUTTING MINING CO. **SOUTH DAKOTA**

Address: Deadwood, S. D.

Officers: Fred W. Cutting, pres.; Burt Rogers, sec.

Property: adjoins the Homestake on the W., near Central, Lawrence

county. Several veins have been opened by tunnels and a 500′ two-compartment shaft is being sunk, down 250′, July, 1919.

Equipment: includes elec. power, single-drum hoist and compressor. About 16 men employed.

CUYAHOGA MINING CO. SOUTH DAKOTA

Address: Custer, S. D.; J. H. Snyder, v. p.

Property: the Spokane silver-lead mine. In 1917 the shaft was sunk to 200′. Ore containing 43% sulphur and some copper was shipped to Cleveland, Ohio, for chemical purposes. Good gold ore was opened and a hoist and additional boilers installed. Presumably idle, 1918-19.

DAKOTA CONTINENTAL COPPER CO. SOUTH DAKOTA

Idle. **Office:** 300 Commonwealth Trust Bldg., Harrisburg, Pa. Company is a reorganization of the Continental Copper Mining & Smelting Co.

Property: near Sheridan, Pennington county, S. D., in the Black Hills, known as the Dakota-Calumet, or Lillian property, 52 claims, patented, 179 acres. Claims show quartz schist with a pyrrhotized zone, from 50′ to 200′ wide, traceable one-half mile. The mineralized zone shows bands of nearly pure pyrrhotite, with occasional traces of copper. At boundary between oxidized and unaltered material, a little copper is occasionally found, as a secondary concentration. Small amounts of rich ore were found at the surface and down to 25-30′, but property is valueless as a copper mine. Extensive diamond drilling and exploration work prove a large amount of pyrrhotite available for acid making. A body of gold quartz ore of commercial grade was cut in diamond drilling and one shipment was made in 1918.

Development: includes an 850′ shaft, 1,170′ crosscut tunnel and 9 drift tunnels.

Equipment: includes 300-h. p. steam plant, with hoist good for 1,200′, 7-drill compressor, all necessary shops and an old smelter of no present value.

Company had a bond on the Golden Summit gold mine 4 miles E. of Hill City and did some diamond drilling in 1918.

DEADWOOD-HEIDELBERG MINING CO. SOUTH DAKOTA

Address: Deadwood, S. D.

Officers: John Treber, pres.; H. S. Vincent, v. p.; Jacob Goldberg, treas., A. T. Roos, mgr., with B. Stewart, Jim Hogarth and Geo. Porter, directors. Wm. L. Treber, sec.

Inc. June, 1914, in South Dakota, by the Deadwood Business Club, in an attempt to promote the mining interest of the section. **Cap.,** $125,000; 25c par; 295,000 issued. Annual meeting in June.

Property: 9 claims, unpatented, 185 acres, on Two Bit Creek, Lawrence county, shows gold ore in a contact deposit between shale and porphyry. The orebody is reported to be 20′ thick, 6 to 15′ wide, 200 to 300′ long, with N. E. course and dipping W. Milling ore averages $5 per ton. Ore reserves said to be 5,000 tons.

Development: 7 tunnels, 65-380′ long, with deepest workings at 193′ from surface; total development, 2,000′.

Production. 180 tons, averaging $20 per ton. Management plans sinking to the contact of the shale and underlying quartzite. Inactive, 1918-19.

DEADWOOD LEAD & ZINC CO. SOUTH DAKOTA

Address: Deadwood, S. D. Aaron Dunn, supt.

Property: in Spruce gulch, near Deadwood, Lawrence county, under development by tunnels.

Ore: complex sulphide carrying gold-silver-lead-zinc values. A 10-stamp concentrator installed July, 1918, made but one test run. Concentrates showed $25 p. t. in gold, $15 in silver, 22% lead and 8% zinc.

ECHO GOLD MINING CO. SOUTH DAKOTA

W. L. Mason, gen.-mgr., Manchester, N. H.

Officers: Dr. Henry H. Jewell, pres.; Dr. Andrew J. Pitman, v. p.; L.

B. Snelling, sec.; Judge Geo. A. Wagner, treas., with Herbert W. Lake, Dr. John J. Gailey, John S. Rand and Burt Rogers, directors.

Inc. 1892, in South Dakota.

Property: 62 acres, in the Maitland district, 4 miles N. W. of Deadwood, Lawrence county.

Development: by 200′ vertical shaft, and several tunnels. About 100′ E. of the shaft a pyrite vein was cut showing 4′ of lead-silver-gold bearing ore. Shaft is being extended to 500′ depth.

Equipment: includes a special electric power line to shaft house, 25-h. p. electric hoist, air compressor and sinking pump. Management reports company is well financed, and is yet in the prospective stage.

ELKHORN TUNGSTEN CO. **SOUTH DAKOTA**

Office: Hill City, S. D.

Officers: Arthur E. Wiedmann, pres.; Dr.: E. K. Curry, 1st v. p.; Dr. W. J. James, 2nd v. p.; C. W. Crosby, sec.-mgr., 3310 Harrison Ave., Kansas City, Mo. A. A. Anderson, supt.

Inc. Feb., 1917, in Arizona. **Cap.,** $2.000.000; $1 par; all outstanding. Company purchased the property of the old Black Hills Tungsten Mining & Milling Co. at sheriff's sale, August, 1917.

Property: 361 acres near Hill City, Pennington county, shows quartz vein dipping 70°, said to contain tungsten as wolframite. Developed by shaft and equipped with electric and steam power and a concentrator. Plan to sink shaft and recommence operations, 1920.

ELK MOUNTAIN M. & M. CO. **SOUTH DAKOTA**

Address: Lead, S. D.

Operated the Slavonian group near Crown Hill and treated the ore in the Deadwood Standard mill during part of 1917; estimated production 3,120 tons of ore valued at $9.215.

FREMONT FRACTION **SOUTH DAKOTA**

Address: Jas. T. Street & Sons, 822 W. Main St., Lead, S. D.

Property: 1 claim in Whitewood mining district, near Lead, Lawrence county. Vein runs S. E.-N. W. dips 80°, and averages 3′ in width. Assays average 49.6 Mn., 1.82% Fe., 3.76% Silica, 0.0039% Phos.

Development: by 160′ shaft and 145′ tunnel. The ore is hand-sorted. Produced 31.2 tons of ore in 1918, at a cost of $1,500 and valued at $1.670. No shipments made.

Mine examined by State Mine Inspector Ellerman.

GOLD DOLLAR MINE **SOUTH DAKOTA**

In Crown Hill district, Black Hills, S. D. Leased to Coleman, Madill, and others at last accounts.

Property has been a gold producer, whose ore was treated in the Mogul mill near Deadwood.

GOLDEN CREST MINING CO. **SOUTH DAKOTA**

Address: Deadwood, S. D.

Owned by F. W. Bird, Victor Bird, Alex Bird and J. G. Playford, all of Deadwood, S. D.

Property: 12 patented and 8 unpatented claims, 275 acres, in Bear Butte and Whitewood mining districts, Lawrence county, 5 miles E. of Deadwood. **Ore:** occurs in fissure veins in porphyry, varying in size up to 15′ and carries gold, silver, lead. Mine worked about 1902; reopened and sampled in 1917, and some development work done in 1918.

Development: Nine shafts, greatest depth 335′, with about 6,000′ of drifts.

Equipment: includes electric double-drum hoist, 10-drill compressor, pumps, 40 stamps, 200-ton cyanide mill, Moore filter, etc.

GOLDEN REWARD CONSOLIDATED GOLD M. & M. CO. **S. D.**

Office: 475 Fifth Ave., New York. **Mine office:** Deadwood, Lawrence county, S. D.

Officers: C. T. Tegethoff, pres.; Harris Franklin, v. p.; with R. W. Goelet, Henry de Forest, W. B. Devereaux, Walter Luttgen, Ed. de Witt and W. A. Harriman, all of New York, directors. W. J. Johnson, sec.; N.

E. Franklin, asst. sec., Deadwood; Henry Schnitzel, gen. mgr.; F. R. Baldwin, gen. supt.

Inc. June 25, 1896, in South Dakota. **Cap.**, 1,000,000 shares; $10 par; 841,793 shares issued to June, 1916. Stock transferred at company's office. Annual meeting 1st Tuesday in August at Deadwood, S. D.

Property: 442 patented claims, 3,391 acres at Terry, in Whitewood and Bear Butte mining districts, near Deadwood, includes, the Union and Astoria mines.

Ore: occurs as contact deposit in shale, carrying gold-silver values and 75% silica. Pay ore occurs in shoots from 5-100′ long, said to give average assays of $5 per ton.

Development: by several tunnels and vertical shafts from 100-350′ deep, with about 15 miles of workings.

Equipment: includes electric power, electric double-drum hoist, compressor, 150-ton cyanide plant, 100-ton filter and 75-ton roaster. The furnace was stopped in July, 1916, for further investigation of the blue ore, which does not give high recovery. Average gold extraction is 75.55%. Experiments failed to show a higher extraction and practically all work was stopped in April, 1918, owing to high costs and low grade ore.

Ore reserves: estimated by management June, 1916, at 2,000,000 tons.

Production: in 1911-12, $323,846 from 52,583 tons; in 1913, $423,840 from 53,712 tons; in 1914, $369,182 from 51,355 tons; in 1915, $484,995 from 58,837 tons; in 1916, $311,204 from 52,204 tons; in 1917, $198,040 from 33,328 tons; in 1918, $36,589 from 6,542 tons.

GOLD KING MINING CO. **SOUTH DAKOTA**

Developing a gold-silver property on Silver creek, near Rochford, Pennington county.

Equipment: includes boilers, hoist and compressor, installed in 1918.

HIDDEN TREASURE MINING CO. **SOUTH DAKOTA**

Trojan, Lawrence county, S. D. Described, Vol. XIII.

HILL CITY MINING & DEVELOPMENT CO. **SOUTH DAKOTA**

Hill City, Pennington county, S. Dak.

Officers: John Wise, pres. and gen. mgr.; with J. W. Stoner, and Albert Booth, directors; E. A. Schilliman, sec.-treas.

Inc. 1911, in South Dakota. **Cap.**, $500,000; $1 par; 300,000 issued. Annual meeting, March 9.

Property: 11 claims, 6 patented, 220 acres in Burnt Fork gulch, 3 miles north of Hill City. **Ore:** gold, in fissure vein, in schist; strike N. S., dip 80°. Said to have an average width of 16′.

Development: by shafts, deepest 200′. **Equipment:** includes double-drum hoist, compressor and a 10-stamp mill. Company planned to sink to 400′ depth and later to build a cyanide plant. No recent returns.

HILL CITY TUNGSTEN PRODUCERS CO. **SOUTH DAKOTA**

Office: Hill City, S. D. Described Vol. XIII.

HOMELODE MINING & MILLING CO. **SOUTH DAKOTA**

Idle. Silver City, Pennington county, S. Dak. L. A. Richards, gen. mgr.; L. L. Farnam, supt.

Property: shows several quartz veins, 1′ to 2′ wide, containing gold, silver, antimony, lead and zinc ore. Two veins have been opened up; one by a 200′ adit, connecting with a shaft, sunk on the vein, at the 100′ level; a 50′ winze shows the ore to be continuous to that depth. In these workings ore varies from 12″ to 18″ and is 150′ in length; values are mainly in gold and antimony. The second vein parallels the first, is ¼ mile E., said to be 24″ wide and to contain more zinc than No. 1. Two shafts, 370′ apart, 66′ and 103′ deep, respectively, have been sunk on the vein.

At camp No. 2, there is reported to be a 4 to 6′ quartz vein carrying gold-silver values. Developed by 300′ shaft with 500′ of drifting.

Equipment: includes three 100-h. p. boilers and an amalgamating mill, equipped with crusher, slow-speed Lane mill, tables and classifiers. Con-

centrate shipped reported to carry 2-4 oz. gold, and 6-10 oz. silver, principally as arsenopyrite. Cyanide plant to be added.

HOMESTAKE MINING CO. **SOUTH DAKOTA**

Main office: American National Bank Bldg., San Francisco, Cal. **Eastern office:** 15 Broad St., New York. **Mine office:** Lead, South Dakota.

Officers: Edward H. Clark, pres.; Frank G. Drum, v. p.; Fred Clark, sec.; Louis P. Haggin, treas.; preceding, with Harry L. Tevis, Thos. Turner and Richard A. Clark, directors; B. C. Yates, supt.; W. J. Sharwood, metallurgist; C. W. Merrill and Allan J. Clark, cons. metallurgists; R. G. Wayland, asst supt. and chief engineer.

Inc. Nov. 5, 1877, in California. **Cap.,** $21,840,000; increased March 25, 1913, to $25,116,000 by payment of 15% stock dividend; shares $100 par. Columbia Trust Co., New York, transfer agent; Union Trust Co., New York, registrar. Annual meeting, third Tuesday in March, in San Francisco. Listed on New York Stock Exchange since 1879.

Balance Sheet, years ending December 31:

Assets.

Year	Mines and works	Cash balances and Liberty loans	Bullion in transit	Supplies	Total
1919*	$27,355,435	$570,326	$16,885	$665,444	$29,275,642
1918	27,105,865	1,184,947	214,382	671,316	29,176,511
1917	26,713,219	1,077,354	309,594	553,241	28,653,408
1916	25,116,000	1,332,006	325,569	383,635	27,157,210
1915	25,116,000	1,222,812	302,097	.....	26,640,909

* Profit and loss account for year 1919 was $667,551.

Liabilities.

Year	Capital stock	Outstanding drafts	Sundries	Profit and loss account	Reserve for depreciation	Total
1919	$25,116,000	$239,492	$5,101	.....	$3,915,048	$29,275,642
1918	25,116,000	273,608	18,508	$380,532	3,387,863	29,176,511
1917	25,116,000	371,749	5,126	1,189,403	1,971,130	28,653,408
1916	25,116,000	522,353	5,224	949,934	563,600	27,157,210
1915	25,116,000	486,640	5,336	1,032,933	.....	26,640,909

Income.

Year	Receipts mng. oper.	Other income	Balance brought forward	Total
1919	$4,352,631	$37,908	$1,048,083**	.....
1918	5,916,890	204,457	1,189,403	.....
1916	6,531,003	586,505	1,032,933	$8,150,442
1915	6,448,024	77,758	897,596	7,423,378
1914	6,160,160	148,562	1,428,248	7,736,970
1913	6,186,652	132,716	1,455,958	7,775,326

Expenditure.

** Includes profit and loss account.

Year	Oper. expenses(a)	Dividends	Balance Dec. 31	Total
1919	$3,781,217	$1,130,220	$667,551	.....
1918	4,006,526	1,506,960	380,532	.....
1916	4,990,300	2,210,208	949,934	$8,150,442
1915	4,180,238	2,210,208	1,032,932	7,423,378
1914	4,629,166	2,210,208	897,596	7,736,970
1913	4,200,853	2,146,225	1,428,248	7,775,326

(a) Including salaries, legal, general, etc.; bills payable; taxes; property purchased; interest.

Taxes are high; in 1914, amounting to 16c per ton of ore milled, 15c in 1915; 16c in 1916; 18c in 1917; 21c in 1918; 34c in 1919.

Dividends: have been paid monthly almost continuously since Jan., 1879; were suspended in May, 1907, as result of a fire in the mines, and

resumed January 25, 1908; continued to December, 1909, inclusive, when they were suspended owing to labor troubles at the mines; resumed in March, 1910. Present rate is 50c per share per month. Dividends paid to September, 1919, total $41,927,559.

Property: 468 claims, about 3,723 acres, in the Whitewood mining district, Lawrence county. The towns of Lead and Deadwood and the settlements of Blacktail, Terraville and Central City have grown up around the mines and mills.

The first claims acquired by the company were the Grant and Old Abe, located by J. B. Pearson, December 11, 1875. In the Fall of 1876, representatives of Haggin and Hearst bought these claims, and the Homestake Mining Co. was incorporated. In July, 1878, the first and only assessment was levied, $1 per share; it furnished the $200,000 required to build the 80-stamp Homestake mill. In 1899, company acquired the Highland Mining Co., an adjoining property of about 73 acres; also the Black Hills Canal & Water Co., owning 40 miles of ditches, flumes and pipe-lines, with reservoirs, improvements and water rights covering the water supply of Deadwood and Lead districts.

Geology: the orebody is a great mass of silicified slate, averaging $3.75 to $6 per ton in gold. The ore is several hundred feet thick and has been mined to a depth of 1,700′. This deposit lies in a mineralized zone of nearly vertical Algonkian slates and crystalline schists, into which enormous masses of rhyolite have been intruded. The ore-bearing zone is approximately ½ mile wide and several miles long. Only the northern end of the zone has been extensively developed. The deposits are not fissure veins, but impregnations that appear to have taken place along two converging lines of crushing; they follow roughly the direction of schistosity and show a general pitch southward; where several unite, the aggregate thickness is over 500′ and many stopes are carried across that width of ore. The larger lenses are on the west side of the zone and are flanked on the east by a series of smaller parallel lenses, some of which join the larger at depth. Near the surface the orebodies follow the rhyolite porphyries, but at depth diverge from them and become in part associated with phonolite. The ore varies considerably in composition in different portions of the deposit, but that of the deeper levels, the unoxidized ore, usually contains either chlorite or ferruginous hornblende (cummingtonite), with quartz, carbonates of lime, magnesia, iron, arsenopyrite, pyrite and pyrrhotite. Ferrous minerals predominated and this has been an important factor in determining the metallurgical treatment. In the upper oxidized parts of the deposits the ore is dark red, but deeper, in the sulphide zone, is greenish-blue to blue-black. Sulphides vary in amount from 3 to 5%, and even as high as 10% or more of the ore. In the sulphide zone the distribution of gold is uniform and averages $4 to $4.50 per ton. Over 60% of the ore is free milling. Secondary enrichment has not resulted in the formation of any particularly rich zones.

Development: 6 shafts; 4 in the footwall, one in the hanging, and one in the lode; depths January 1, 1917, were:

Ellison	B. & M.	Golden Prospect	Golden Star	Old Brig	Golden Gate
2,195′	1,700′	1,100′	1,400′	800′	800′

The 1,850′ and 2,000′ levels of the Ellison shaft will eventually be connected with the B. & M. shaft, through which outlet the bulk of the ore will be hoisted to surface. The B. & M. shaft is equipped with loading pockets at 800, 1,000, and 1,550′, a hoist and skips, which will dump into N. 8 Gates crushers, and their product carried by a belt-conveyor system to smaller gyratories. Total cost of sinking at the Ellison shaft is said to have averaged $60.64 per ft. There are in all about 130 miles of workings. Underground work during 1916 amounted to 24,381′; 19,320′ in 1917; 7,354′ in 1918; 5,770′ in 1919. Measured reserves are large and sufficient to supply

the reduction plants for many years. Broken ore in stopes amounts to 1,574,886 tons, a year's supply for the mills. A new ventilating system for the lower levels recently installed includes two large electrically-driven fans.

Ore treatment: the metallurgical equipment at the Homestake is one of the most modern and efficient in the country, and has been fully described in the technical press. The treatment problem is simple, the ore crushes well, averaging 4.7 tons per stamp daily. Amalgamation in battery and on plates is followed by cyanidation of sands and slimes separately. There are 1,020 stamps employed in six different mills, the pre-war cost being 26c per ton.

Mills: at the south side—3 stamp-mills (660 stamps) with 36,356 sq. ft. of amalgam plates; 1 regrinding plant, with independent cone system, and 540 sq. ft. of amalgam plates; 4 batteries of cones for classification; 3 clarifying tank houses; 1 sand plant. The mills are the Amicus, Golden Star, Homestake and Pocahontas. In 1915 the Pocahontas mill was completely rebuilt. The Amicus mill was remodeled in 1917.

At the north side—2 stamp-mills (300 stamps), the Monroe mill and Mineral Point mill; 2 tank-houses; 2 cone-houses; 1 sand plant. Ore supplied to these mills is usually drawn from the upper levels of the mine, and is partly oxidized.

A 5-stamp crushing and concentrating mill was built, 1916, for treating tungsten ores. It contains an amalgamation plate, cone classifiers, two Deister and one Wilfley tables for cone products, two small ball-mills for grinding middlings, and another Deister table to concentrate the ground product. Tailing passes to the cyanide plants. This mill has operated continuously on ore averaging 2%WO_3, yielding concentrate carrying 54%. Net sales of wolframite were $229,916 in 1916; $226.535 in 1917; $167,468 in 1918; $6,515 in 1919.

At Deadwood—A slime plant, treats the slime from both south and north side mills. At all the mills the stamps weigh 1,000 lb. and drop 10", making 88 drops per minute Homestake order of drop is 1-3-5-2-4 or 1-4-2-5-3. A 25-h. p. back-geared motor drives each 10 stamps. Ratio of water to ore is large being 10 or 12 tons of water to one of ore. A minimum of about 50,000 tons of water per day is used, most of it from Spearfish Creek and its tributarties, being conveyed over 20 miles in ditches and vitrified clay pipe, and costing 10c per ton of ore stamped.

Inside amalgamation is practiced, quicksilver being fed to the mortar. Chuck-blocks are cleaned in rotation, at intervals of about 2 weeks; outside plates, except those of the fourth row, are cleaned and dressed daily. Fourth row plates are dressed at 2-day intervals. Amalgam is retorted three times each month. Oil-fired retorts are used, the resulting bullion being melted in coke-fired furnaces.

A ball-mill is being tested for reduction of Homestake ore.

Regrinding is done in tube-mills. In cyaniding the usual methods are closely conformed to. A recovery is made of about 94% of the value in the ore: 72% by amalgamation and 22% by cyanidation.

Power and equipment: company has hydro-electric plants at Spearfish and Englewood. Power equipment includes a steam-driven electric generating station at Lead, maximum capacity, 4,000 k. v. a. The company operates its own machine shops, carpenter shops and foundry. Power used is about 1.15 k. w. hr. per ton of ore treated.

The Homestake Mining Co. has long been known for the way in which it has looked after the welfare of its 1,630 employees. In 1914, it completed a recreation building, containing a theatre with seating capacity of 1,000, library, swimming pool, gymnasium, bowling alleys, billiard and amusement rooms. Wages are from $4 to $5 per day underground and from $3.75 on the surface.

Production: to Jan. 1, 1920, $164,023,965, exclusive of wolframite. Recent production has been:

Year	Ore milled tons	Recovered per ton	Total cost per ton
1919	1,192,588	$3.6443	$3.330
1918	1,628,630	3.633	2.700
1917	1,677,623	3.946	2.900
1916	1,600,220	4.0813	3.110
1915	1,573,822	4.0848	2.6561
1914	1,587,774	3.8797	2.9155
1913	1,540,961	4.0148	2.7258

At the end of 1918 the mines and mills were operated at only 77 per cent capacity. Production continued steadily during 1919, until September 25, when a fire was discovered on the 800′ level, and it was found necessary to flood the mine to the 600′ level. During October and November operations were necessarily curtailed, but they were resumed December 1.

In our opinion the Homestake is the greatest gold mine in the world, judging by its past performance, present condition, and possibilities. Management says little, but produces the gold and dividends.

IMPERIAL COPPER CO. **SOUTH DAKOTA**

Idle. Property in Custer Peak district. Described in Vol. XIII.

LAUREL GROUP **SOUTH DAKOTA**

Owners: August Peterson, Nemo, S. D. E. A. Skalinder, Joe Kellar, Deadwood, S. D.

Property: 4 unpatented claims, 60 acres, in Greenwood mining district, Lawrence county, developed by 495′ tunnel and 90′ shaft, said to contain free milling gold and silver, assaying $2.40 to $10 per ton. Expended $12,000 during 1918. No shipments made.

MALONEY-BLUE LEAD COPPER M. & S. CO. **SOUTH DAKOTA**

Address: 215 Ry. Exchange Bldg., Chicago, Ill., and Hill City, S. D.

Officers: M. T. McCaskey, pres.-mgr.; F. A. Poor, v. p.; J. G. Thomas, sec.; R. N. Baylies, treas.

Inc. 1899, in South Dakota. Cap., $750,000; $1 par; 670,000 outstanding.

Property: 23 patented claims, 340 acres, near Keystone, Pennington county, shows copper ore in limited amount.

Worked by lessees in 1918, who are reported to have shipped 580 tons to the Omaha smelter, averaging 4.46% copper and 1.38 oz. silver, valued at $8.202.

MOGUL MINING CO. **SOUTH DAKOTA**

Address: Terry, S. D.

Inc. 1905, to take over holdings of the Horseshoe Mining Co. Company treated ore from its own mine and other companies, and operated the mine of the Ofer Mng. Co. at Trojan, Lawrence county. A 1,200′ tunnel on the Ofer mine was completed in 1918 and 33,750 tons of ore shipped to the Mogul plant returned $169,974.

Equipment: includes 1,600′ aerial tramway.

Production: treated 59,384 tons in 1912, valued at $242,567; 5,593 tons in 1913, valued at $44,117; 21,770 tons, in 1914, valued at $141,298; 37,419 tons in 1915, valued at $161,605; 38,671 tons in 1916, valued at $189,935; 35,980 tons in 1917, valued at $187,317 and 33,750 tons in 1918, valued at $169,975. All work was suspended October, 1919.

MONTEZUMA & THE WHIZZERS MINE **SOUTH DAKOTA**

Address: J. T. Milliken, Deadwood, S. D.

Property: 150 acres, on the divide between Deadwood and Whitewood Cañon, and on Deadwood Creek and West Gold Run, near Lead City, S. D. Property shows Algonkian schists, slates and quartzite, and carries a strong gossan, of 45′ estimated average width, traceable 3,000′. Principal claims are the Spiegel No. 1, formerly known as the Whizzers, and Brownie No. 5, carrying 2 parallel quartzite reefs, about 300′ apart. The first named has chalcopyrite in a gangue of hornblende schist, surface ores carrying 0.5 to 1.5% copper, up to 1 oz. silver and $1-$2 gold per ton.

Brownie No. 5 claim has 2 tunnels, one 650′ long, and has produced about

50,000 tons of low-grade fluxing ore, sent to smelters at Deadwood and Rapid City, until the latter was closed down. A 22′ winze, below the water-level, gave picked samples, assaying $16.80 gold per ton.

The Montezuma claim, near West Gold Run, has 2 short tunnels, showing ore assaying up to 1 oz. silver and $53.70 gold per ton. Though low in average grade, the property is considered promising, because of the enormous tonnage assured, but needs big capital to develop. Examined and reported favorably on by Geo. Huston, of Mullan, Idaho, and Nicholas Treweek, of Salt Lake City.

Property acquired in 1917 by J. T. Milliken, of St. Louis, Mo., who is developing the Oro Hondo nearby. Mine was unwatered and diamond drilling underway since 1917.

NATIONAL TIN CORPORATION **SOUTH DAKOTA**

Address: 61 Broadway, New York City.

Officers: Simon Lederer, pres.; Henry E. Vaughan, v. p.; Fred A. Travis, treas.

Inc. March, 1919, in Delaware. **Cap.**, $1,000,000; 50c par; amount outstanding not divulged. Stock listed on New York Curb and quoted at $7.50 in October, 1919, and at $13 in January, 1920. Security Transfer & Registrar Co., registrar and transfer agents. Company has a 20-year lease on the mines and mill of the American Tin & Tungsten Co., the latter company to receive 25% of the net profits.

Property: the old Harney Peak Tin Co. property, 6 claims and a millsite on the Keystone branch of the Ch. B. & Quincy R. R. at Keystone, Pennington county.

Ore: occurs as scattered grains of mineral in quartz veins and pegmatite dikes, the tungsten as wolframite and ferberite, the tin as cassiterite. In the Cowboy mine the cassiterite occurs in lenticular quartz mica veins, 12″-2′ wide, with strike N. 54° W. and dip of 67° N. E. Stoping operations between the 200 and 250′ levels claimed to have broken 6,000 tons of 1.98% ore. The Mohawk mine is developed by a 100′ shaft, said to show a 3′ lense of 2% ore at 40′ depth.

Development: by vertical shaft being sunk to depth of 500′. **Equipment:** an old, but recently remodeled, 125-ton concentrating mill, cyanide unit, electric power plant, compressor, 60 h. p. hoist.

Property reported on 1917 by E. F. Schramm. Company expects to start shipments in 1920.

Company has been financed and its shares are active on the New York Curb. It is thought that if property is economically handled, it can be made to yield fair profits.

NEW GOLDEN WEST MINES CO. **SOUTH DAKOTA**

Mine near Rochford, Pennington county, S. D. Described in Vol. XIII.

NEW PURITAN MINING CO. **SOUTH DAKOTA**

Address: Lead, South Dakota.

Officers: Wm. J. McGoffin, pres, and mgr.; L. Herseth, v. p.; P. A. Gushurst, sec.; W. C. Nissen, treas., with S. Ruud, W. Worth, and A. Randall, directors.

Inc. 1915, as a reorganization of the Puritan Mining Co. **Cap.**, $1,500,000 shares; $1 par; non-assessable; 200,000 shares issued. Annual meeting in June.

Property: 60 patented acres, in Whitewood mining district, Lawrence county, shows an orebody, 28′ thick in quartzite, carrying gold ore said to assay $3.60 per ton. Developed by several shafts to depth of 190′.

Equipment: includes steam hoist, 6-drill compressor, pump, and a 250-ton concentrating mill with cyanide unit.

Property has been idle for several years, owing to litigation, and as mill will have to be remodeled at a cost of $25,000, and company has no funds, the outlook is not bright.

NEW RELIANCE GOLD MINING CO. **SOUTH DAKOTA**

Idle. **Office:** 218 Tribune Annex Bldg., Minneapolis, Minn. **Mine**

office: Trojan, Lawrence county, South Dakota. F. C. Bowman, gen. mgr. C. O. Veker, sec.

Property: the Reliance mine, at Trojan, shows gold ore in quartzite formation. Orebody said to have average width of 8′ over a distance of 1,000′ and to assay $4 per ton.

Equipment: includes a 30-stamp mill, treating slime by the continuous decantation, counter current system, drills and air compressor. During 1916, mill treated 13,524 tons of ore, yielding $49,893.

Work was suspended in November, 1916, due to low value of ore.

NEW SILVER QUEEN MINING CO. SOUTH DAKOTA

Address: Galena, S. D.

Property: in Galena district, Lawrence county, under development since 1917. Shipped 144 tons of lead-silver ore valued at $1,995 in 1917, and 57 tons, valued at $2,093 in 1918.

NORTH HOMESTAKE MINING CO. SOUTH DAKOTA

Address: A. Maitland, Negaunee, Mich., pres and controlling owner; A. F. Maitland, v. p.; T. C. Jates, sec.

Inc. in South Dakota. **Cap.**, $6,000,000; $5 par; 1,000,370 shares outstanding.

Property: 77 patented claims, 1,100 acres at Maitland, Lawrence county, shows veins of quartz and sulphide ore, carrying gold and silver values.

Development: by 750′ vertical shaft and 600′ drift on the 600′ level with crosscuts E. and W. for 200′ and 100′, respectively.

Equipment: includes 125-ton cyanide mill, electric power, 4 electric pumps, 2 compressors and hoist. Mine is credited with a production of $1,500,000 under former management. Development work carried on intermittently during past 5 years has so far failed to disclose new orebodies of commercial grade.

Work suspended in September, 1916, but mine was being kept dry, at last accounts.

OFER MINING CO. SOUTH DAKOTA

Property: in Bald Mtn. district, near Trojan, Lawrence county, operated by Mogul Mining Co., which see.

OLAF SEIM MINE SOUTH DAKOTA

Olaf Seim, owner.

Property: 1 mile from Deadwood, Lawrence county, adjoining the Montezuma and the Whizzers on the north, carries pyritic ore high in sulphur. Operated during part of 1918.

Production: 1,150 tons averaging 38% sulphur. During 1918, 916 tons shipped returned $7,200.

ORO HONDO MINE SOUTH DAKOTA

Address: E. W. Talbot, supt., Deadwood, So. Dakota.

Property: at Deadwood, So. Dakota, is said to show replacement deposits in schist.

Development: by 2,200′ vertical shaft. Did about 2 miles of diamond drilling, 1916, presumably in search of southerly extension of the Homestake orebodies.

Management does not furnish or publish details of its operations, but was reported developing in 1919.

PURITAN MINING CO. SOUTH DAKOTA

Address: Deadwood, So. Dakota. Described in Volume XIII.

See New Puritan Mining Co.

RARE METALS CO. SOUTH DAKOTA

Address: Hot Springs, S. D.

Officers: Frank Hitch, pres.; W. N. Hunter, v. p.; Chas. Eastman, sec.-treas. Jos. R. Bland, chief engr.

Operates a small concentrating mill at Custer, Custer county, equipped for treatment of tin, tungsten and vanadium-bearing ores and the refining of mica ore.

RATTLESNAKE JACK MINING & MILLING CO. SOUTH DAKOTA

Galena, Lawrence county, S. D. Owned by C. B. Harris, of Galena, and William Sansome, of New York.

Property: several claims, including the Rattlesnake Jack mine near Galena, said to show gold ore assaying $15 to $20 per ton.

Development: 200′ shaft and tunnels. A 10-stamp mill and cyanide plant, completed in August, 1915, ran for several months, when a shutdown was made to build a tailing dam; resumed operations in January, 1916, only to close down in April, due to a disagreement between the owners.

Reported that 1,670 tons of ore treated in 1916, yielded $14,270. Daily tonnage treated averaged 60 tons when the mill was running. Idle since 1916.

SPOKANE LEAD CO. SOUTH DAKOTA

Address: Custer, S. D.

Property: at Custer, Custer county, 7½ miles S. of Keystone, developed to depth of 200′ with levels at 60′, 100′ and 200′.

Ore: silver-lead. **Equipment:** includes 100-ton concentrator, installed 1918. Mine worked intermittently.

Production: in 1918, 102 tons of concentrate, containing 13.25 oz. silver and 35.74% lead per ton, and valued at $4,428.

TROJAN MINING CO. SOUTH DAKOTA

Office: Deadwood, S. D. **Mine office:** Trojan, S. D.

Officers: H. W. Seamon, pres.; C. M. Curtis, v. p.; A. G. Smith, treas.; F. M. Clark, sec.; H. S. Vincent, mgr.; above are the directors. C. E. Dawson, asst. mgr. and purch. agt. H. Slaughter, mine supt.; N. B. Goodrich, mill supt.

Inc. 1911, in South Dakota. **Cap.,** $3,000,000; par $1; outstanding 1,000,000. Annual meeting in June.

The company publishes no financial reports.

Property: 166 patented claims, 1,550 acres in Bald Mtn. district, Lawrence county. Ore-bodies are flat deposits and verticals between porphyry shale and quartzite carrying refractory values in gold and silver.

Development: by Portland, Decorah, Empire and Eagle adits, the Portland being main outlet.

Equipment: 5 electric hoists, 300-h. p., 17,000-lb. capacity; 600 cu. ft. compressors and 2 gasoline locomotives. Mill equipment is for cyaniding. Capacity 400 tons daily. Crushing is by Chilian and tube mills, filtration by Oliver machines.

Production: Total to Jan. 1, 1919, 634,000 tons ore mined, 631,540 tons milled, including 10,060 tons custom ore; also 13,420 tons shipped to smelter; total value, $2,777,455. The 1918 production was 107,373 tons, valued at $530,642, as compared with 113,121 tons, valued at $471,268 in 1917.

WASP No. 2 MINING CO. SOUTH DAKOTA

Address: D. A. McPherson, pres., First National Bank, Deadwood, So. Dakota; H. H. Stewart, sec., Lead, S. D. A close corporation, most of the stock still held by original 14 stockholders.

Inc. November, 1901, in South Dakota. **Cap.,** 500,000 shares; $1 par; all issued. Original purchase of land paid for from sales of ore. Voluntary assessment of $50,000 paid in 1911 to replace mill destroyed by fire. To October, 1914, dividends paid, totaled $451,966. In 1916, 20%, or $100,000, was distributed. This was over double that paid in 1915.

Property: includes the Alma Fraction and Wasp claims at Flatiron, long famous for low cost mining and milling of low-grade ore, which occurs in the Cambrian formation above the quartzite. Wolframite occurs along fissures in flat Cambrian quartzite.

Development: by open cuts, steam shovels stripping 20′ of waste which overlies an ore bed 20′ thick. The total mining cost was $1.661 per ton. In 1916-17 a decided change was apparent in the ore extracted from the workings, and the mill was dismantled and sold for scrap along with all surface equipment.

Equipment: included a 500-ton plant, in which the ore was crushed

coarsely and cyanided direct at a cost of 59.1c per ton. In 1916 a 25-ton plant was erected for concentrating low-grade tungsten ore, crushing to ⅛" by rolls, re-crushing by smaller rolls, grinding by ball mill and treating coarse in jigs, sand on Wilfleys and slime on canvas tables. Three grades of concentrates were produced, 65%, 45% and 35% tungstic acid.

Production: in 1914, 176,140 tons ore, average value $2.015 gold and 28.7c silver per ton, returned $1.533, at a cost of $1.287 per ton. In 1915, costs increased and operations were curtailed until shipping and milling of tungsten ores added new profits.

From May, 1915, to March, 1916, company shipped 184 tons ore, averaging 45% tungstic acid. In 1916, 50,035 tons of gold ore averaged $1.79 per ton; and 36 tons of tungsten concentrate were sold for $97,869. Total value in 1916 was $187,775. In 1917 a final cleanup was made, netting $4,493. Tungsten concentrate amounting to 12 tons returned $19,561.

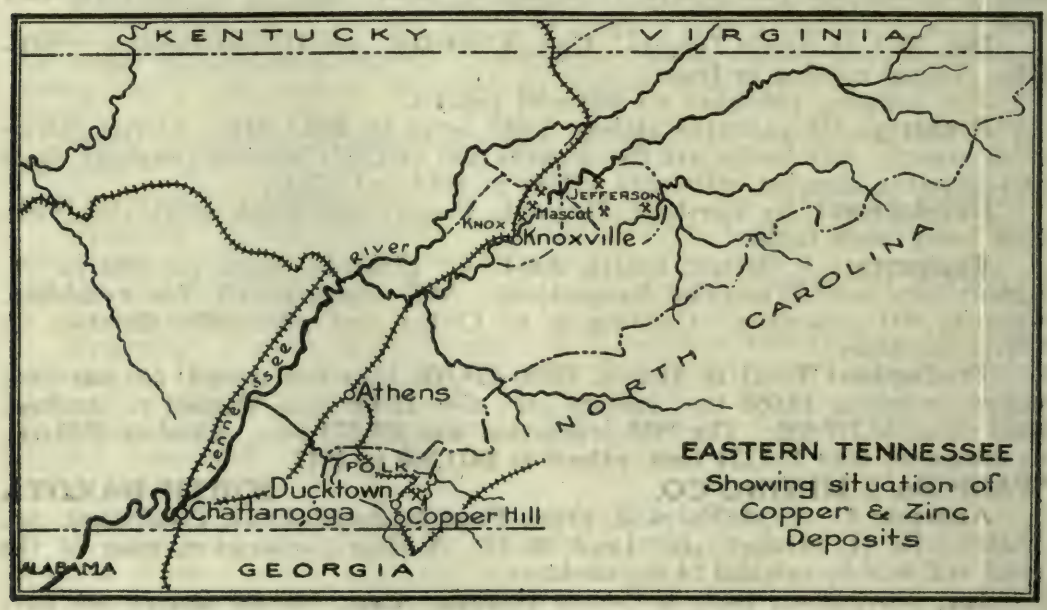
TENNESSEE

AMERICAN BALLAST CO. — **TENNESSEE**

A subsidiary of the Amer. Z., L. & Sm. Co., and described under that title.

AMERICAN ZINC CO. OF TENNESSEE — **TENNESSEE**

A subsidiary of the Amer. Z., L. & Sm. Co., and described under that title.



CHATTANOOGA COPPER CO. — **TENNESSEE**

Bought by the Ocoee Copper Co., which see.

COPPER PYRITES CORPORATION — **TENNESSEE**

Office: 17 Madison Ave., New York City. **Mine office:** Copperhill, Tennessee.

Officers: Wm. Young Westervelt, pres.; Roger L. Wensley, v. p.; J. N. Bailey, sec.-treas.

Inc. March 17, 1919, in New York. **Cap.**, $203,000, in 20,000 preferred and 300 common shares; par $10; all outstanding. To end of June, 1919, company had spent over $200,000 for a 25-year lease from June 29, 1916, and development of the School property.

Property: Sec. 16, comprising 640 acres of School land, in Ducktown mining district, Polk county, showing ¾ of a mile of gossan outcrop. Diamond-

drilling of the southern end gives assurance of approximately 1,500,000 tons of ore averaging over 45% iron, 29% sulphur and 1% copper. Management anticipates 12,000,000 to 13,000,000 tons of this grade ore.

Development: shaft A had been sunk 250', to October, 1919, and 1,200' of work done on two levels.

Equipment: includes steam hoist, air-compressor and ½ mile broad-gauge railway, connecting with the L. & N. R. R. at McHarg Siding. Company plans erecting a differential flotation mill to make 18% copper concentrate and a de-coppered pyrrhotite concentrate. Tests show latter will contain between 90 and 95% sulphide of iron, which can be used in the production of sulphuric acid, and a sintered material for iron furnaces.

DUCKTOWN SULPHUR, COPPER & IRON CO., LTD. TENNESSEE

Office: 1 Gresham House, Old Broad St., London, E. C., Eng. **Mine office:** Isabella, Polk county, Tenn.

Officers: J. G. Gordon, chairman and managing director; L. G. Mortimer, managing director; preceding, with Col. J. Le G. Daniell, H. G. Palmer, Edward Dexter and Col. H. B. Mortimer, directors; J. W. Felstead, sec.; William Young Westervelt, 17 Madison Ave., New York, cons. engr. Executives at the mine: W. F. Lamoreaux, gen. mgr.; J. H. Taylor, asst. gen. mgr.

Inc. in Great Britain, Feb. 16, 1891. **Cap.**, £75,000; shares £1 par, in £74,800 ordinary shares and 200 founders' shares. Increased 1907, to £200,000 shares, increase subscribed to by the old stockholders at par, except £48,799 ordinary shares sold to the public at 25s. Stock is fully issued and fully paid. Profits are divisible on the basis of 7%, plus one-half of the net remaining profits, to ordinary shares, balance of profits going to founders' shares. £83,900 first mortgage, 6½%, debentures outstanding, July 1, 1919, against which a general reserve fund of £55,000 has been accumulated.

Recent Dividends:

	Shares Ordinary	Shares Founders' £ s d		Shares Ordinary	Shares Founders' £ s d
1907	82½%	249 3	1912	10%	29 19 5
1908	55%	108 18	1913	12½%	54 18 11
1909	10%	16 0 8	1914	12½%	54 18 11
1910	10%	21 17	1915	13¾%	9 9 10
1911	10%	28 4 5	1916	20%	129 17 3

Total dividends paid to all classes of shares, £558,063. Of this, £363,547, amounting to 375 5/6% on shares outstanding at the times of payment, was paid to the ordinary shares, and £194,506, amounting to 97,253% was paid to the founders' shares, the latter constituting the world's record for profitable copper mining investment. On the 74,800 ordinary shares, from 1895 to 1907, inclusive, 293%, or £229,636, was paid.

Property: nearly 7,000 acres, bought for £68,057, includes the Mary, East Tennessee and Isabella mines, which are active, and the Calloway and Cherokee mines, which are idle. Country rocks consist largely of very tough highly metamorphosed, silicified mica schists, of ancient origin. The ores are exclusively sulphide, averaging about 2½% copper and containing minute quantities of gold and silver, sufficient, however, to be appreciable in the matte.

The **Mary** mine, which is the principal producer, has three shafts, the Gordon 1,180' deep being now the main working shaft. The richest ore in the mine is on the lower levels The workings blocked out 1,500,000 tons, averaging 1.8% copper and 16% sulphur with an additional amount of indicated ore of similar grade making a total of 3,000,000 tons.

The **East Tennessee** mine did not commence to produce until 1910. The Thomas, or operating shaft, 700' deep, has 2 compartments and yields about 30 tons per diem of ore containing 3% to 5% copper and 8% sulphur. Reserves scattered through old mine, between 5,000 and 10,000 tons contain at least

2.5% copper and 8% sulphur, and there are prospects of considerable further developments of rich ore.

The **Calloway** mine, now idle, contains between 10,000 and 20,000 tons of 2% copper ore immediately below the third level, with possibility of further developments in depth.

The **Cherokee** mine shows extensive outcrop on the continuation of the orebody of the School property and it is anticipated that it will yield four million to five million tons of ore averaging 1% copper, 29% sulphur and 45% iron.

The **Isabella** mine has thus far yielded but a few thousand tons of ore a year. The ore, averaging about 0.8% copper and 29% sulphur, has as yet been used for little else than experimental purposes. 5,600′ of systematic diamond-drilling, however, has already revealed over 2,500,000 tons of average ore with like amount anticipated making 5,000,000 tons in all, so that doubtless the property will, eventually, be worked on a considerable scale for acid and iron manufacture.

Smelter: the companys' smelter, and headquarters are located at Isabella, on the company's private, standard-gauge railway, about 2½ miles from the Mary mine. The plant contains two 500-ton, sectional water-jacket blast furnaces, operated by induction motor Connersville blowers of 300 cu. ft. per revolution aggregate capacity, charged by a Freeland patent electrical charger and served by an electrical traveling crane for the matte and belt bucket elevators for the granulated slag. Since 1902, when heap-roasting was abandoned, semi-pyritic smelting, introduced into this country from Tasmania by this company, has been employed. The first fusion gives a matte containing from 12-15% copper and disposes of the bulk of the non-valuable material of the ore in a slag containing from 0.2 to 0.3% copper. This coarse matte is then raised to 45% copper content by a second fusion in the same furnace, usually undertaken once a week. A small percentage of coke, with cold blast of from 20 to 30 oz. pressure is used in both fusions. The 45% matte is sold to the American Metal Co., of New York, and treated for them at the Laurel Hill, L. I., or the Carteret, N. J., smelters.

A 300-ton differential flotation plant finished 1920, produces an 18% copper concentrate and a nearly pure pyrrhotite product.

In 1905, investigations were undertaken to determine the possibility of making sulphuric acid from the smelter fumes. In 1906, an experimental contact plant was erected, but proved unsuccessful, and in 1908, work on the present chamber acid plant was commenced. This plant, which cost over $600,000, was put into operation in less than a year from the time of breaking the ground for its erection, and has since been producing from 40 to 50 thousand tons per annum of 60° Beaume sulphuric acid. It was the first acid plant to successfully convert sulphuric gases from pyritic smelting into concentrated acid.

The credit for the successful development of the company is due primarily to the chairman and managing director, Mr. Gordon, himself a technical man, to the consulting mining engineer, Mr. Westervelt, who developed the mines, and to the former manager, Mr. W. H. Freeland, who developed the pyritic smelting process employed.

Production:

Year	Pounds Copper	Tons 60° B. Sulphuric Acid
1919	5,290,000	*17,400
1918	5,252,000	35,000
1917	5,593,000	32,900
1916	5,129,000	†41,000
1915	5,500,000	41,000
1914	5,862,000	46,900
1913	5,811,000	48,800
1912	5,213,000	48,100
1911	5,040,000	45,600
1910	4,409,000	46,800

* Six months. † 11,000 tons contained 95% to 97% acid.

Company is managed with commendable financial probity, technical ability of a high order, and is heartily endorsed as worthy of confidence and investment.

EAST TENNESSEE MINING & DEVELOPMENT CO. **TENNESSEE**

See Southern Zinc & Mng. Co., Inc.

EAST TENNESSEE ZINC CO. **TENNESSEE**

Inc. in New Jersey, and registered in Tennessee. All stock owned by M. C. Hinn. M. Casewell Heine, atty., 1 Liberty St., New York.

Property: 173 acres, 2 miles from Newmarket, on the Southern railway, reported to show zinc blende ore occurring in joint planes and fractures in limestone beds.

Development: by drilling claimed to have proven about 6,722,000 tons of ore. Work on the property includes an open quarry pit 75′ deep with 5 tunnels running from it.

Equipment: includes 100-ton concentrator, 540′ cable tram and 25-h. p. hoist.

ELENOR MANGANESE CO. **TENNESSEE**

R. B. Hayes, pres., Masontown, Pa.

Inc. 1919. **Cap.,** $15,000.

Property: at Butler, Johnson county, to be developed and equipped.

MAX MINING CO. **TENNESSEE**

Braemer, Tenn.

Prospecting for manganese on Little mountain, Carter county, where 15% ore is found that shows manganese minerals in grains and lumps in a clay bed.

OCOEE COPPER CO. **TENNESSEE**

Address: J. I. Carter, Chattanooga, Tenn.

Officers: J. I. Carter, pres.; John Stagmaier, 1st v. p.; G. H. Miller, 2nd v. p.; S. E. Whitaker, sec.; P. B. Carter, treas., with R. B. Davenport, W. S. Palmer, J. C. Vance and W. H. Weatherford, directors

Inc. 1917, in Tennessee. **Cap.,** $1,250,000; shares $10 par; 70,000 shares in treasury to be sold to secure capital for development; 55,000 shares paid to Chattanooga Copper Co. for its holdings. Practically a reorganization of that company, the officers and directors remaining the same.

Property: 120 acres in northern part of Ducktown copper district, Polk Co., surrounded on 3 sides by the holdings of the Tennessee Copper Co., and the Ducktown Copper, Sulphur & Iron Co., adjoins the East Tennessee mine on the east, owned by the last named company. Several diamond-drill holes prove that the ore deposits of that mine extend downward on their dip beneath the land of the Ocoee Copper Co., and that the ore is identical in character, mineral association and occurrence with that of the East Tennessee mine. Ore was found in the drill holes at depths of 685 to 1,050′. Ownership of surface carries ownership of all beneath the surface, as Tennessee does not have an apex law. Diamond drill records indicate an orebody 290′ long, 415′ in depth and 30′ thick, equal to about 241,000 tons, allowing ⅓ for waste. Development might add to this figure.

Development: by 6x14′ shaft, 427′ deep, June, 1919, being sunk to depth of 1,000′.

The property has attractive possibilities, which warrant a well-planned drilling campaign, in addition to the shaft work and development now underway.

SCHOOL MINE **TENNESSEE**

Operated under lease by Copper Pyrites Corporation, which see.

SOUTHERN AGRICULTURAL CHEMICAL CORP. **TENNESSEE**

Subsidiary of Tennessee Copper & Chemical Corp'n.

Office: 61 Broadway, New York City.

Inc. August, 1919, in Virginia. **Cap.,** $1,000,000.

Company handles the entire output of sulphuric acid and phosphate fertilizer manufactured by the T. C. & C. Corp'n.

SOUTHERN MANGANESE CORPORATION TENNESSEE

Operates several manganese mines and is the largest producer of manganese ore in Eastern Tennessee.

Ore: occurs between limestone and decomposed quartzite and is mined by open pit method.

Equipment: includes complete treatment plant and electric smelting furnaces at Anniston, Ala.

Production: (1918) 140 tons of 26% Mn. ore from Scotia Valley; 360 tons of 22-52% Mn. ore from the Doe Valley mine; 550 tons of 25-45% Mn. ore from Taylors Valley; 550 tons of 25-26% Mn. ore from Shady Valley, and 63 tons of 49% Mn. ore from the Neely mine.

SOUTHERN ZINC & MINING CO., INC. TENNESSEE-VIRGINIA

John H. Caldwell, receiver, Bristol, Tenn.

Officers: E. L. Patton, pres.; Geo. F. Reynolds, v. p.; J. E. Kingsland, sec.-treas., with S. V. Fulkerson, Horace D. Fry, Kirby Thomas and H. G. Peters, directors.

Inc. in Delaware. **Cap.,** $1,600,000, in $600,000 7% cum. pfd., and $1,000,000 common stock; shares $10 par; full paid; non-assessable.

Property: mineral rights of Fall Branch and Arcadia mines, 1,125 acres; the Fall Branch property, 225 acres, is in the S. W. corner of Sullivan county, Tenn., 7 miles S. W. of Fordtown; the Arcadia property is in Sullivan county, Tenn. and Scott county, Va., about 12 miles N. of the Fall Branch property.

Ore: carries zinc in Knox dolomitic limestone; said to be in the same ore-bearing zone as the Mascot and Bertha mines. Prospecting has shown 4 parallel veins. No. 1 vein is opened by a system of open cuts and a 127′ incline shaft that has exposed the ore for 300′ along the strike. The greater part of this work was done under lease by the East Tennessee Min. & Dev. Co., which built a mill prematurely and exhausted its funds. A rough estimate of ore in No. 1 vein gives 188,000 tons of 4% zinc ore above the 100′ level. Veins 4, 5 and 6 parallel No. 1, but have had no systematic development.

Mill: 100-ton capacity, equipped with "Clifford" dry process system. J. H. Banks states in his report: "I consider this a very promising zinc property and can unhesitatingly recommend its further development." No work done in recent years owing to litigation with general creditors.

TENNESSEE COPPER & CHEMICAL CORP'N. TENNESSEE

General office: 61 Broadway, New York. **Corporate office:** Millbrook, New York.

Officers: Adolph Lewisohn, pres.; Sam A. Lewisohn, v. p.; E. H. Westlake, v. p.; F. M. Loper, sec.; E. H. Westlake, treas.

Directors: Jules S. Bache, J. Parke Channing, Wm. B. Joyce, H. M. Kilborn, Adolph Lewisohn, Sam A. Lewisohn, S. S. Rosenstamm, J. H. Susmann, Richard Sutro, Martin Vogel and E. H. Westlake. Annual meeting, fourth Thursday in April.

Inc. Oct. 11, 1916, in New York, to re-finance and take over control of Tennessee Copper Co. (which see), through stock ownership. Stockholders of old company were given privilege of converting stock share for share, and of subscribing for an equal additional amount of the new stock at $16 per share.

In August, 1919, company organized the Southern Agricultural Chemical Corp. (which see) to handle its acid and fertilizer business.

Capital: 800,000 shares; no par value; increased May 29, 1919, from 400,000 to provide funds for the fertilizer manufacturing business. Holders of voting-trust certificates were given right to subscribe for 100% of their holdings at rate of $12.50 per share, the stock subscribed for to be issued to the voting trustees, who will issue additional certificates under the agreement of October 30, 1916. The issue was underwritten by J. S. Bache & Co. and Adolph Lewisohn & Sons at $1.50 a share. By this issue about $4,400,000 additional capital was secured. Columbia Trust Co., New York, transfer agent; Empire Trust Co., New York, registrar. Listed on New York Stock Exchange.

Balance sheet of T. C. & C. Corp. and Tenn Copper Co., years ending December 31:

Assets.

Year	Prop. & Plant	Orig. & Bond Expense	Invest. Insur. etc.	Cash & Lib. Bonds	Acid, Cop. ore, etc.	Accts. Rec. etc.	Total
1918.....	$9,019,154	$436,902	$229,329	$1,194,644	$1,386,586	$88,021	$12,274,636
1917.....	9,243,690	493,118	405,651	1,171,815	1,556,171	415,663	13,286,108

Liabilities.

Year	Net Bond Indebt. & Reserves	Accts. Payable	Accrued Sink. Fund	Accr'd Exp., Taxes, etc.	Total
1918.....	$1,453,392	$364,596	$161,732	$115,835	$2,095,555*
1917.....	2,639,282†	173,944	184,901	123,592	3,121,719

* Assets and liabilities do not agree on account of capital stock having no par value. † Includes $1,140,000 as reserve for possible liability under Russian contract in dispute, which was paid in November, 1918.

Income account of Tenn. C. & C. Corp.

Year	Dividends Tenn. C. Co.	Int. on Invest., etc.	Total Income	Gen'l. Expense	Dividends Paid	Balance incl. prev.
1918.....	$385,634	$153,904	$539,538	$62,026	$392,817	$153,673
1917.....	.....	128,533	128,533	59,555	.....	68,978

Tennessee Copper Co., Tennessee.

Subsidiary of Tenn. Copper & Chemical Corp. Same directorate.

Office: 61 Broadway, N. Y. Mine at Copperhill, Polk county, Tenn.

Operating officials: A. L. Tuttle, gen. mgr.; M. A. Caine, asst.

Inc. April 24, 1899, in New Jersey. **Cap.,** $6,875,000; shares $25 par; $5,000,000 issued. State Street Trust Co., Boston, and Equitable Trust Co., New York, registrars; Old Colony Trust Co., Boston, and National City Bank of New York, transfer agents. Annual meeting, fourth Thursday in April.

Authorized bond issue, 1915, $3,000,000; first mortgage 6% 10-year convertible sinking fund gold bonds; $1,488,000 outstanding. This issue enabled the company to retire the $800,000 outstanding bonds of the first issue, December 1, 1915.

Financial results:

	Profit	Dividend	Surplus		Profit	Dividend
1918.....	$356,571	$400,000	$1,905,409	1910.....	$445,387	$300,000
1917.....	911,150	.....	1,895,402	1909.....	339,406	250,000
1916.....	387,657	150,000	1,717,883	1908.....	324,768	500,000
1915.....	1,242,693	600,000	.....	1907.....	800,634	650,000
1914.....	751,892	600,000	.....	1906.....	824,231	250,000
1913.....	1,087,503	750,000	.....	1905.....	452,106	218,750
1912.....	1,095,875	500,000	.....	1904.....	186,966	218,750
1911.....	367,049	.....	.....	1903.....	417,565	218,750

Property: 12,640 acres of mineral and timber lands, in the Ducktown district. Ore was discovered and mining first begun in 1850, and the mines were operated regularly by a New York company previous to the Civil War, and during the earlier part of the war, under compulsion by the Confederate Government to supply copper for munitions. Company owns the Burra Burra, London, and the Eureka mines. Company also holds under lease 270 acres, including the Polk County mine. The Eureka was formerly operated under lease for iron ore by the Virginia Iron, Coal & Coke Co.

Geology: property shows pre-Cambrian metamorphosed mica-schist, carrying several lines of mineralization with lenticular orebodies. Four deposits, under development, show extensive gossans, originally having a little rich sooty glance ore under the gossan, which was mined out many years ago. The lenses range 30 to 150 in width, 500 to 2,000′ in length, and are of unknown depth. The ore consists of a massive mixture of pyrite and pyrrhotite, with a little chalcopyrite, in a gangue of various metamorphic minerals and quartz, ore ranging from 1.2 to 3% copper, 40% iron, 27% sulphur and 15% silica, with minute quantities of gold and silver. The ore is excellently adapted to smelting, giving very clean slags.

Development: the mines are extensively developed; new work is shown in the following tables, with reserves:

Year	All Mines	Cost p. ft.	Drilling	Cost p. ft.	Ore Reserves, Tons
1918.....	2,858′	$0.202	3,579′	$2.539	3,480,911
1917.....	3,107′	0.139	3,351′	2.310	3,485,713
1916.....	2,991′	0.187	4,090′	2.000	3,372,305

The **Burra Burra mine,** which is the principal property, is operated through a 1,600′ main central shaft, sunk at 75° in the footwall, having its first level 170′ below the collar, with succeeding levels at 100′ intervals, the mine ending 1918 with 10 producing levels, with No. 12 under development. The entire output in 1918 came from back stopes in the mine and 134,910 tons of broken ore was in the stopes January 1, 1918.

The main orebody of the Burra Burra is 1,200′ long and averages 60′ wide on the third level. The McPherson orebody farther north is developed by a drift from the third level of the main shaft, connecting with the McPherson shaft, now down to the eighth level. This shaft is 2,200′ N. E. of the main shaft and facilitates working the McPherson orebody, which is about 900′ long with an average width of 25′. The Hiwassee shaft, 900′ S. W. of the main Burra Burra shaft, is sunk to the third level, showing a comparatively small orebody, of about 200′ length and 12′ average width. Haulage underground is by electric locomotives, and loading of skips in shafts is done from two pockets. During 1918 a total of 2,231′ of underground development work was done. Burra Burra produced 297,083 tons of ore in 1918.

The **London mine** has an 850′ shaft, sunk at at incline of 75°, with 7 levels opened, developing an orebody of 25 to 75′ width and about 600′ length, ranging 2 to 4% in copper tenor. A total of 378′ of underground work was done in 1918, consisting mainly of raises and drifts. The London produced 70,534 tons of ore in 1918.

The **Polk County mine** has a 485′ vertical shaft, with 5 levels opened, developing an orebody of very irregular shape, up to 120′ maximum width, of about 2% average copper tenor. The Polk mine is held under lease. To January 1, 1919, about 248′ of drifting had been done. Production of this mine was 22,726 tons of ore in 1918. In 1919 it supplied the smelter with a silicious flux.

The **Eureka mine,** idle since 1912, has a shaft 165′ deep, at which point the first level will be opened. Diamond-drill borings have shown an ore-body of 20 to 165′ width, about 1,000′ length, and it is estimated that this mine has 2,500,000 tons of ore developed that average 44% iron, 30% sulphur and about 1% copper. This ore will be treated for its iron and sulphur, as experiments indicate that it will make a good non-phosphorous iron ore.

Equipment: at McPherson shaft includes electric hoists, 400-h. p. motor and engine good for 1,200′, 3 Rogler type electrically-driven (450 h. p. motors), 2,500-cu. ft. compressors, a combination shaft-house and crusher building. Crushing plant includes 18x36″ crusher, feeding to a 36″x33′ Robins belt conveyor, used as a picking belt, which discharges into storage bins of about 2,500 tons capacity. As far as possible all barren rock is removed from the crushed ore by hand picking, plant having a daily crushing and assorting capacity of 1,500 tons, ore being reduced to 4″ size. There are similar shaft houses at the London and Polk County mines. Electricity is obtained from the Tenn. Power Co.

The new power and compressor plant at the McPherson shaft has supplied air for the Burra and London mines. The hoist at the latter is driven by air. During 1917 a new steel head-frame and crusher-house was erected at the Burra shaft, and the old steam plant shut down. A brick change house for 308 men was erected in 1918.

The company's private railway connects the mines with the works and has connection at Copperhill with the Louisville & Nashville railway. The track is of standard gauge, with 80 and 90 lb. rails, with 7½ miles of main line and 8 miles of sidings and spurs. Equipment includes four 105,000 lb. Schenec-

tady locomotives, eighty-five 65-ton steel tank cars, 74 standard gauge gondolas and 13 flat cars, and 57 hopper bottom ore cars. The company has a repair shop for locomotives and cars, equipped for making all repairs and capable of completely rebuilding when necessary.

Smelter: at Copperhill, 1 to 5 miles from the mines of the company, was designed and built by J. Parke Channing. On the upper level are the ore bins, having storage capacity for 10,000 tons of ore, 800 tons of coke, and necessary fluxes and furnace products requiring re-treatment. Charges are drawn from the bins into cars of 44 cu. ft. capacity, hauled by electric locomotives over 4 tracks that run under the bins and circle around the furnaces, so that a train loaded on any track may go to any furnace and return to the bins. A sampling plant was built in 1917 and a smelter laboratory in 1918.

The furnace building of steel has space for 7 blast-furnaces, but only 5 are in use, each having an oval settler lined with firebrick. Slags skim into pots of 105 cu. ft. capacity, which are hauled by the electric lomomotives. Considerable slag is used for railway ballast.

Coal dust pulverizing and firing equipment was erected in 1918, and tests so far indicate a considerable saving in fuel in the blast-furnaces.

The converter department has two 40-ton electric traveling cranes taking matte from the settlers to the converters. Two 12′ basic lined converters of the Great Falls type were installed in 1916 to replace the old ones, also a copper-casting machine.

Hot converter slag is poured into the blast furnace settlers, by reason of which the only converter slags requiring re-smelting are the skulls forming in the ladles. Converter bars average 99.4% copper. Copper is cast in 210-lb. pigs and sent to the Baltimore Copper Smelting & Rolling Co. for electrolytic refining, which affects the saving of the very small gold and silver values contained. The finished electrolytic copper is marketed through the American Smelting & Refining Co.

Leaching of flue-dust is being tried, mainly with the idea of securing data for subsequent treatment of ore in the Eureka mine.

The smelter power house includes two 250 k. w. 500-volt d. c. Westinghouse generators, direct-connected to 2 Nordberg tandem-compound Corliss engines, and one 400 k. w. 500-volt d. c. Crocker-Wheeler generator, driven by a Bates tandem-compound Corliss engine, all 3 engines running non-condensing, with exhaust steam going to a feedwater heater. Furnace blast is supplied by 3 Nordberg piston blowing engines, each of 20,000 cu. ft. capacity per minute, and 3 Nordberg duplex cross-compound piston blowing engines, each 30,000 cu. ft. capacity per minute, supplying blast at 50 oz. pressure to a common blast-main, above the charge floor. A motor-driven blower was put in during 1919. Converter blast is furnished by 2 Nordberg duplex cross-compound air compressors, supplying 10,000 cu. ft. per minute each, at 12 lbs. initial pressure. An Ingersoll-Rand air-compressor furnishes air at 100 lb. pressure for operating the charging doors and sundry pneumatic tools. The electric plant includes a 110-k. w. 250-volt Keystone generator, direct-connected to a Ball tandem-compound engine furnishing current for electric light, and there is a motor-generator set for transforming a 500-volt current to 220-volt current for electric lighting outside of the power plant.

The smelter boiler house has four 512- h. p. Altman & Taylor water-tube boilers, with Murphy automatic stokers and Foster superheaters, delivering steam at 175 lb. pressure, with 150° superheat. Coal and ashes are handled mechanically by a bucket and chain conveyor, an 800-ton steel coal bunker being located to feed automatically to the boilers. A brick transformer house was added to the plant in 1915.

Water is pumped from the Ocoee river by three 10″ 2-stage Worthington pumps, belt-driven by motors, each with capacity of 2,800 gal. per minute, to large storage tanks above the smelter. A 4,000,000-gal. reservoir at about the level of the furnace floor receives the flow from the water-jackets.

The company operates a quartz quarry at Austral, Tenn., 35 miles N. of

Copperhill, on the Louisville & Nashville railway. Equipment of the quarry consists of a boiler, air-compressor and rock drills.

The smoke damage situation is complicated by the location of the works, which are in the extreme S. E. corner of Tennessee, winds carrying the bulk of the fumes into the State of Georgia, by reason of which the State authorities of Georgia brought suit against the Tennessee Copper Co. and the Ducktown Sulphur Copper & Iron Co. in the Federal courts, and the latter decided that the smelters must cease operations or stop the fumes by using them for a sulphuric acid plant. This undertaking proved much more difficult than was anticipated by reason of the intermittent and varying nature of the gas supply from the blast furnace tops.

The No. 1 acid plant cost about $1,600,000 and was put into full operation early in 1908, with a rated capacity of 120,000 tons yearly of 60° Beaume chamber acid. With the completion of the No. 2 acid plant in July, 1916, the company had 2 large lead chamber plants for the manufacture of 60% acid, with an estimated capacity of 300,000 tons per year. No. 1 was overhauled by July, 1917, while considerable improvements were made in 1918. There are also plants for concentration of sulphuric acid to 66° and 97½%, and for manufacture of nitric acid.

As the furnace gases contain sulphur dioxide, sulphur trioxide, carbon dioxide, oxygen and nitrogen in considerably varying percentages, new methods of control were found necessary to maintain the volume of sulphurous gases suitable for making sulphuric acid by the chamber process. After some experimentation the problem was solved by equipping one of the smaller and three of the large blast furnaces with tight tops, above the charge floor, to exclude atmospheric air, these being connected with a dust chamber, where most of the solid matter is precipitated from the gas, the dust chamber being so constructed as to conserve the heat of the gases sufficiently to concentrate the acid in the Glover towers. There are 2 octagonal Glover towers of 30′ diameter and 50′ height with suitable nitre plants at the foot of each. After passing through the towers the gases are conducted through very large lead flues of 200 sq. ft. sectional area, which deliver the fumes to the chamber system containing 4,600,000 cu. ft. of chamber space. In a general way the chamber plant is of conventional design, yet the enormous quantities of fume received and acid produced have brought about developments that were new to the industry, among the most notable being the size of gas connections, acid lines, acid coolers and fans, which are all on a scale never before known. The discharge from the chamber plant is conducted into 11 Gay-Lussac towers, which are of a gigantic size, the three latest and largest being octagonal of 36′ diameter and 65′ height. The company has contracted for the sale of its entire production of sulphuric acid to the International Agricultural Corporation, at a price understood to be $4.81 per ton, the contract expiring on December 31, 1920. This acid plant is the largest and most complete in existence.

On May 29, 1919, the company issued the following statement:

"The Tennessee Copper Co. has a capacity of approximately 360,000 tons per year of 50° Baume sulphuric acid, and under the terms of a contract entered into several years ago it has delivered its entire production of acid to the International Agricultural Corporation at a price much below the current market. Under the heavy increases in wages and supplies in the past few years, this contract has proved a handicap to the company. The contract, however, expires by limitation on December 31, 1920, and plans are now being made by the Tennessee company for the construction of a number of large acid-phosphate plants at strategic points throughout the South. These plants will be of the latest construction, and will be equipped with the most modern machinery, with a view to reducing the labor cost to the lowest possible minimum. Work on these plants will be started as soon as the necessary preliminary arrangements have been completed. The company also has under contract a large deposit of phosphate rock in Florida, and plans are now under consideration for its early development. In addition to the above, the company has secured options on and is prospecting additional high-grade deposits. W. D. Huntington will direct the development

of the fertilizer enterprise. He is president of the National Fertilizer Association, and is recognized as being one of the leading authorities in the fertilizer field. While a large part of the tonnage of acid produced at Copperhill will be converted into acid-phosphate at the various plants, the company will have a part of its output available at all times to supply to fertilizer manufacturers and others, and it is expected that the prices received for this acid will average much higher than in the past."

Production:

Year	Ore smelted, tons	Copper, per ton ore, lb.	Oper. cost per ton	Production Acid, tons	Copper, lbs.	Cost per lb.,c	Received per lb.,c.
1919.....	.....	....	....	266,627	10.414,815	....	.....
1918.....	402,071	24.25	$4.50	283,092	9,750,008	20.59	24.800
1917.....	457,902	23.04	3.43	262,858	10.547,708	16.59	26.238
1916.....	385,188	24.41	3.51	181,637	9,404,295	14.36	23.663
1915.....	475,301	26.83	2.82	210,666	12,750,418	10.53	16.274
1914.....	485,051	26.54	3.14	210,163	12,871,113	11.84	13.706
1913.....	470,135	28.70	3.25	197,713	13,493,140	11.34	15.748
1912.....	444,289	29.80	3.27	192,084	13,252,634	11.00	.....
1911.....	436,285	31.65	3.44	.....	13,808,940	10.88	.....

Low-grade copper ores are treated profitably at other points, but in nearly all other cases, they contain considerable gold and silver, which are lacking in the case of the Tennessee. This company has shown both courage and ability in the installation of its acid plant, by virtue of which a very serious handicap has been turned into a permanent source of large revenue.

TENNESSEE MANGANESE CO. TENNESSEE

Address: D. C. Campbell, pres., Knoxville, Tenn.

Cap., $20,000; increased 1918 to $200,000.

Property: mines at Sevierville, Sevier county, and Knoxville, Knox county. A 25-ton electric steel furnace to be installed for the production of ferromanganese.

TEXAS

Under this head, mining companies are arranged alphabetically. Apart from the great sulphur and oil deposits, the mineral production of the State is small; silver is the principal metal produced and nearly all comes from the Presidio mine. Some of the copper deposits (red beds) are said to be worth exploitation. Production for 1919 was 540,000 oz. silver. Small shipments of copper, gold, lead and zinc ore were made from the Van Horn and Sierra Blanca districts.

AMERICAN SULPHUR ROYALTY CO. TEXAS

Address: Houston, Texas.

Has a royalty share in the production of the Freeport Sulphur Co., which see.

CHISOS MINING CO. TEXAS

Howard E. Perry, pres.-gen. mgr., Terlingua, Brewster county, Texas. Property is at Terlingua, 108 miles S. E. of Marfa on the S. P. R. R. Cinnabar ore occurs as replacement deposits in limestone and shale. In the lower limestones the ores are generally in nearly vertical calcite veins, or in lodes of friction breccia. For geology, see Texas Bull. 405, 1909.

Development: by shafts. The mine, which is the biggest producer in the district, had a record-breaking year in 1915, producing 1,200 flasks of mercury in November and December. Yearly output not available. Produced 500 flasks per month in 1918, with a smaller output in 1919.

Equipment: includes an 18-ton shaft furnace.

COLQUITT-TIGNER QUICKSILVER MINE TEXAS

Located in Brewster county. Idle several years.

CONSOLIDATED KANSAS CITY SM. & REF. CO. **TEXAS**

Owns the El Paso smelter at El Paso, Texas, described under that title.

ELLIS MINE 34 **TEXAS**

Address: W. K. Ellis, treas., McKinney Springs, Tex. W. R. Wyatt, supt.

Property: 5 patented quicksilver claims, 103 acres, in Brewster county, 100 miles S. of Marathon, Texas.

Development: by 250′ shaft and 200′ tunnel. **Equipment:** includes 15-ton retort furnace.

Production: 41,400 lb. quicksilver in 1918.

EL PASO SMELTER **TEXAS**

Address: Kuno Doerr, gen. mgr.; J. Heggie, supt., El Paso, Texas.

Owned by the Cons. Kansas City Sm. & Ref. Co.

Is a subsidiary of the American Smelting & Refining Co., which see.

The smelter proper occupies 43 acres out of an 1,100-acre tract of land which is traversed by the Sante Fe, El Paso & Southwestern and the Southern Pacific railways.

The monthly average of cars of ore that is brought to the smelter from the surrounding mines has never been less than 1,600. Often it has run as high as 2,300 cars per month and in a few instances even larger amounts of ore have been handled in a month.

Three Godfrey lead roasters and 12 mechanical roasters average from 1,200 to 1,500 tons daily. There are four reverberatory copper smelting furnaces, that in practice actually smelt 1,500 tons of copper ore in a working day.

The constant increase in the tonnage of copper smelted at the El Paso smelter has made it necessary to replace the two 10′ diameter, 30′ long Pierce-Smith converters which have been in use by 2 new converters of the same type, each of which is 30′ in length and 13′ in diameter.

A 12′ Great Falls type converter converts in connection with the others 200 tons of blister copper per day and is not the least important item in the equipment. From 1,500 to 2,000 tons of lead are smelted each month.

An interesting mechanical feature is the 90′ craneway span over which two 60-ton cranes are operated. The new converter stack is 300′ in height, is 16′ in diameter and was built of concrete. The smoke and escaping gases reach this stack through a steel "Balloon type" flue 4,400′ long.

In 1918, ore worth $2,500,000 a month and over $30,000,000 a year, was smelted in the plant, which covers 43 acres of ground.

The El Paso smelter is a city within itself, with stores, fire station, church, an electric light plant that could light a city of 50,000; parks, water works and office buildings. A portion of the grounds were used during 1916 and 1917 by United States troops as a military post. The hospital has a number of ever-ready beds and a resident physician. The smelter owns and operates a complete railway system, and more than 7,000 people who live in El Paso look to it for support.

FREEPORT SULPHUR CO. **TEXAS**

Address: 61 Broadway, New York City, and Freeport, Tex.

Is a subsidiary of the Freeport Texas Co., a holding company owning the entire capital stock, $200,000.

Property: 8,677 acres of real estate, including 500 acres of sulphur deposits, near the mouth of Brazos river, Brazoria county.

Geology: sulphur occurs in pockets, cavities, and as streaks impregnating gypsum, or a formation in which gypsum predominates. The bed is about 1,000′ from the surface.

Development: by wells drilled to the sulphur bearing formation. **Process:** the sulphur is extracted from the rock by the well-known Frasch process. Steam is made in boilers and used in water-heaters, each capable of heating 1,000 gals. of water a minute and from 60 to 336° F. under a pressure of 100 lbs. This superheated water is forced down the wells to the formation, the sulphur melts, and rises to surface, where it cools. Sulphur is pure and is

mostly used in the paper pulp industry, the remainder being used for sulphuric acid manufacture.

Equipment: includes 4 plants aggregating 23,800 h. p., complete with oil storage, 4½-mile oil pipe line, canal from river, pumping plant, water purification plant, compressors, and large battery of boilers.

Production: about 2,000 tons of sulphur daily.

HAZEL MINING & MILLING CO. **TEXAS**

Officers: at last accounts. John V. Hughes, Dallas, Tex., pres.; G. G. Wright, v. p.; C. F. Freeman, Dallas, Tex., sec.; R. B. Stichter, treas. **Directors:** J. V. Hughes, T. J. Oliver, G. H. Cox, C. A. Culters, C. F. Freeman, Milton Parks and G. G. Wright.

Property: the Hazel Silver mine, in Diablo mountains, 15 miles N. E. of Van Horn, Culberson county, shows a fissure vein that yields chalcocite ore with barite gangue. Shipping ore said to average 10% copper and 50 oz. silver per ton.

Development: includes 700′ shaft and extensive workings at various levels. Mine was worked for 10 years by H. G. Clifford, of El Paso, and A. C. Schriver, of San Antonio, producing $500,000, but was shut down in 1895. A dry concentrator was erected to treat the old dumps, said to contain about 100,000 tons of $15 copper-silver ore, but was unsatisfactory and has been converted into a wet concentrator.

Reported that the Sutton Steele & Steele Co., of Dallas, had taken over the mine and would install a cyanide mill. O. W. Steele, mgr.

MARIPOSA MINING CO. **TEXAS**

Terlingua, Tex.

F. M. Dancy, pres., Philadelphia, Pa.

Property: adjoins the Terlingua mine. **Ore:** occurs in fissure veins outcropping over a wide area. The mine, at one time the largest producer in the country, is being developed at depth. Past production has been practically from the surface.

Equipment: two 10-ton Scott furnaces, with a capacity of 100 flasks quicksilver per month and the 50-ton Terlingua furnace held under lease. Dumps said to have 32,000 tons containing $241,000 in mercury, April, 1918. Estimated output, 250-300 flasks per month.

PECOS MINING CO. **TEXAS**

Idle. J. Y. Canon and James Dougherty, of Van Horn, Tex., principal shareholders.

Property: the Pecos mine, 3 miles N. E. of the Hazel silver mine in El Paso county, 19 miles from Van Horn, shows a N. E.-S. W. vein in brown igneous tuffs, traceable 2 miles across the mountains to the Red Maverick mine.

Development: by a 105′ shaft with a level at 90′, showing seams a few inches thick of copper-silver ore, said to assay 70% copper; the seams in places aggregate 2′ in thickness. The mine was first operated in 1888, abandoned after working and relocated 1903, by George Briggs and T. R. Owen, forfeited by technicality of Land Commission and located by J. Y. Canon.

PRESIDIO MINING CO. **TEXAS**

Office: 406 Balboa Bldg., San Francisco, Cal. **Mine office:** Shafter, Tex.

Officers: W. S. Noyes, v. p. and gen. mgr.; F. C. Handy, supt.

Cap., $150,000; shares $1 par; all issued.

Property: the Shafter or Presidio mine, at Shafter, Presidio county, has a production record of over $7,000,000 since 1883. **Ore:** carries silver mainly as chloride. The mine was once known as the Bullis, and has an interesting history.

Development: by about 20 miles of workings.

Equipment: includes 1 mile aerial tram, a 15-stamp 100-ton mill and a cyanide plant. The mill is equipped with 2 tube mills, filter, Pachuca tanks, Dorr thickener and 250-h. p. oil engine.

Production: figures are not available, but the State of Texas has yielded the following quantities of silver, most of which is from the Shafter mine:

540,000 oz. in 1919; 612,000 oz. in 1918; 588,000 oz. in 1917; 600,000 oz. in 1916, and 12,417,882 oz. from 1885 to 1915, inclusive.

Little information is available concerning operations, but it is probable that good profits are made.

RAINBOW MINING CO. **TEXAS**

Address: Terlingua, Tex.

Property: a prospect adjoining the Chisos mine, under development.

SHAFTER SILVER MINE **TEXAS**

Owned by the Presidio Mining Co., which see.

SHERIDAN MINING CO. **TEXAS**

Inc. in Texas. **Cap.,** $200,000.

Owns a copper-molybdenite property in the Llano district, Burnet county.

STUDY BUTTE MINING CO. **TEXAS**

W. D. Burcham, mgr., Terlingua, Texas.

Property: a lease on the Big Bend quicksilver mine, 5 miles E. of Terlingua, Brewster county. Ore occurs in fissures filled with calcite and cinnabar and occasional impregnations, in a flat lying rhyolitic intrusion 500′ thick covered by 50′ of limestone shale.

Equipment: includes power plant, 20-ton furnace and oil-engine. Output in 1918 showed a large falling off. Additional depth necessary to maintain past production.

TAMA SILVER MINING CO. **TEXAS**

Was reported developing a group of claims in the Quitman district, El Paso county. The ore is silver-lead and occurs in replacement deposits in limestone.

Adjacent properties include the Thunderbolt group on the lead and zinc-bearing Bonanza lode, owned by Geo. H. Stokes, which is developed by two tunnels. Love Bros. are also working similar silver-lead deposits at the head of Quitman canyon, 9 miles S. E. of Sierra Blanca.

TEXAS ALMADEN MINING CO. **TEXAS**

Terlingua, Texas.

Property: Texas Almaden quicksilver mine, unwatered and under development, 1918. Equipped with 50-ton furnace.

TEXAS COPPER & REFINING CO. **TEXAS**

Address: 527 Cooper Bldg., Denver, Colo.

Officers: W. P. Dietz, pres.-treas.; Wm. Shubert, Jr., v. p.; K. M. Shubert, sec.

Property: reported to own 1,200 acres of copper-bearing land in Hardman county.

TEXAS DEVELOPMENT & MINING CO. **TEXAS**

Reported to own a copper mine at Nacogdoches, Tex.

TEXAS GULF SULPHUR CO. **TEXAS**

Office: 50 East 42nd St., New York, and Gulf, Texas.

Officers: W. H. Aldridge, pres.; T. Schulze, v.-p.; H. F. J. Knobloch, sec.-treas., with C. F. Ayer, E. C. Bacon, H. B. Baruch, J. A. Black, and T. Cochran, directors. F. V. Munster, asst. sec.-treas. Charles Biesel, gen. mgr.

Inc. Dec. 23, 1909, in Texas. **Cap.,** $7,600,000; increased in 1919, from $5,000,000. Was originally $3,000,000. Shares $10 par; issued $5,100,000; subscribed and 50% paid, $2,500,000. No funded debt. Annual meeting, fourth Tuesday in November.

Property: sulphur-bearing land near Matagorda, Matagorda county, Texas. Drilling in 1918 and 1919 revealed over 10,000,000 tons of sulphur-bearing rock.

Equipment: entire works cost over $3,500,000, including 6-mile railroad spur, and 10,000 h. p. steam boiler plant for the Frasch process.

Production: since March, 1919, at the rate of 1,500 tons of sulphur daily.

UTAH

The descriptions of the mining companies of the State are grouped in five sections, the first including all mines outside of the four big mining districts, while the mines of the Alta-Cottonwood, American-Fork, Bingham, Park City and Tintic-Eureka-Ophir districts, are described under these separate headings. Salt Lake City is the actual business center for each of these districts and most of the operating companies have offices there.

In 1919, the metal production of Utah had a value of $45,439,000, or nearly 41 million less than in 1918, the decrease being one of both price and quantity. The gold output was $2,070,000, compared with $2,949,170 in 1918, more than half of it from Bingham. The 1919 output of the silver mines of the State was 11,569,000 oz., compared with 13,455,597 oz. in 1918, the Chief Consolidated at Eureka being the largest producer, with the Tintic Standard a close second; Bingham and Park City mines were also large producers. The copper output in 1919 was 123,626,000 lb., compared with 227,169,630 lb. in 1918, the Utah Copper Co. contributing 9,000,000 lb. monthly. The lead output was 121,249,000 lb., compared with 167,008,224 lb. in 1918, and the zinc production 4,467,000 lb., compared with 18,399,417 lb. in 1918, decreasing 77%.

ADAH COPPER CO. **UTAH**

Address: St. George, Washington county, Utah.

A. H. Dahle, pres., at last accounts.

Inc. 1916, in Utah. **Cap.**, 600,000 shares; 2c par.

Property: the Burg mine, in Harrisburg district, Washington county, 10 miles E. of St. George, said to be a regular shipper of copper-gold-silver ore. Management planned erecting a 40-ton leaching plant in 1917. No recent returns.

ALUMINUM POTASH CO. OF AMERICA **UTAH**

Address: 514 Templeton Bldg., Salt Lake City, Utah.

Officers: G. M. Winkelman, pres.; J. Stokes, Jr., v. p.; H. O. Pack, sec.; Homer McCarty, treas., with G. C. Shipp, Geo. H. Blood, and W. P. Hauerbach, directors.

Inc. March 24, 1919. **Cap.**, $3,000,000; $100 par. Operating expenses reported $30,000 for 3 months in 1919.

Property: 15 acres in Marysvale district, Piute county, said to have one of the best alunite deposits in the state. Company claims reserves of 60,000,000 tons of ore assaying 10% potash, and 37% alumina. Reported in May, 1919, that a 300-ton mill was being erected.

AMERICAN COPPER MINING & MILLING CO. **UTAH**

Office: Lehi City, Utah. J. N. Butt, pres.; Charles Anderson, v. p.; A. O. Slade, treas.; preceding officers, Howard Murdock and Chas. Herron, directors; William Asher, sec.

Inc. Aug., 1912. **Cap.**, $100,000; shares 10c par. An assessment of 1 mill called March, 1914. Property is in Tooele county, but as officers do not reply to letters, no details of the company's holdings are available.

AMERICAN EAGLE COPPER MNG. CO. **UTAH**

Officers: F. R. Meadows, American Falls, Idaho, pres.; S. H. Cotterel, v. p.; H. P. Huey, sec., with Henry Miller and Mr. Sparks, directors.

Property: 10 claims, about 200 acres, 2 miles E. of Farmington and 15 miles N. of Salt Lake. The ore carries copper, silver and gold.

Development: by 130′ tunnel.

AMERICAN STANDARD COALITION MINING CO. **UTAH**

Controlled by Lorin Hall, Salt Lake City; Willard Scowcroft, and John Scowcroft, Ogden, Utah.

Property: ½ mile N. of Siegel mine in Schell range, said to have a vein 60′ wide on surface, and traceable for 600′. Values are mainly in silver.

ANTELOPE STAR CONSOLIDATED MINES **UTAH**

Inc. March, 1917, in Utah. **Cap.**, $300,000; shares 10c par. Is a consolidation of several properties in Mineral Mountain range, 9 miles S. E. of Black

Rock, Millard county. Is said to be a reorganization of the Antelope Star Mining Co.

The incorporators are: Leo Neilson, Logan; Darby Crandall, New York; W. R. Hensleigh, V. L. Arnold and Chas. M. Morris.

ANTELOPE STAR MINING CO. **UTAH**

Office: 618 Newhouse Bldg., Salt Lake City, Utah.

Officers: Chas. M. Norris, pres.; H. L. Parker, v. p. and mgr.; V. L. Arnold, sec.; L. J. Brattager, asst. sec., with W. N. Williams, B. L. Rich, and Leo Nielsen, directors.

Inc. in Utah. **Cap.**, $250,000; 25c par; 50,000 shares in treasury. Stock listed on Salt Lake Exchange.

Property: 9 claims and a millsite, about 200 acres, 20 miles N. E. of Milford, in Millard county, said to have a 5′ fissure vein of milling ore, assaying 8-10% lead. The orebody is leached at surface and contains barium, lead, silver, copper and iron.

Development: by 373′ tunnel, 65′ shaft and about 800′ of drifting and raises. Promoted by Woolley Bros., Salt Lake City.

ARROWHEAD MINES CO. **UTAH**

Officers: H. D. Chase, pres., 76 G St., Salt Lake City, Utah; Chas. A. Root, v. p.; G. Alma Gardner, sec.-treas.; A. J. Hoban, managing director, with J. A. Reeder, H. Mann, R. M. Usher, Chas. Anderson and W. J. Allen, directors. J. H. Nelson, supt.

Cap., $10,000; shares 10c par; assessable; 261,953 shares in treasury. Stock listed on Salt Lake Exchange.

Property: the General Connor mine, 9 claims, 1 patented, near Marysvale, Piute county, said to show a 15′ fissure vein of free milling ore, with a 16″ streak averaging $18-$20 in gold and silver.

Development: by 95′ shaft, 225′ tunnel, winzes and crosscuts. Ore reserves estimated at $275,000. Five men employed. Management plans sinking from tunnel level and erecting a mill. No recent information.

BEAVER-BUTTE COPPER CO. **UTAH**

Office and mine: Beaver, Beaver county, Utah. Sherman McGarry, supt.

Inc. 1909, in Utah. **Cap.**, $50,000; shares 10c par; assessable. Property idle from 1912-1914, owing to lack of capital, but development work was resumed in summer of 1914, and property reported under lease to Senator A. B. Lewis, representing Eastern capitalists, 1916.

Property: 15 claims, unpatented, in the Newton district, 8 miles from a railroad, show gold-silver ore and are believed to carry the continuation of the Sheep Rock ledge.

Development: by a 150′ two-compartment shaft, crosscuts and drifts. Company claims to have 2′ of $10 ore on surface and 19′ of $8 ore on the 150′ level with 1′ of $18 ore along the footwall side. Planned installing an electric hoist and drifting on the 150′ level. See Beaver Gold Mines Corp. and remember Majestic Mines. No returns, 1917-1919.

BEAVER COPPER CO. **UTAH**

Office: 609 Newhouse Bldg., Salt Lake City, Utah. Mine at Milford, Beaver county, Utah.

Officers: W. J. Dooley, pres.; S. S. Pond, sec.; A. J. McMullen, mgr., with Chas. A. Weaver, A. R. Bain, Blaine Grey, and W. C. Lockington, directors.

Inc. 1907, in Utah. **Cap.**, $100,000; 10c par; assessable; all issued. Annual meeting, third Monday in March. Listed on Salt Lake Exchange.

In 1919 the company absorbed the Beaver Lake Metals Co. and the Utah-United Copper Co. All machinery and other equipment has been moved to the Utah United property because the officers believe that group offers the best chance to develop a producing mine with the limited funds on hand.

Property: 31 claims, 600 acres, in the Beaver Lake district, showing fissure veins in monzonite, contact deposits between monzonite and limestone and replacement orebodies in lime. The ore is complex, containing copper, and lead

sulphides with gold-silver values. Plan on mining an orebody 225′ long said to contain 10,000 tons of 2% copper ore blocked out.

Development: by a 470′ incline shaft with about 1,000′ of workings. Late in 1919 the east drift on 470′ level cut 6″ of ore containing 6% of zinc, 11% of lead, and 19 oz. silver per ton.

Equipment: includes hoists, compressor, and pump. Total output to July, 1919, was 4 cars copper ore and 2 cars lead ore. Assays were 4% copper, 40% lead, and 17 oz. silver.

The consolidation of the three properties and new plans for development appear to be an honest effort on the part of the management to make a producing mine.

BEAVER GOLD MINES CORP. **UTAH**

Officers: A. B. Lewis, pres.; E. C. McGary, v. p.; M. P. Braffet, sec.-treas., with B. F. Caffey, W. L. Cook, W. H. Stephens and S. Glazier, directors. A. B. Blainey, mgr.

Inc. in 1914. **Cap.,** $3,500,000; shares $1 par.

Property: claims covering the Sheep Rock gold vein in the Newton district in eastern Beaver county, 12 miles N. E. of Beaver City, Utah.

Development: by 100′ shaft. Company claimed to have cut a vein of milling ore, 15′ wide on the 60′ level, and 18′ wide on the 100′ level. In January, 1916, the company was reported to have obtained a bond, $240,000, on the old Sheep Rock mine, a former high-grade producer, developed to the 300′ level and equipped with a 5-stamp mill. Promotion methods caused much comment. No recent report; probably idle.

BEAVER HORSESHOE GOLD MNG. CO. **UTAH**

Letters returned unclaimed. Probably closed down.

Officers: H. B. Ward, Mina, Nev., pres.; John Waldis, Tonopah, v. p.; C. R. Bunker, Salt Lake City, sec.-treas., with Fred Zimmerman, J. W. Kelley and F. E. Becker, directors.

Inc. in May, 1915. **Cap.,** $250,000.

Property: 19 claims located on south Fork of Beaver river, 14 miles east of Beaver City. Surface samples are said to assay $24.60 in gold.

BEAVER LAKE METALS CO. **UTAH**

Described in Volume XIII.

Merged with Beaver Copper Co., which see.

BEAVER MINES CO. **UTAH**

Office: 222-23 Continental Bank Bldg., Salt Lake City, Utah. **Mine address:** Marysvale, Piute county, Utah.

Officers: A. H. Cutright, pres. and mgr.; Geo. R. Raymond, v. p.; W. E. Kilburn, treas.; A. Maxwell, sec., and Alex. Beckstead, directors.

Inc. Dec. 17, 1910, in Utah. **Cap.,** 1,000,000 shares, 1c each; issued 859,000 shares. Annual meeting, second Saturday in January.

Property: 11 claims, 220 acres, in the Ohio district, 5 miles from D. & R. R. R. Claims carry copper-bearing gold-silver ores in fissure veins in andesitic porphyry. There are 7 veins, 2 developed by crosscut tunnels, 725′ and 72′ long. Mine had only a prospecting outfit. No recent report; presumably idle.

BEAVER RANGE MINE CO. **UTAH**

Address: Black Rock, Millard county, Utah.

Officers: John B. Taylor, pres. and gen. mgr.; W. W. Moody, v. p. and supt.; R. B. Graff, sec.-treas.

Inc. July, 1916, in Utah. **Cap.,** $100,000; shares 10c par.

Property: 10 claims, in the Mineral Mountain range, 10 miles S. E. of Black Rock on the Salt Lake R. R. Claims are in limestone near quartzite and said to carry copper and lead ore, in three prominent N. S. fissures.

Development: over 1,500′ of tunnel and shaft work. Main Chicago tunnel in over 300′ and expected to cut the shoots which show lead ore on the surface. No recent report. One of the many Utah companies which appear to be afraid to answer letters of inquiry.

BEE BEE MINING CO. **UTAH**

Office: 409 Kearns Bldg., Salt Lake City, Utah. **Mine office:** Goldstrike, Washington county, Utah.

Officers: H. G. Snyder, pres.; John A. Bryson, v. p.; Robt. L. Judd, sec.-treas., with E. J. Lund and Thos. Marioneaux, directors; S. F. Snyder, supt.

Inc. April 13, 1915. **Cap.,** $100,000; shares 10c par, issued $70,000. Assessment of 4/10c per share levied, August, 1916.

Property: 3 claims, unpatented, in the Goldstrike mining district, Washington county, claimed to show 20,000 tons of $10 to $35 free milling ore in fissure vein. No recent report. Probably idle.

BIG INDIAN COPPER CO. **UTAH**

Office: Provo, Utah. Col. C. E. Loose, pres.-gen. mgr.; J. T. Farrer, v. p.; P. G. Peterson, sec.-treas. and supt.; Niels C. Christensen, metallurgist. Col. Loose and Senator Smoot are the principal owners.

Inc. in Utah. **Cap.,** $10,000; shares 1c par; 185,000 taken by insiders, 700,000 issued for property; 100,000 shares offered the public in 1917 at $1. Increased, 1918, to $750,000; shares, 50c par.

Property: 21 claims, 11 patented, about 350 acres, 38 miles S. E. of Moab and 60 miles from the D. & R. G. railway at Crescent, San Juan county, Utah. Claims are said to show copper ore occurring disseminated through sandstone with sulphides appearing at 100′ depth.

Company started operating a 300-ton leaching plant to use the sulphur dioxide process to treat a large tonnage of 3% ore, in November, 1917. Water is piped from La Sal ranch, 7 miles distant.

Reported in 1919 that property had been leased for 3 years to the Metallurgic Improvement Association.

BIPONT SILVER MINING CO. **UTAH**

C. A. Phillips, pres., Spokane, Wash.; J .B. Randall, sec., Oakley, Utah.

Company was organized in 1918, to take a $250,000 bond and lease on 56 claims, including the Bipont mine, 20 miles from Oakley and 2 miles from the Idaho-Nevada line. Reported that over 100,000 tons of rich silver-lead ore was available and company would build a mill.

BLACK JACK CONSOLIDATED MINING CO. **UTAH**

Merged, 1917, with Empire Mines Co., which see.

BLACK ROCK COPPER MINING & MILLING CO. **UTAH**

Address: Black Rock, Millard Co., Utah. Walter James, gen, mgr.

Property: 11 claims, 17 miles S. W. of Black Rock, developed by 250′ shaft and a drift on the 180′ level, exposing a vein in limestone, said to show copper values. Working in 1918; no later report.

BLUE RIBBON GOLD MINING CO. **UTAH**

Address: Minersville, Utah.

Officers: W. B. Seymour, pres.; L. Shaw, v. p.; Fred R. Pryor, sec.-treas., with J. H. McOmie and Clara D. Smith, directors, at last accounts.

Inc. Feb., 1915, in Utah. **Cap.,** $100,000; shares 10c par; issued $60,460.

Property: 8 claims in Jarloose mining district, miles E. of Minersville, Beaver county, Utah.

Ore: gold in shoots in vein 6′ to 12′ wide, between well-defined walls of rhyolite. Average assay said to be $9.40 per ton.

Development: by 50′ shaft. Plan the addition of 25-h. p. gasoline hoist, and sinking shaft of 500′ depth. Is only a prospect.

BREWER GOLD & COPPER MINING CO. **UTAH**

Office: 212 Utah Savings & Trust Co. Bldg., Salt Lake City, Utah. **Mine office:** Ibapah, Tooele county, Utah.

Officers: J. P. Gardner, pres.; S. W. Morrison, v. p.-treas.; H. B. Windsor, sec.; John Mortimer, asst. sec.

Inc. Feb. 16, 1907, in Utah. **Cap.,** $50,000; shares 10c par; assessable; 4 assessments have been levied.

Property: 11 claims, 6 patented, on Dutch mountain, in the Clifton district, less than 5 miles to loading station on the Deep Creek railroad. In operation, May, 1917. No later information.

BUENA VISTA CO. **UTAH**

Address: 4 E. 43rd St., New York.

Officers: Jos. E. Barlow, pres.; C. C. Nolfle, v. p.-treas. and mgr., care Big Indian Mine, Moab, Utah; A. M. Cheney, sec., with N. C. Christensen, and C. A. Dowell, directors.

Inc. 1918, in Utah. **Cap.,** $1,000,000; $1 par; 600,000 outstanding. Annual meeting, first Tuesday of December.

The company was organized to buy, or lease, and operate mining properties, in particular properties, where it is possible to use the processes owned by the Metallurgical Improvement Corporation, 101 Park Ave., New York. A lease has been acquired on the Big Indian Mine in San Juan county, Utah, with the special object of making a commercial demonstration of the Christensen Lixiviation process. The mill was expected to be in operation in October, 1919, with a daily capacity of 8,000 lb. of copper.

BULL VALLEY GOLD MINES CO. **UTAH**

Office: 410 Felt Bldg., Salt Lake City, Utah.

Officers: M. R. Evans, pres.; Williard Scowcroft, v. p.; N. A. Robertson, sec.-treas., with M. P. Braffet and R. G. McQuarrie, directors.

Inc. 1913. **Cap.,** $100,000; shares 10c par.

Property: 16 patented lode claims, 295 acres, 1 millsite, and one placer claim, 35 acres in Goldstrike district, near Enterprise, about 40 miles from Modena, on Salt Lake Route.

Ore: free milling gold quartz found in fissure veins, 3′ wide, along porphyry dike in lime, quartz, andesite and rhyolite formation, said to run as high as $50 per ton.

Development: several thousand feet of workings, including 2 tunnels, 500′ and 705′ long, at last accounts. **Ore reserves:** estimated at 10,000 tons milling ore in sight, valued at $20 per ton. **Equipment:** 3-stamp, 10-ton mill.

Production: consisted of several high-grade shipments in 1915. Company does not reply to requests for information.

BULL VALLEY HASSIAMPIE GOLD MINING CO. **UTAH**

Address: Goldstrike, Washington county, Utah.

Officers: J. D. Alsop, pres.; Ren Bryson, v. p. and supt.; J. A. Bryson, sec.-treas., with H. J. Burgess, A. B. Hemenway, A. F. Miles, W. E. Ayer, directors.

Inc. July 28, 1913, in Utah. **Cap.,** $100,000; shares 10c par; outstanding, $70,500. Annual meeting, first Monday in July.

Property: 3 claims, 60 acres, unpatented, adjoining Bull Valley Gold Mines Co., in the Goldstrike mining district, covers a large belt of porphyry and quartzite. **Ore:** gold in fissure vein, 17′ wide, with 80° dip, said to assay from $1.20 to $14.60 per ton.

Development: several tunnels and shallow shafts.

Property is still in the development stage. This is one of the many Utah companies who shun publicity—in this book.

BURGOMASTER ORE CO. **UTAH**

Address: Zenith, North Dakota.

Property: 120 acres, south of Atlas mine in the Star district, Beaver county, said to show silver ore. Developed by shaft to depth of several hundred feet. Plans early resumption of work.

CALDO MINING CO. **UTAH**

Address: J. M. Callow, pres., care General Engineering Co., Salt Lake City, Utah.

Company had a lease on the dump of the Horn Silver mine at Frisco, Beaver county, Utah, said to contain 200,000 tons of silver, lead, zinc tailings, and operated a 200-ton flotation mill. Operations on the Horn Silver dump have been completed and the company is inactive.

CALUMET MINING CO. **UTAH**

Address: Lund, Iron county, Utah.

Property: 19 claims, 30 miles N. W. of Lund, developed during 1917, Management estimated 2,000 tons of 30% lead and 2 oz. silver ore available above

75′ level. Shipments in August, 1917, yielded $3,000. Production to September, 1917, was about 700 tons. No recent returns.

CAPITOL MINING CO. **UTAH**

Address: Charles Smith, supt., Milford, Utah.

Property: 2 claims, 3½ miles S. W. of Milford, Utah. Being developed by shaft, 225′ deep in June, 1919. Crosscutting and drifting was to begin on 275′ level.

Ore: carrying silver, lead and gold occurs in limestone and porphyry.

CARBONATE KING MINING CO. **UTAH**

Officers: M. J. Dooley, pres.; J. F. Free, v. p.; F. E. Harding, sec.-treas., of Salt Lake City.

Cap., 1,000,000 shares; 10c par; 400,000 in treasury.

Property: the Hetty Green, Schindler, Ethelwin and Pinky claims, in Ophir camp, near Hidden Treasure mine.

Development: 200′ inclined shaft on Hetty Green vein. Property is still in prospective state. No recent report.

CEDAR RIDGE MINING CO. **UTAH**

Owns 5 claims, about 65 acres, adjoining the Lake View mine on N. E. Promontory Point, Boxelder county, Utah. Mail returned, 1919, from Promontory Point.

Samples had good zinc values for length of 1,500′, the ore showing 11.7% zinc for 60 samples cut at regular intervals along workings.

CEDAR TALISMAN CONS. MINES CO. **UTAH**

Offices: 515 Newhouse Bldg., Salt Lake City and Milford, Beaver county, Utah.

Officers: S. S. Pond, pres. and mgr.; F. B. Sherwood, v. p.; Geo. Baglin, sec.-treas., with H. M. Chamberlain, Geo. Lynch and G. L. Bemis, directors.

Inc. March, 1909, in Utah, as a merger of the Cedar Mining Co. and the Talisman Mining Co.; latter company described in The Copper Handbook, Vol. XI. **Cap.,** $500,000; shares 50c par; assessable. The 10th assessment was levied on March 15, 1917, of 1c a share. All outstanding. Stock transferred at company office. Listed in Salt Lake City.

Financial statement, January 1 to April 30, 1916, showed profit of $2,851. At this time management changed and in report, May 1 to September 16, an operating loss was given of $8,193 on this period, or net loss of $5,341. Management has been changed again and reports are not available.

Property: 13 claims, 8 patented, 250 acres, in the Star mining district, Beaver county, Utah. **Ore:** carbonate of lead, copper, and zinc, containing gold and silver.

Development: several thousand feet of shafts and underground workings, the lowest on the 1,000′ level of the incline, or main working shaft. On 300′ level drift is out 267′ and will be driven 200′ further. Previous to the consolidation the two properties are said to have had a total net production of $130,000, but for years they have not shown a production of any importance. Company claimed 50,000 tons mill ore on dump and blocked out, that will average 8% lead, 14% zinc, 7 oz. silver. In July, 1917, the property was leased for 2 years to H. S. Joseph, who started shipping 12% lead and 10 oz. silver ore in August. Shipments for 1918 totaled 200 tons. Company operations to be resumed in 1920.

CHRISTMAS MINING CO., INC. **UTAH**

Address: 802 S. 2nd West St., Salt Lake City, Utah.

Officers: Thos. H. Hazel, pres.-treas.; C. F. Kabisius, v. p.; J. H. Snyder, sec., with A. Johnson, and C. F. Adams, Jr., directors.

Inc. April 21, 1891, in Utah. **Cap.,** $10,000; 5c par; outstanding, 170,000 shares; assessable. Last assessment, No. 18, ½c a share, was called March 20, 1919.

Property: 12 patented claims, 4 miles from Gold Hill, Tooele county, said to show fissure veins in limestone and porphyry, with gold, silver, copper and lead ore.

Development: 150′ vertical shaft with 100′ of workings. The president in a letter to the stockholders, says: "We have a mint in the Christmas property, only the majority of you don't know it." He also says: "We are just budding into shippers." This is a prospect handicapped by "lack of funds," a not uncommon malady.

CITY ROCKS MINING CO. **UTAH**

Office: Houghton, Mich.

Officers: N. W. Haire, pres,; John Edwards, v. p.; Jas. P. Edwards, sec.-treas.; L. M. Cleaves Byers and Jos. Busch, directors.

Inc. 1906, in Utah. **Cap.,** $1,000,000; $5 par. Property consists of shareholdings in the Michigan-Utah Mining Co., received for lands sold in 1912.

CLIFF MINING CO. **UTAH**

Former address: First Nat'l Bank, Milwaukee, Wis. **Operating office:** 414 Judge Bldg., Salt Lake City, Utah. **Mine office:** Ophir, Tooele county, Utah.

Officers: A. G. Kern, pres.; Grant Snyder, v. p.-mgr.; J. A. Stewart, sec.-treas., with A. D. Thompson, Frank Adams, Geo. Swift and E. McVicker, directors. A. H. Williams, supt.

Inc. May 31, 1906, in Maine. **Cap.,** $3,000,000; $10 par; all outstanding.

Dividends: to 1916, $90,000.

Property: in the Ophir district, contains silver-lead-zinc ore as replacement deposits in limestone.

Development: by tunnels, with several miles of workings.

Equipment: includes electric power and one-mile aerial tram.

Does not reply to requests for information.

CLIPPER MINING CO. **UTAH**

Successor to Mohawk Mining Co.

Inc. July, 1916, by T. J. Yates, J. S. Barlow, John Russon, Dr. G. N. Curtis and J. A. Dalton, all of Salt Lake City.

Property: 7 claims, near Tecoma, Boxelder county, Utah, shows 2 veins exposed throughout property, carrying silver-lead and zinc ores.

Development: by an 80′ shaft with 100′ of drifting. Is a prospect only.

No recent report.

COMMONWEALTH MINES CO. **UTAH**

Office: 420 Herald Bldg., Salt Lake City. **Mine office:** Newhouse, Beaver county, Utah.

Officers: Wm. M. Bradley, v. p.; W. T. Allen, sec.-treas.; Newton A. Dunyon, gen. mgr., with C. H. Strevell and Jas. H. Paterson, directors.

Inc. Nov., 1906, in Wyoming. **Cap.,** $600,000; $1 par.

Property: the Commonwealth mine, 7 claims, in the Star district, adjoining Lady Bryan and Progressive mines. Claims show Topache limestone with intrusive sheets of altered green porphyry, cut by fissures, with more or less mineralization along fissures and outward along certain limestone beds. Lead ore was produced from surface workings and the Nellie claim has copper sulphides in its bottom workings.

Development: by a 1,400′ tunnel, with back of about 300′. Said to have opened ore assaying up to 4% copper, 20% lead and 60 oz. silver per ton.

Equipment: includes gasoline power and an air compressor. Development shows but little ore, mostly low-grade, and claims are not especially promising, according to geological reports. No recent information; probably idle.

CONSOLIDATED ORES CO. **UTAH**

Owns vanadium-uranium claims in Brumley ridge district, near Moab. Reported, October, 1919, that work would be started; J. W. Stephen, in charge.

COPPER BUTTE MINING CO. **UTAH**

Idle. **Office:** Richfield, Sevier county, Utah. Wm. Johnston, pres.; Alfred J. Bird, sec.-treas.

Property: is a copper prospect on Gold mountain, in the Kimberly district, Piute county, Utah.

Development: by a short tunnel, showing a 6′ vein of low-grade silver-

bearing copper ore. Company claims to own a large deposit of alunite, a potash ore.

COPPER MOUNTAIN MINE **UTAH**

Owned by Samuel Newhouse, Newhouse Bldg., Salt Lake City, Utah. Leased to A. J. McMullen, Milford, Utah.

Property: 7 patented claims, 125 acres, in Beaver Lake mining district, Beaver county, Utah.

Geology: ores containing gold, silver, iron and copper occur as contact deposits in E.-W. shoots with a dip of 70° to the north between a monzonite foot wall and a limestone hanging wall. Ore carries copper oxide with lime and iron, the average of carload shipments being 4%.

Development: by a shaft 100′ vertical, then 150′ incline and 620′ of drifts. Mine is worked by overhead stoping.

Equipment: 15-h. p. gas hoist.

Production: 60 to 70 tons for 1916. Ore reserves were estimated at 10,000 tons.

COPPEROPOLIS MINING CO. **UTAH**

Address: N. A. Dunyon, mgr., Tooele county, Utah.

Property: 65 claims in Deep Creek district. Shipments of selected ore in October, 1917, reported to have returned 60% copper, 65 oz. silver and $12 gold per ton. In February, 1918, a car of ore was shipped assaying about 10% copper.

Developments: by tunnels.

COPPER QUEEN MIDLAND MINING CO. **UTAH**

Address: Grantsville, Utah.

Officers: John P. Anderson, pres.; E. T. Woolley, v. p.; Mrs. Hilda Erickson, sec.-treas., with Gustave Anderson, and O. W. Anderson, directors.

Inc. June, 1907, in Utah. **Cap.,** $125,000; 25c par; issued 380,000 shares.

Property: 15 claims, unpatented, in Clifton mining district, Tooele county, and 6 miles S. E. of Gold Hill; said to show several promising veins with gold-silver values in lead and copper ore.

Development: 6 incline shafts from 50′ to 205′ deep, two tunnels, 620′ and 125′ in length. Total workings about 1,850′ are mainly result of assessment work. About 30 tons of $50 ore was shipped in 1918.

COPPER RANCH CONS. MINING CO. **UTAH**

Office: 130 South, on West Temple, Salt Lake City, Utah.

Officers: D. L. Evans, pres., Malad, Ida.; Jos. Pingree, sec.-treas.; A. F. McCulley, v. p.; D. E. Kirk, and E. V. Kessler, directors.

Inc. Sept., 1917, in Utah.

Property: the Copper Ranch mine, 10 claims, located next to Milford Copper Co. ground, 7½ miles west of Milford. Mine operated during 1916-17 by lessees who produced 100 cars of ore netting $32,368 smelter returns. Orebodies in sight reported sufficient for regular shipments for several years.

Development: by 300′ incline shaft with drifts and crosscuts on ore.

Equipment: motors, hoist and compressor.

COPPER RANCH MINING CO. **UTAH**

Presumably dissolved.

Former officers: Moses Thatcher, former pres.; C. L. Rood, v. p.

Inc. in Utah. **Cap.,** $500,000; shares 50c par.

Property: a mine near Milford, sold Aug., 1917, for $57,000 to D. L. Evans, of Malad City, Jos Pingree and A. S. McCully, of Milford, Utah. This amounted to 13c. per share of Copper Ranch stock. (See Copper Ranch Consolidated.) The company and its property are described in The Copper Handbook, Vol. XI, 1914.

COPPER ZONE MINING CO. **UTAH**

Address: Newcastle, Utah.

Officers: W. W. Wiscourt, pres.; J. R. Richards, v. p. and supt.; Geo. T. Hyde, sec.-treas.

Inc. in Utah. **Cap.,** $100,000; shares 10c par.

Property: 8 unpatented claims, near Newcastle, said to show copper, silver-lead ore. Developed by a tunnel that was 600′ long at last report. Is a prospect.

CREEDMOOR MINES CORPORATION **UTAH**

Address: Palladio Bldg., Duluth, Minn.

Officers: W. D. Williams, pres.; J. A. Keyes, v. p.; R. A. Casson, treas.; C. J. Bonner, sec.; with Lloyd Davie, Milford, Utah, directors.

Inc. Aug., 1915, in Utah. **Cap.,** 1,000,000 shares; 500,000 outstanding.

Property: 7 claims, 120 acres, in Star district, Beaver county, Utah, said to show silver-lead ore.

Development: open-cuts and shallow shafts. Some ore shipped from mine under former ownership.

CREOLE COPPER MINES CO. **UTAH**

Address: Atlas Bldg., Salt Lake City, Utah.

Officers: H. A. Pederson, pres.; H. Brellean, sec.; B. H. Goddard, mgr.

Inc. 1917. **Cap.,** $250,000; shares, 15c par.

Property: 10 claims, 6 patented, 75 acres in Lincoln mining district, Beaver county, shows gold-silver-copper-lead ore in a contact deposit between granite and limestone. Deposit has an E. W. course and dips E. 38°. Average assays said to be 12% copper, 5% lead, 17 oz. silver and $1 to $5 gold per ton.

Development: 400′ incline shaft and 200′ tunnel, with total workings about 2,500′. Management claims to have large bodies of ore blocked out for shipping when copper prices warrant.

Equipment: includes compressor and hoist.

CREOLE MINING CO. **UTAH**

Was a leasing company. Fully described in Vol. XIII.

CROFF MINING CO. **UTAH**

Officers: R. R. Tanner, supt., Beaver, Utah; G. P. Norton, sec.

Cap., $1,000,000; shares $1 par; 295,000 shares and $7,354 in treasury, January, 1916. Listed in Salt Lake City.

Property: 5 patented claims, in Lincoln mining district, 12 miles east of Milford, Beaver county, Utah. Ore is found along the contact of lime shale hanging-wall and limestone foot-wall and varies in width from 6″ to 3′. It is said to carry silver, lead, copper and gold.

Development: by 240′ incline shaft, also 665′ of tunnels and drifts. Have proven ore shoot on 150′ level.

Three carloads of ore shipped, 1917, assayed 13% lead, 6 oz. silver and $2.80 gold per ton.

Equipment: includes a gasoline hoist and air-compressor. No recent report.

CUPRIC MINES CO. **UTAH**

Mail returned from former office at 17 Battery Place, New York, and also from 206 Templeton Bldg., Salt Lake City, Utah. F. A. Bishop, sec.; M. C. Morris, mgr.

Inc. May 11, 1908, in New York. **Cap.,** $1,000,000; $1 par; assessable; issued, $500,000. Is affiliated in finances and is managed by the Horn Silver Mining Co.

Property: the Cupric, or Iron Devil mine, 16 claims, unpatented, in the Frisco district, Beaver county, adjoining the Peacock mine, at the east end of White mountain and 2 miles S. E. of Newhouse. The mine is near the igneous contact, dikes and tongues of monzonite invading the limestone; there are numerous mineralized fissures carrying chalcopyrite, pyrite, specular hematite and magnetite with garnet, tremolite, muscovite, etc.

Development: by 2 old incline shafts and 425′ two-compartment vertical shaft, sunk near the main tunnel of the Cactus mine. Equipped with gasoline hoist. Property has good ore, but not, it is believed, in large enough quantity to make mine profitable.

DEEP CREEK COPPER KING CO. **UTAH**

Mail returned, 1919 from former address, Gold Hill, Tooele county, Utah.

Property: 10 claims in Deep Creek district, extending south from the Western Utah Copper claims.

Development: by 100′ shaft said to be sunk on copper-silver-lead ore. Probably idle.

DEEP CREEK COPPER M. & M. CO. **UTAH**

Office: 501 Boyd Park Bldg., Salt Lake City, Utah.

Officers: R. C. Naylor, pres.; J. Pingree, treas.; A. L. Thomas, Jr., sec., with A. Winzell, L. Housekeeper, I. A. Powell and W. T. Smith, directors.

Property: 10 claims, in the Deep Creek district, Tooele county, said to show lead-silver-copper ore.

Development: by shallow shaft on the Moonlight claim which is to be sunk 100′ on a 2½′ vein.

Company reported raising funds for development work by stock sales, at last account.

DEER TRAIL MINING CO. **UTAH**

O. J. Salisbury, pres., 574 E. First St., Salt Lake City, ; G. A. McCaskill, gen. mgr. Company operates the Deer Trail mine, near Marysvale. The ore contains gold, silver and lead.

Development: by tunnels, one over 2,200′ in length. Early in 1918 a 100-ton mill with flotation unit was completed. Shipments in 1918-'19 averaged 10 to 12 carloads a month. About fifty men employed.

DELSA MINING CO. **UTAH**

Property about 6 miles from Santaquin, reported operated under lease by G. M. McLean in 1917. Ore occurs in veins, 1-2′ wide, carrying silver-lead-zinc. Developed by tunnel, 500′ long at vertical depth of 300′. Probably idle.

DETROIT COPPER MINING CO. **UTAH**

Samuel A. King, pres.; Judge Bldg., Salt Lake City, Utah.

Inc. Jan., 1916, in Utah. **Cap.,** $1,000,000; shares $1 par; 400,000 in treasury. Held 5-year $100,000 bond and lease, from November 24, 1915, on 40 claims, locally known as Ibex mine, and owned by Ibex Gold Mng. Co.

Company described in Vol. XIII. Property is now held under bond and lease by the Monarch Cons. Mines Co. and described under that name.

DEWEY SILVER AND COPPER CO. **UTAH**

Mail returned, 1918, from former address, Lorin Hall, Brigham City, Utah.

Property: 5 claims, 5 miles N. of Brigham City, Boxelder county.

Development: by tunnels, ore occurring in limestone. Surface ore said to contain up to 60% lead with some silver and copper. Probably idle.

DRY CANYON CONSOLIDATED MINING CO. **UTAH**

Address: Gisborn, Tooele county, Utah.

Officers: C. J. Garber, pres.-treas.; L. L. Travis, v. p.; J. E. Darmer, sec., with V. C. Anderson and Violet S. Scribner, directors.

Inc. 1900, in Utah. **Cap.,** $100,000; shares 5c par; assessable; 1,800,000 shares outstanding. Annual meeting January 15.

Property: 29 claims, 12 patented, 400 acres, in Dry Canyon, Ophir mining district, Tooele county, said to show a complex ore containing gold, silver, copper, lead and zinc.

Development: by tunnels with a total of over 8,000′ of workings.

Production: during 1918 produced steadily, smelter returns paying all expense of development work.

DUGWAY COPPER MINING & SMELTING CO. **UTAH**

Office: 54 East 4th South St., Salt Lake City, Utah. **Mine office:** Clover, Tooele county, Utah.

Officers: O. F. Peterson, pres.-treas.-gen. mgr.; P. C. Kittle, v. p.; A. V. Peterson, sec., with A. E. H. Peterson and H. B. Windsor, directors.

Inc. June 13, 1902, in Utah. **Cap.**, $30,000; shares 10c par; assessable; issued, $22,506. Annual meeting, third Tuesday in July.

Property: 6 claims, patented, 118 acres, in the Dugway district, 43 miles from a railroad. Shows an ore zone, reported by company, to be 300′ long on the 200′ level, containing a number of orebodies that carry chalcopyrite, bornite and argentiferous galena, giving assays of 1 to 15% copper, up to 30% lead, up to 7% zinc, up to 66 oz. silver, and $1.60 gold per ton.

Development: by a 333′ incline shaft, with about 1,000′ of workings, showing considerable ore. Idle for several years.

DUGWAY SMELTING CO. **UTAH**

Office: 203 Atlas Block, Salt Lake City, Utah.

Officers: A. L. Thomas, Jr., pres.; K. D. Kuhre, v. p.; C. S. Goddard, sec.-treas., with E. R. Hardy, and C. G. Adams directors.

Early in 1918, this company was arranging to construct a 100-ton smelter at Dugway, Tooele county, with the idea of refining the ores from the Dugway district, and the advertising matter sent out stated "This will give the Dugway Smelting Co. a profit in excess of $1,000 a day with 100 tons daily capacity, and with increased capacity the profits will be more than proportionately larger. As a rule, the public is not cognizant of the large profits in smelting, as the returns are so large and sure that the public has never been given a chance to invest, all the capital being furnished by close corporations." Nothing has been heard of the proposed company for over a year, so presumably the public has lost another chance to get either profit or experience.

DULUTH & UTAH DEVELOPMENT CO. **UTAH**

Property sold to Bullion Coalition, and proceeds distributed. Company presumably dissolved. Fully described in Vol. XIII.

EAGLE COPPER MINING CO. **UTAH**

Mine office: Santaquin, Utah county, Utah.

Officers: Armon Cravens, pres.; S. W. Higginson, v. p.; C. E. Snell, sec.-treas.; L. F. Peterson, supt.

Inc. May, 1907, in Utah. **Cap.**, $1,000,000; shares 10c par. Last assessment of ½c delinquent, April 11, 1914.

Mine on Mount Nebo, east of Santaquin, has shipped a little high-grade lead and copper ore. Developing with a small force at last accounts. No recent information.

EAST ANTELOPE MINING CO. **UTAH**

Address: 135 E. Broadway, Salt Lake City, Utah.

Officers: John Matson, pres. and mgr.; John W. Chase, v. p.; H. E. Giers, sec.-treas.; with N. P. Hansen, and A. C. Nebeker, directors. C. W. Pettit, supt.

Cap., $100,000; 10c par; assessable; last assessment, ½c a share, delinquent September 15, 1919. Listed on Salt Lake Exchange.

Property: 11 claims, unpatented, on Mineral Mountain, Millard county, adjoins Keno and Antelope Star mines.

Development: by 400′ tunnel with drift on limestone quartzite contact; 800′ of work in 1916-17, showed excellent ore in small amount in west drift. Closed down during 1918, but reopened in March, 1919.

ELDORADO GOLD MINING & MILLING CO. **UTAH**

Address: Don Maguire, mgr. and principal owner, Ogden, Utah.

Property: 900 acres, said to show silver-lead-zinc ore in limestone-quartzite contact. Copper ores occur in granite. Shipments in 1912 ran 37.5% lead, 10 oz. silver and $2 gold. Mine is said to show 40,000 tons of 15% zinc ore and 100,000 tons of silver-lead ore.

Development: includes 1,400′ tunnel. Planned mine development and installation of a new tramway. No recent report. Probably idle.

EMERALD MINING CO. **UTAH**

Mine office: Mammoth, Juab county, Utah. J. E. Oglesby, pres.; J. L. Yundt, gen. mgr.

Inc. 1896, in Utah. **Cap.**, $300,000; shares $1 par; assessable, fully issued. Listed on Salt Lake Exchange.

Property: 4 claims, and additional land bought, 1910.

Development: 1,100′ shaft, with about 4,000′ of workings, on a narrow but rich vein, carrying copper, silver and lead ores. A 4′ vein between well defined walls, showing heavy iron mineralization and sugar quartz was opened in a 700′ winze.

Company has levied assessment for years and been regarded as the "wildest of wildcats," but is now in favor and may repay stockholders for their blind faith and yearly contributions.

Reported June, 1919, to look promising on 1,000′ level.

EUREKA OPHIR MINE **UTAH**

At Dry Canyon camp, via Stockton, in Rush Valley district, Tooele county, Utah, on the S. P. L. A. & S. L. R. R.

Property shows veins with replacement orebodies in Paleozoic limestones at and near dike contact and shipped 50 tons a month from the 200′ and 375′ levels, averaging 8% copper, 15 oz. silver, 10% lead, in 1913.

Property: operated under bond and lease by Mineral Development Co., some years ago. and shipped $26.92 ore from the 200′ level. Planned sinking main shaft to 400′ level. No recent returns.

FALK MINING CO. **UTAH**

Address: Midvale, Utah.

Officers: K. H. P. Nordberg, pres.; Alma E. Malstrom, v. p.; Hyrum A. Nordberg, sec.-treas.; with Alma Francom, and Kristina Nordberg, directors.

Inc. 1913, in Utah. **Cap.**, $100,000; shares 10c par.

Property: 8 patented claims, 160 acres, in North Willow Canyon, Tooele county, 8 miles S. W. of Grantsville, said to show veins with lead-silver, gold, copper ore.

Development: by several tunnels and 120′ shaft. Property is a prospect. idle for some time, but management attempting to sell stock to enable company to resume work.

FEDERAL MINING & MILLING CO. **UTAH**

Out of business. Former address: Stateline, Iron county, Utah. I. C. Clark, mgr. See Vol. XIII.

FERBER COPPER CO. **UTAH**

Dead. See Vol. XIII of this work.

FLORENCE MNG. & MLG. CO. **UTAH**

Address: Marysvale, Utah. J. A. Fitzpatrick, gen. mgr.; W. A. Fitzpatrick, sec.-treas. Operates a 100-ton potash plant, built in 1918. The mine supplies alunite from which the potash is derived.

FORTUNA GOLD QUEEN MINING CO. **UTAH**

Office: B. F. Capper, pres., at last accounts, 333 Judge Bldg., Salt Lake City, Utah.

Property: 3 claims at Fortuna, Beaver county, said to show free gold in 8′ quartz vein in limestone and porphyry. Opened by tunnels and 200′ shaft. Equipped with gasoline hoist. Closed down. No recent returns.

FORTUNA INDEPENDENCE MINES CO. **UTAH**

Inactive. **Address:** E. C. McGarry, pres., 1388 S. 9th E St., Salt Lake City, Utah.

Property: 8 claims in Fortuna district, Beaver county, and 2 claims in Grand county, held under bond and lease. Ore occurs in intrusive rocks, porphyry and trachyte predominating. Mine is developed by 165′ shaft and 400′ adit, said to show an oreshoot 18″ wide and exposed for 135′, giving assays of $20 gold and 3-5 oz. silver. Management planned extending the adit to 800′ in 1917. Five-stamp mill built in 1917, at company's Henry mountain property, 85 miles S. of Green River station. No recent returns.

GALENA PARK MINING CO. **UTAH**

Address: Ogden, Utah.

Officers: F. W. Thackwell, pres.; W. J. Critchlow, v. p.; S. C. Powell, sec.; J. E. Beesan, treas.

Inc. Sept., 1919, in Utah. **Cap.,** $125.000; par 10c.

Details of property not available.

GARFIELD CHEMICAL MANUFACTURING CORP'N. **UTAH**

Subsidiary of the American Smelting & Refining Co.

Address: Garfield, Utah.

Officers: C. W. Whitley, pres.; C. M. McNeil, v. p.; R. C. Gemmell, v. p.; J. M. Bidwell, sec.-treas.; E. L. Newhouse, mgr., with J. M. Hays, directors.

Treats concentrate from the Utah Copper Co. and custom ores from scattered points in Utah. To supply sulphuric acid for leaching copper ore and other purposes, a 150-ton acid plant costing nearly $500,000 was erected late in 1916. Fumes from the smelter supply the sulphur.

Equipment: two 20′ Herreshoff roasting furnaces of 50-ton capacity each, brick-lined steel flue, pyrite burners, Glover tower, lead-lined acid chambers, and two Gay-Lussac towers. Both 66° and 98° B. acid are made. Leaching and flotation plants nearby will consume most of the acid.

GARFIELD SMELTING CO. **UTAH**

Office: 120 Broadway, New York. **Operating office:** 714 McCornick Blk., Salt Lake City, Utah. **Works office:** Garfield, Salt Lake county, Utah. Entire capital stock owned by American Smelters Securities Co. The smelter has cost, complete, about $7,000,000. Fully described Vol. X.

Capacity has been almost trebled by additions and metallurgical improvements in last few years.

GARRISON-MONSTER MINING CO. **UTAH**

Office: Utah Sav. & Trust Co., Salt Lake City, Utah. Mine near Gold Hill,Tooele county, Utah.

Officers: J. P. Gardner, pres.; J. S. Garrison, v. p.; H. B. Windsor, sec.; S. W. Morrison, treas.

Inc. June, 1906, in Nevada. **Cap.,** $1,000,000; $1 par; assessable. Assessment No. 9, ½c per share levied in September, 1918. Is a merger of the Garrison G. & C. Mng. Co. and the Monster Mng. Co.

Property: 26 claims, patented, on Dutch mountain, in the Deep Creek district, 40 miles from Wendover, on Western Pacific railroad. A branch line to the district was completed in 1917, reducing transportation costs materially. The Garrison Monster company built a loading station at Garrison station on its spur from the Deep Creek line. Mine has over 3,500′ of workings and is said to show considerable bodies of silver-lead ore. Work was resumed in 1917. A few carloads of ore were shipped early in 1919.

GENERAL EXPLORATION CO. **UTAH**

Address: Providence Bldg., Duluth, Minn.

Officers: Hansen Evesmith, pres.; Wm. O. Pealer, v. p.; M. W. Evesmith, sec., with E. I. Bricker, U. L. Yynott, and E. J. Hansen, directors.

Inc. July 21, 1903, in Minnesota. **Cap.,** $100,000; $50,000 in preferred, and $50,000 in common stock; outstanding, $50,000, and $300 preferred.

Company is an exploration and holding company interested in the St. Croix and other companies in Star and South Star districts, Beaver county.

GETHIN LEROY UNITED MINES CO. **UTAH**

Office: 517 Atlas Blk., Salt Lake City, Utah.

Officers: A. S. Fowler, pres. and treas.; Jas. Moffat, sec., with Given Fowler and Loris Pratt, directors.

Cap., $1.000.000; $1 par; 750,000 issued. Paid a dividend of 1c per share, November, 1913.

Property: in Silver Island district, Tooele county, 15 miles north of Wendover. Company has made several shipments of silver ore, but ran out of money and leased mine; lessees are said to have shipped 500 sacks of ore in January, 1916.

Property reported sold in August, 1917, to satisfy a judgment for $3,616 in favor of E. Hanson. No later information.

GINZA COPPER CO. **UTAH**

Idle. Mine near Kelton, Boxelder county, Utah. Operations stopped in 1915 after considerable prospecting had failed to locate ore of commercial grade. Described Vol. XI, Copper Handbook.

GLEN ALLEN MINING CO. **UTAH**

Address: Box 88, Park City, Utah.

Officers: Jas. B. Allen, pres.; E. K. Stallo, v. p.; Emer Murdock, sec.-treas.; with A. C. Hatch, Jos. Hatch, A. C. Miller, S. A. King, J. W. Patt, Leon Nash, and W. R. Ridgely, directors.

Inc. May, 1918, in Utah. **Cap.,** $2,000,000; $1 par; issued 1,500,000 shares. Annual meeting in May.

Property: 36 claims, 15 patented, in Glencoe Canyon, 3 miles S. E. of Park City, includes the old Glencoe mine, a silver-lead producer.

Development: 200′ vertical shaft and a 2,250′ tunnel, with total workings of 3,500′. Management claims 50,000 tons ore blocked out with average assays of 10% lead, 10 oz. silver, 16% zinc, and ½% copper.

Equipment: includes a 50-h. p. hoist, and 6-drill compressor. A 200-ton flotation mill has recently been built.

GOLD BOND MINING & MILLING CO. **UTAH**

Idle. **Last address:** 27 Latimer Block, Salt Lake City, Utah.

Officers: A. A. Crome, pres.; Walter Crome, v. p.; Wm. Crome, sec.-treas., with W. C. Howe and C. F. Stanley, directors.

Inc. 1898, in Utah. **Cap.,** $25,000; 5c par; assessable; 200,000 shares outstanding.

Property: 2 unpatented claims, 4 miles from a railroad, Tooele county, shows a contact fissure vein, traceable on surface and carrying streaks of copper, gold, silver ore in limestone formation. Assays average 4% copper. Is merely a prospect reported to have good showings. Developed by a shallow shaft and 120′ tunnel, with about 300′ of workings. No recent information, probably idle.

GOLD CROWN MINING & MILLING CO. **UTAH**

Address: Milford, Beaver county, Utah.

Officers: A. L. Cullimore, pres.; C. G. Johnson, v. p.; S. L. Swanson, sec.-treas.; James Kirk, mgr.; W. E. Yardley, asst. mgr.

Cap., $10,000; shares $1 par.

Property: 7 claims and lease on another in Star district, Beaver county. Some rich lead-silver ore opened. Reported in May, 1919, that nine cars of ore had been shipped, mainly from 300′ level, said to assay 20-25% lead and 45 oz. silver.

GOLDEN EMMA MINING CO. **UTAH**

Geo. F. Busch, pres. and mgr., 426 Vermont Bldg., Salt Lake City.

Cap., $1,000,000; shares $1 par.

Property: 30 claims, under development in 1918. No recent report.

GOLDEN REEF CONS. MNG. & DEV. CO. **UTAH**

Address: 22 Keith Emporium Bldg., Salt Lake City, Utah.

Officers: D. P. Rohlfing, pres. and mgr.; Leon Sweet, v. p.; H. S. Young, sec.-treas., with L. Simons, J. Rosenberg, C. B. Stewart and David Spitz, directors.

Cap., $100,000; shares 10c par; 800,000 shares outstanding.

Property: about 750 acres, in Beaver county, about 5 miles N. of the Horn Silver mines, developed by a 2,000′ tunnel and a 450′ double-compartment shaft with four levels.

Work was resumed in November, 1919, after a shutdown of several months.

GOLDEN RELIEF MINING CO. **UTAH**

Address: Provo, Utah. Ben. H. Bullock, mgr.

Property: located in Santaquin district, was under development in the Fall of 1919.

GOLDSTRIKE BONANZA MINING CO. **UTAH**

Probably dead, see Goldstrike Con. Both companies described in Vol. XIII.

GOLDSTRIKE CONSOLIDATED MINING CO. **UTAH**

Dead. Mail sent Rollo E. Clapp, pres., returned, from former office, 603 Newhouse Bldg., Salt Lake City. Described in Vol. XIII.

GOLDSTRIKE MINING & LEASING CO. **UTAH**

Mail returned, 1919, from former address, 603 Newhouse Bldg., Salt Lake City, Utah.

Officers: H. G. Snyder, pres.; E. J. Lund, v. p.; Rolla E. Clapp, sec.-treas., with Clyde McQuarrie, Louis R. Lund and H. A. McQuarrie, directors. **Inc.** April 16, 1915. **Cap.,** $100,000; shares 10c par.

Property: lease Nos. 1 and 2 on Hamburg claim of Bull Valley Gold Mines Co., 3 claims of the Herd Girl group, Last Chance and Cripple Creek groups in Goldstrike district, Washington county, Utah. Said to show gold ore occurring in fissure vein, 4′ wide and averaging from $7 to $20 per ton.

Development: 500′ adit, at depth of 300′ with several winzes, drifts and upraises.

Equipment: two 3-stamp mills of 20 tons daily capacity, 20-h. p. engine and compressor.

Ore reserves: 10,000 tons blocked out, according to published reports.

No recent report, probably idle. The Goldstrike district had a boom several years ago, but is at present inactive.

GRAND RIVER PLACER CO. **UTAH**

Office: 201 Felt Bldg., Salt Lake City, Utah.

Officers: O. W. Kumrow, pres.; Leo Erdman, v. p.; W. H. Penner, sec.-treas., mgr.

Inc. 1918, in Utah. **Cap.,** $100,000; shares 10c par; 300,000 shares issued; 700,000 in treasury. Annual meeting, first Monday in July.

Property: 3,000 acres of placer ground, at Grand River, Grand county, Utah. Gravel runs from 80 cents to $7 per cu. yd. Equipped with a Mitchell amalgamator of 35 tons capacity. Expended $6,000 in 1918. No production reported.

GRANITE COPPER CO. **UTAH**

Address: Beaver, Beaver county, Utah.

Officers: A. L. Fotheringham, pres. and mgr.; Jos. McEwen, v. p.; J. F. Tolton, sec.-treas., at last accounts.

Cap., $1,000,000. shares $1 par.

Property: the King of the Hills mine in the Mineral range between Milford and Beaver, has a 2′ vein, carrying high-grade silver-lead ore with some copper.

Opened by a 250′ shaft and 1,100′ tunnel. About $25,000 has been spent on the mine. No recent report, probably idle.

GRANITE MINING & MILLING CO. **UTAH**

Address: Santaquin, Utah.

Officers: E. O. Bylund, pres.; Jos. Tietjen, v. p.; Jas. Goodall, sec.; C. A. Lindstrom, treas.-supt., with T. B. Heelis, R. J. Armstrong and Jos. Crook, directors.

Property: 12 claims, unpatented, near Santaquin, includes the Granite mine. Claims show limestone with ore-bearing fissures, carrying replacement deposits of copper and silver-lead ore developed by 1,000′ tunnel. No recent report, probably idle.

GREEN MOUNTAIN MINING & MILLING CO. **UTAH**

Probably idle. No 1917-19 returns secured.

Officers: Dr. R. S. Millbee, Marshfield, Wis., pres.; Dr. H. H. Millbee, v. p.; A. E. Goodell, sec.; S. Amberson, treas., with B. S. Rich, directors.

Inc. 1915, in Utah. **Cap.,** 1,500,000 shares; 100,000 issued.

Property: Green Mountain group in Miners Basin, Grand county, Utah,

35 miles S. E. of Cisco, on the D. & R. G. R. R., formerly owned by the Green Mtn. G. & C. Mng. Co. and fully described in Vol. XI, Copper Handbook.

Ore: gold, silver and copper, low-grade ore said to average about $8 per ton; also said to show some high-grade ore. Developed by Dewey crosscut tunnel.

Equipment: 30-h. p. gasoline engine, 2 sets of power drills, compressor and pumps.

HANAUER SMELTING WORKS UTAH

At Salt Lake City, Utah. Controlled through stock ownership by American Smelting & Refining Co.

HINMAN MINING CO. UTAH

H. W. Hinman, pres., Garfield, Utah; F. G. Morse, sec., 639 Sixth Ave., Salt Lake City, Utah.

Property: the old Pocahontas lead-silver mine, 6 claims, located 6 miles from Gold Hill. A tunnel was driven to get under the ore disclosed in the 130′ incline shaft above, and some ore was shipped in 1918.

HOMESTAKE T. & C. CO. UTAH

Recently merged with the Great Divide Mines Co.; controlled by John B. Taylor, v. p., 678 E. S. Temple St., Salt Lake City; J. H. Hurd, pres.; Walter A. Cook, sec.-treas.

Inc. 1906, in Utah. **Cap.,** $100,000; shares $5 par; assessable; fully issued. Is a close corporation, with only 5 stockholders.

Property: 30 claims, in Pine Canyon, West Mountain section, Tooele county, with water rights, tunnel rights and franchise for a deep tunnel, from Pine Canyon into the Bingham district; also several hundred acres of bench lands, and an 800-acre smelter site, 4 miles from the International smelter. Claims show bedded veins with lead and copper ores.

HOPE OF ISRAEL MINING CO. UTAH

Ben H. Bullock, pres., Provo, Utah; Nora A. Bullock, sec.-treas.

Inc. 1918, in Utah. **Cap.,** $50,000; shares 1c par.

Property: at Santaquin, being developed by tunnel said to have opened up low-grade lead-silver-copper ore.

HORN SILVER MINES CO. UTAH

Office: 27 Cedar St., New York. **Operating office:** McCornick Bldg., Salt Lake City, Utah. **Mine office:** Frisco, Beaver county, Utah.

Officers: Jacob Neadle, pres.; Alexander B. Simonds, v. p.; M. S. Hirschberg, sec.; Harvey N. Wadham, treas., with E. B. Critchlow, A. B. Simonds, Jacob Neadle, W. R. Britton, Chas. Brenneman, Wm. J. Barrette, S. T. Perrin, H. N. Wadham, and H. S. Young, directors; Benjamin B. Lawrence, cons. engr.; Wm. H. Hendrickson, mgr.

Is a reorganization of the Horn Silver Mining Co., which was incoporated in 1879 in Utah, with capital of $10,000,000; shares $25 par. Stock in old company exchangeable for stock in the new on an equal basis.

Inc. Oct. 17, 1917. **Cap.,** $400,000; $1 par; 348,000 issued. Listed on New York Curb.

Dividends: old company paid $5,642,000 in dividends up to 1907. Three dividends of 5c. each were paid in 1916, two by the former company and one by the present. Two 5c. dividends were paid in 1917, and one of same amount in 1918.

Statement for 1918 shows receipts from ore shipments, $181,235; misc. income, $4,513; operating expenses, $147,864; general expenses, $20,383; net profits, $8,434, compared with $27,283 in 1917, and $62,798 in 1916.

Property: 19 claims, 9 patented. The mine is extensively developed, and has been a large producer of zinc, lead, silver and gold, with some copper as a by-product. The old bonanza ores extended down to depth of about 800′, with silver ores on the footwall, and copper ore on the hanging.

Main orebody was lost at 900′ and present company's main object is to find its extension below that level. Shaft has been deepened to 1,200′ and considerable work done on the lower levels. The north 900′ and 1,000′ levels now show

shipping ore. In addition the low-grade ores and tailings are estimated at 180,000 tons.

Production: in 1916, 16,567 tons or ore were shipped, made up of 8,504 tons lead-silver ore, 3,986 tons zinc-lead, 102 tons zinc, 1,237 tons copper and 2,739 tons old slag. In 1917, output was 11,736 tons of ore, consisting of 10,507 tons of lead ore; 131 tons zinc ore, and 1,098 tons copper ore. In 1918, output was 12,528 tons, consisting of 11,712 tons lead ore, 170 tons copper ore and 646 tons lead concentrates. In 1919, company employed about 75 men and produced 1,500 to 2,000 tons a month, including concentrates. Most of the ore came from above the 600′ level.

HORN SILVER MINING CO. **UTAH**

Reorganized, 1916, as Horn Silver Mines Co., which see.

IBAPAH GOLD MINING CO. **UTAH**

Property: the Queen of Sheba mine, in the south end of the Deep Creek country, Beaver county, Utah, an old gold mine credited with a production of $80,000. Mine shows vein 5-18′ wide. Pay ore occurs in shoots assaying from $10-$13 per ton.

Development: by a 1,187′ main tunnel, several short tunnels and a 376′ raise.

Equipment: includes a small mill.

Worked under a 3-year lease from 1914 by C. E. Johnson. No later information.

IMPERIAL LEAD MINING CO. **UTAH**

J. H. Turner, mgr.; Frank Jardine, supt.

Property: located in southeastern part of Tooele county, said to show a 6′ vein of lead-silver ore, assaying 40% lead and 10 oz. silver. Under development in 1919.

INDIAN QUEEN CONSOLIDATED MINING CO. **UTAH**

Office: Provo, Utah. **Mine office:** near Newhouse, Beaver county, Utah.

Officers: Jesse Knight, pres.; L. N. Morrison, v. p.; W. L. Mangum, sec.-treas.; K. S. Jordan, gen. mgr.; J. W. Knight, directors.

Inc. 1907, in Utah. **Cap.,** $150,000; shares 10c par. Listed on Salt Lake Stock Exchange.

Property: 39 patented claims in Newhouse district.

Development: by 3 tunnels, 4,700′, 300′ and 200′ long, respectively; also prospect tunnels and shafts.

Equipment: includes compressor, drills, blower and electric power. Part of the mine has been worked by lessees.

JAY HAWKES MINING CO. **UTAH**

Mail returned, 1919, from former address, Ogden, Utah.

Property: 6 claims in Little Valley, on Promontory Point, in Great Salt Lake, near the Lake View mine. Ore carries galena with silver. About $3,000 was expended sinking an incline shaft and open cut work.

JEANNETTE COPPER MINING & MILLING CO. **UTAH**

Address: via Vernal, Utah.

Officers: J. T. Fitch, pres.; F. B. Hammond, v. p.; C. R. Jones, sec.-treas., with G. A. Storrs and W. H. Griffin, Jr., directors.

Cap., $200,000; shares 20c par.

Property: 34 unpatented claims in the Uintah basin, Utah, 55 miles S. of Rock Springs, Wyo.

Development: by 1,000′ of tunnels and shafts, costing $10,000. Ore contains up to 20% copper and good gold and silver contents. Shipments were made in 1916. The long haul prevents shipping ore at a profit, and a plant was planned at last accounts. Probably idle.

KENO M. & M. CO. **UTAH**

Controlled by Knight Investment Co., Provo, Utah. **Mine office:** Frisco, Utah.

Officers: Jesse Knight, pres.; W. Lester Mangum, sec.-treas.; Knight Starr Jordan, gen. mgr.; R. S. Andrew, supt.

Inc. March, 1907. **Cap.**, 500,000 shares; 10c par. Stock listed on Salt Lake Exchange.

Property: located in the Antelope mining district, Millard county, is in the development stage.

KENTUCKY-DOUGLAS MINING CO. **UTAH**

Mail returned, 1918, from former address, care Roger Traweek, sec., 62 W. 3d St. N., Salt Lake City.

Officers: E. S. Holt, pres.-treas.; Thos. E. Brooks, v. p.; with T. S. Fowler, directors.

Inc. 1916, in Utah. **Cap.**, $1,000,000; $1 par; 600,000 paid for property, 400,000 in treasury.

Property: 10 claims, in Silver mining district, western Tooele county, said to show silver-lead ore in veins and deposits in limestone, at and near porphyry contacts.

Development: 150′ crosscut tunnel, expected to cut vein at 250′. Is a prospect. Presumably idle.

KING COPPER MINING CO. **UTAH**

Controlled by the Baileys of Salt Lake City. Property, located on the divide between Emigration and Red Butte canyon, 12 miles E. of Salt Lake City, shows 6′ vein of copper carbonates on contact between quartzite and blue limestone. Is developed by 300′ tunnel, principally in sandstone. Ore said to carry $14 in gold, copper and silver.

KING DAVID MINING CO. **UTAH**

Address: Provo, Utah. **Mine office:** Frisco, Beaver county.

Officers: Jesse Knight, pres.; David Evans, v. p.; W. L. Mangum, sec.-treas.; K. S. Jordan, gen. mgr.

Inc. 1908, in Utah. **Cap.**, $500,000; shares 50c par; assessable; 67,000 issued. Shares listed on Salt Lake City Exchange. Sales at 2c. in 1919.

Property: 63 claims, patented, 940 acres, adjoining the Horn Silver mine, and supposed to carry the extension of the Horn Silver vein. Claims are well mineralized. **Ore:** mainly silver-lead bearing, with small quantities of zinc and copper. **Development:** by 800′ 3-compartment shaft and several prospect tunnels and shafts. Present work consists of drifting, sinking and diamond-drilling.

Equipment: includes two 80-h. p. boilers, a double-drum hoist, 5-drill air compressor, 14 machine drills, generator, blower and steel head-frame. Inactive in 1919.

KING OF THE HILLS MINE **UTAH**

Address: Milford, Beaver county, Utah. Mine in Granite district, 25 miles N. E. of Milford, reported to have a 14 to 18′ contact metamorphic vein of copper-lead ore in limestone, cut by porphyry.

Development: by tunnels. Equipped with concentrating mill, making a product carrying 10% copper, 42% lead and 10 oz. silver. Developing at last accounts.

LAKEVIEW MINING CO. **UTAH**

Office: Ogden, Utah. **Mine office:** Promontory Point, Utah.

Officers: W. H. Wattis, pres.; L. F. Farr, sec.-treas., with C. L. Farr and Jas. Wotherspoon, directors.

Inc. March 9, 1915, in Utah. **Cap.**, $50,000; shares 5c par; assessable; all issued to officers of the company. Annual meeting, March 9.

Dividends: to May, 1916, amounted to $124,000.

Property: 15 claims, unpatented, 235 acres, at Promontory Point, Box-elder county, 3 miles E. of Saline on the S. P. R. R., shows zinc-lead ore in a contact deposit between limestone foot and shale hanging-wall. The ore-zone runs 35° W. and dips 35° N. E. Pay shoots are from 1′-20′ wide and from 52′-250′ along the strike. Assays reported to average 32% zinc, 5% lead, 2% iron, 16% insoluble.

Development: to 1,000′ below the outcrop by 5 adits, from 230′-350′ long. Zinc ore as shipped averaged 32%, and lead ore 26%.

Equipment: includes 600′ tram and oil-driven Chicago Pneumatic compressor of 187 cu. ft. capacity.

Production: to July 1, 1917, 279 cars realized $352,471, mostly from zinc carbonate ore.

The mine made quite a remarkable record. Located January 27, 1915, work was commenced March 9, with a small force and by December, 1915, all debts were paid, the mine was developed, equipped and shipping, a $70,000 dividend paid to stockholders and a cash surplus remained in the treasury. Mine developed into a lead property with depth, sulphides replacing oxidized ore. Property examined and sampled by Pierre Peugot, July, 1917.

In July, 1919, mine was again being operated in a small way under management of W. H. Wattis; company had approximately $20,000 in the treasury.

LA VORE GOLD MINES CO. **UTAH**

Idle and probably dead. Address: W. Scowcroft, Ogden, Utah. Mine is near St. George, Utah.

Officers: Willard Scowcroft, pres.; R. G. McQuarrie, v. p.; D. H. Morris, sec.-treas., with Irvine McQuarrie and Herrick McQuarrie, directors.

Inc. 1915, in Utah. **Cap.,** $100,000; shares 10c par; 60,000 issued.

Property: 10 claims in the Goldstrike district, Washington county, said to show a vein 11′ wide, averaging $5 gold per ton.

LEONORA MINING & MILLING CO. **UTAH**

Office: 18-20 E. First South St., Salt Lake City, Utah. **Mine office:** Milford, Beaver county, Utah.

Officers: John Matson, pres.-mgr.; J. W. Chase, v. p.; C. D. Brown, sec.-treas., with L. H. Stohr and N. P. Hansen, directors; S. Molin, supt.

Inc. Dec. 19, 1903, in Utah. **Cap.,** $100,000; shares 10c par; assessable; issued 950,000 shares. Listed on Salt Lake Exchange. Sales vary from ¼ to 2c., 1919.

Property: 13 claims, in the North Star district, near Milford, shows fissures in limestone carrying replacement deposits of gold, silver, zinc and lead ores.

Development: by tunnels of 1,500′, 500′ and 300′ and 7 shallow shafts of 25′ to 100′ depth.

Company spent $9,000 on development work in 1917 and 1918, and has cut some promising looking veins. Expects to be shipping soon.

Equipment: includes electric hoist and air compressor.

LITTLE VALLEY MINING CO. **UTAH**

Owned 9 claims in compact group N. and E. of the Lakeview property, Promontory Point, Boxelder county, Utah. Mail returned, 1919, and company probably idle.

LOWLAND TUNNEL WATER & TRANSPORTATION CO. **UTAH**

Mail returned, 1919, from former address, 819 Newhouse Bldg., Salt Lake City. **Mine office:** Starr, Utah.

Officers: Louis Fugal, v. p.-mgr.; C. L. Whitney, sec.-treas., with Geo. F. Wasson and D. H. Livingston, directors.

Inc. Nov., 1912, in Utah. **Cap.,** 1,000,000 shares; 1c par; 350,000 issued.

Property: 36 unpatented claims, 700 acres, in Nebo mining district, Juab county, said to carry gold-silver-lead-copper-zinc-iron ore. Formation is quartzite, lime and granite.

Ore: occurs as a contact deposit and in fissure veins, running N.-S. with dip of from 40-90°.

Company was organized to drive a 10,000′ drainage and transportation tunnel into the Mt. Nebo mineral belt to serve 11 companies operating in that district and to develop its own mineralized ground. The tunnel was in 600′, January 1, 1917. No later information.

LUCIN COPPER CO. **UTAH**

Address: 908 Kearns Bldg., Salt Lake City.

Officers: R. W. Powers, pres.; D. J. Wheeler, v. p.; G. S. Norris, sec.-treas., with F. Riter, P. K. Flynn, and V. Ergmaga, directors.

Property: near Lucin, Boxelder County, said to have a promising showing of ore. In December, 1918, property was being operated under lease by D. J. Wheeler.

LUCKY BOY MINING & MILLING CO. **UTAH**

E. E. Lowry, pres.; Ira Griffiths, sec.-treas.

Inc. April 20, 1916. **Cap.,** $50,000; shares 10c par; assessable; 25,000 shares outstanding. Listed in Salt Lake City.

Property: 6 claims, in Clear Creek mining district, Boxelder county, said to show copper-silver-gold ore. No recent information.

LUCKY STAR COPPER MINING CO. **UTAH**

Address: N. J. Nielson, sec.-treas., Dugway, Tooele county, Utah.

Officers: G. N. Strike, pres.; J. T. Aydelotte, v. p., with Israel Larson and Peter Sacos, directors.

Cap., $500,000; shares 10c par; 275,000 in treasury.

Property: Lucky Star mine in Dugway district, 45 miles from rail at Faust.

Development: by 260′ incline shaft with drifts on ore 5′ thick, for length of drift, said to assay 9% copper and 15 oz. silver per ton. Company was doing development work in 1918; no later report.

MAJESTIC COPPER MINING & SMELTING CO. **UTAH**

Office: 53 State St., Boston, Mass. John M. Dick, president. To all practical intents and purposes this company was succeeded, 1904, by Majestic Copper Co., which was suceeded, 1908, by Majestic Mines Co. Majestic Copper M. & S. Co., however, is still in existence, though practically the entire stock issue, and a large majority of the bonds, are owned by the Majestic Mines Co. Very fully described in Vol. IV, of the Copper Handbook.

MAJESTIC MINES CO. **UTAH**

Office: 342 Exchange Bldg., Boston, Mass. **Mine office:** Milford, Beaver county, Utah.

Officers: John M. Dick, pres.; H. M. Inman, v. p.; D. J. Flanders, sec.-treas.; J. A. Bailey, G. F. Kellogg, John Muller, R. H. Phillip, E. M. Southworth and John Freeland, directors; Alex. D. Moffat, mine mgr.

Inc. May 18, 1908, in Maine, practically as successor of Majestic Copper Co. and Majestic Copper Mining & Smelting Co. **Cap.,** $5,000,000; shares $5 par; assessable; issued, 808,795 shares.

Stocks of both companies were exchanged share for share for stock of the Majestic Mines Co. on payment of 15c. a share; bonds of the Majestic Copper Mining & Smelting Co. were exchanged for stock of the Majestic Mines Co., giving 900 shares of new stock for each $1,000 bond.

The result of the reorganization was as follows: all floating indebtedness of the operating company has been liquidated; $868,500 of the $1,000,000 outstanding bonds have been purchased and are now owned by the Majestic Mines Co.—practically 87%—which gives the Majestic Mines Co. control of the situation. Assessments of present company have been as follows: 15c. in 1908; 5c. in June, 1910; 10c. in April, 1911. Last assessment, 10c. per share, was payable April 25, 1919. Shares listed on Salt Lake Stock Exchange, Boston and New York Curbs. Federal Trust Co., transfer agent; State Street Trust Co., registrar, Boston, Mass. Annual meeting, third Tuesday in March.

Property: 120 claims, 2,450 acres, in 8 groups, also an 80-acre smelter site, and 800 acres miscellaneous lands. The groups, located in 5 different districts of Beaver county are the O. K., Old Hickory, Harrington-Hickory, Vicksburg, Hoosier Boy, Southern States, Larkspur, Copperfield and Treasurer, said to have about 100 orebodies, carrying copper, gold, silver, platinum, lead, cobalt, bismuth, vanadium and uranium. The company has platted the town site of Lewisville, where the smelter was located, and the property is served by the Salt Lake Route.

Development: there are 18 shafts, 100 to 600′ deep, with a total of 6 miles of workings. The Old Hickory and O. K. mines yield copper ores, the others silver-lead ores.

Recent work has been on the Old Hickory group of 9 claims, and in July, 1919, rich copper ore was reported on the 400′ level.

The **O. K. mine,** 7 claims, formerly the principal producer, has a 500′ three-compartment shaft, with a vein up to 20′ in width, development being mainly on the 300′ and 400′ levels. This mine had over 500,000 tons of low-grade ore blocked out, in what apparently was a stockwerk, up to 250′ in width, carrying stringers of high-grade ore.

The **Harrington-Hickory** group of 27 claims, partly fractional, shows numerous fissure veins, intersected by cross veins, both approximately vertical, and in addition, has a series of bedded veins, presumably following bedding planes, dipping at 30 to 35°, giving 3 separate intersecting systems of orebodies. Development is by a 600′ two-compartment vertical main working shaft, with drifts on the 500′ level, where there is a body of high-grade ore, assays from which have given 1% copper, 37 to 55% lead, 18 to 22 oz. silver, and about $1 gold per ton.

The **Vicksburg** group of 4 claims, a lead-silver mine, formerly worked for gold, has 3 practically vertical fissures, of 2 to 20′ width, with mineralized cross-fissures, developed by a 200′ 2-compartment working shaft, a 150′ incline shaft and numerous shallow shafts and pits. It is said that high-grade ore has been encountered at a depth of 150′ in this mine. Worked by lessee and 20% royalty paid to company on gross proceeds.

The **Hoosier Boy,** a silver-lead mine is about 3 miles from the Horn Silver mine. An 800′ shaft has been sunk and considerable work done at 200′, 400′, 600′ and 800′ depth.

Equipment: includes 6 gasoline and 1 steam hoist. Electric power, for lighting and pumping, is taken from the Beaver River Power Co.

Mines closed down from August, 1914, to May, 1915.

Production: in 1916 was about 6,500 tons of ore, yielding 350,065 lb. copper, 294,678 lb. lead, 257,476 lb. zinc, and 18,680 oz. silver. Produced about 600 tons per month, 1917. Management has not furnished later production figures.

MAMMOTH COPPER MINING CO. **UTAH**

Office: 219 Judge Bldg., Salt Lake City, Utah. Edward Bardsley, pres.; B. D. Lyon, sec.-treas.

Inc. in Utah. **Cap.,** $10,000; issued, $6,000; shares 1c par; assessable. Listed on Salt Lake Exchange.

Owns 240 acres in Millard county, 15 miles from Milford, said to show a vein of copper ore in monzonite. Development is surficial only, and property is but a prospect. No recent returns.

MASTER KEY MINING CO. **UTAH**

Address: 1014 Boston Bldg., Salt Lake City, Utah.

Officers: A. G. Gutheil, pres.; C. W. Reese, v. p.; G. M. Sullivan, sec.-treas., with A. J. Mooney and Henry Barney, directors.

Inc. Feb., 1915, in Utah. **Cap.,** 1,000,000 shares of no par value; assessable; 500.000 held by Trustee.

Property: 7 claims, 5 patented, 123 acres, 8 miles W. of Milford, Star district, Beaver county.

Geology: ore occurs in bedding planes and fissures in limestone dipping N. E., the Mowitza shale-contact carrying the large orebodies, which extend along the bedding into the Red Warrior limestone. Company expected to cut ore horizon at depth of 250′. Hoosier Boy fissure intersects it. Is a prospect. No recent report.

METAL STATES MINING & MILLING CO. **UTAH**

Address: care Jesse F. Cannon, 743 S. 3 E. St., Salt Lake City, Utah.

Officers: Jesse F. Cannon, pres.; Henry Schepper, v. p.; E. S. Fisher, sec.

Inc. 1919, in Utah. **Cap.,** $100.000. Company was organized to develop copper-gold claims in the Dugway district, Utah.

MILFORD COPPER CO. OF UTAH UTAH

Office: Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Milford, Utah.

Officers: Alfred Frank, pres.; C. W. Saacke, v. p.; H. A. Frank, sec.-treas., with J. E. Bergh, supt.; O. Brodbeck and F. Eckstein, directors.

Inc. Feb. 3, 1917, in Utah. **Cap.,** $500,000; $1 par; all issued. Transfer office 52 William St., New York. U. S. Corporation Co., New York, registrar. Stock listed on Salt Lake Exchange. Annual meeting, January 15. Earnings at rate of $100,000 per year.

Property: 18 patented claims, 300 acres, at Milford, Beaver county, Utah, known as the Montreal mine, being one of the properties developed extensively by the defunct Glasgow & Western Exploration Co. In February, 1916, mine was leased by Alfred Frank and others, who eventually organized the Milford company.

Geology: contact deposit in limestone and quartz-monzonite. Orebody 10 to 50′ wide, dips 45°, and has an irregular course. Ore is partly sulphide and averages 2.5% copper, 0.75 oz. silver, 0.01 oz. gold, 15% silica and 37% iron.

Development: by tunnels and shafts to 400′ depth, workings amount to 3,000′. Ore reserves estimated at 30,000 tons copper ore. In addition 200,000 tons of iron ore, with small values in silver and copper, has recently been opened up.

Equipment: 8x10″ air-hoist and 10-drill compressor.

Production: ships 100 tons daily to Garfield smelter, Utah, which desires the high iron-content of the ore.

MILFORD MAGNOLIA MINES CO. UTAH

Address: R. B. Garff, pres., 219 Colfax Ave., Salt Lake City; H. A. Smith, C. I. Goff, A. F. Judd, and John Clayton, directors.

Inc. 1919, in Utah. **Cap.,** $10,000; shares 1c par.

Property: the old Magnolia group of 9 claims, 12 miles S. W. of Milford, which contain lead-silver ore.

Development: by 125′ and 150′ shafts when the company acquired the property (1919). Company sank the 125′ shaft to the 200′ level on which exploration work exposed 4′ of high-grade lead-silver ore.

MILLER HILL MINING CO. UTAH

Office: care Knight Bros., Knight Block, Provo, Utah. **Mine office:** American Fork, Utah county, Utah.

Officers: Jesse Knight, pres.; J. Wm. Knight, v. p.; W. Lester Mangum, sec-treas.

Cap., $100,000; shares 10c par; assessable. Shares listed on Salt Lake Exchange. In September, 1917, 25,000 shares of stock were offered for sale at 50c. a share. Assessment of 2c. per share was called November 12, 1917. Shares sold from 2 to 15½c. in 1918, and 1½ to 4c. in 1919.

Property: 33 claims, 30 patented, adjoining the Mineral Flat mine, developed by 2,200′ tunnel with about 2,400′ of workings.

Property was worked in 1918, but is now idle.

MINERAL MOUNTAIN MINING CO. UTAH

Address: Tecoma, Nevada.

Officers: G. Austin, pres.; F. Litz, v. p.; E. B. Whipple, sec.; C. F. Whipple, treas.

Inc. March, 1908, in Utah. **Cap.,** $100,000; shares 10c par; 475,000 issued; assessable to 1c. yearly; assessment No. 4, levied July 2, 1919, 1c. a share.

Property: 13 unpatented claims, 250 acres, in Lucin district, Utah, 6 miles from Tecoma, Nevada. Developed to 350′ by incline shaft.

Geology: contact and fissure veins in limestone, quartzite and granite. Shoots are from 12 to 24″ wide. Ore carries lead carbonate, silver, and gold.

MINERALS PRODUCTS CORPORATION UTAH

Address: Marysvale, Utah. Controlled by Chicago capital. Howard F. Chappell, pres.; R. H. Knapp, gen. mgr.

Property: alunite bearing claims, 9 miles S. W. of Marysvale.

Equipment: includes aerial tram 6,200′ long, 600-h. p. steam plant and 50-ton mill to extract potash from the alunite, which is a hydrous sulphate of

aluminum and potassium. In October, 1918, reported as shipping 600 tons of potassium sulphate per month.

MONARCH CONS. MINES CO. **UTAH**

Address: 631 Judge Bldg., Salt Lake City, Utah.

Officers: Joshua Greenwood, pres., 1150 Herbert Ave., Salt Lake City; W. T. Goslen, v. p.; with M. K. Parsons, M. P. Broffet, J. M. Hayes, directors.

Inc. in Utah. **Cap.**, $2,000,000; shares $1 par; issued, 800,000 shares.

Company has a bond and lease on the property formerly held by the Detroit Copper Mining Co.

Property: the Ibex mine (see Ibex Gold Mng. Co.), situated in Detroit district, Millard county, 35 miles from Oasis, and 20 miles west of end of Delta branch line. Claims were located 35 years ago, work began 1894, and the Ibex Co. was formed and smelter put up at Leamington, Millard county, Utah, treating 50 tons daily. In winter of 1894-'95, company failed and property was idle till 1906, when Jesse Knight took it up and reorganized the Ibex Co., patented the claims and sank two shafts. Worked until panic of 1907. Idle till 1915, when lease and bond was taken from Mr. Knight by local farmers who organized the Detroit C. M. Co. and shipped ore.

Claims cover two horizons of limestone; one blue and hard, the other light and soft, both cut by porphyry dikes and intrusives. Ore occurs in veins and bedding offshoots, the veins being 25-100′ in width.

Ore: carries 2%-20% copper, with trace to 3 oz. per ton silver and $1 to $20 per ton gold. Elevation of mine 5,500′ to 6,500′ above sea level.

Development: 600′ shaft on Keystone claim, a tunnel on Ibex, with 500′ vertical depth at face and a 500′ shaft on E. P. H. claim. Good auto road from Delta to Oasis; freight to Oasis $6 (to R. R. terminal $4); R. R. to Salt Lake, $2.50; smelter treatment, $4.

MONZONITE SILVER & COPPER CO. **UTAH**

Idle. **Officers:** S. S. Pond, pres. and gen. mgr.; D. Rigby, sec.; Geo. Baglin, treas.

Cap., $50,000; shares 5c par; assessable. In treasury, Jan., 1916, 400,000 shares; bills receivable and cash, $2,500. Stock listed in Salt Lake City, but no sales for 2 years.

Property: 7 unpatented claims, near Milford, Beaver county, 6 miles from the railroad, surrounded by the Leonora, Hoosier Boy and Paloma Extension mines. Ore: silver and copper.

Development: 100′ shaft with 50′ of crosscutting. Is a prospect.

MORGAN ARGENTINE MINING CO. **UTAH**

Office: 22 E. Broadway, Salt Lake City, Utah. Mine near Peterson, Morgan county, Utah.

Officers: Herbert Pembroke, pres.-gen. mgr.; A. B. Pembroke, sec.-treas.

Inc. 1900, in Utah. **Cap.**, $5,000; shares 1c par.

Property: 15 claims, 9 patented, 280 acres, in Argenta district, shows fissure veins in limestone carrying silver-lead and copper-gold ore.

Machinery was added, and development work started in 1917 and continued in 1918.

MORGAN CRESCENT MINING CO. **UTAH**

Geo. T. Stenhouse, gen. mgr., Morgan City, Utah.

MORGAN-GALENA MINING CO. **UTAH**

Address: 417 Kearns Bldg., Salt Lake City, Utah.

Officers: J. W. Rozzelle, pres.-treas.; A. H. Levine, v. p.; J. H. Ritchie, sec., with F. H. Ashihira and Frank Troxler, directors.

Inc. Oct., 1916, in Utah. **Cap.**, $100,000; shares 10c par; 500,000 issued.

Property: 6 claims in Morgan county, Utah, said to contain fissure veins in porphyry carrying 37% lead ore with some gold-silver values. Development by shafts and tunnels. Is considered a good prospect. No recent report, probably idle.

MOSCOW MINING & MILLING CO. UTAH

Offices: 1020 Boston Bldg., Salt Lake City, and Moscow, Beaver county, Utah.

Officers: Matthew Cullen, pres.; J. L. Rawlins, v. p.; Athol Rawlins, sec.-treas.; G. S. Wilkins, supt.

Inc. May, 1907, in Utah. **Cap.**, $1,000,000; shares $1 par; assessable; issued, 900,000. Listed on Salt Lake Exchange.

Dividends: $108,000 to Sept., 1917, at rate of 2½c per share.

Property: 7 claims, including the Moscow mine in the Star district, 7 miles from a railroad, covers about one-half mile of the strike of an ore zone 50′ to 60′ wide. Ore mainly silver-lead, with some copper and zinc. The Moscow mine is one of the oldest in the district, having been worked over 30 years ago.

Development: tunnels and shaft to the 1,400′ level.

Shipments: have been fairly consistent, while the metal market was good. In June, 1917, output was 1,000 tons, averaging about $30 per ton, but company closed down later in the year.

NATIONAL RADIUM MINES CO. UTAH

Henry Schwartz, Denver, Colo., pres., at last accounts. **Inc.** in Colorado. **Cap.**, $400,000.

Property: in Green River district, Emery county, shows uranium and vanadium ore in a 5″ vein, said to run as high as 20% uranium. Developing in 1916. No recent returns, probably idle.

NEBO SILVER-LEAD MINING CO. UTAH

Company was operating a property near Mono, Utah, reported to show ore which assays about 60% lead and 8 oz. silver per ton.

NEW STOCKTON MINING CO. UTAH

Office: Mankato, S. D. Mine at Stockton, Utah.

Officers: F. M. Currier, pres.; R. A. Dunham, v. p.; W. Z. Harrison, sec.-treas., Hess Bldg., Salt Lake City. W. A. Wilson, cons. engr., 406 Dooly Block, Salt Lake City; C. B. Kennedy, W. D. Kimball and M. M. Ferguson, directors.

Property: the old Ben Harrison mine at Stockton showing a vein with one to two feet of ore, which averages 10% to 45% lead, 5 to 40 oz. silver and 60c. to $7 gold per ton.

Development: by shaft with main work on 200′, 500′, 700′, and 850′ levels.

Production: $70,000 in 1913-1914. As shipped the ore has averaged $12 to $15 per ton with silver-gold-lead values.

In 1917 lessees shipped ore averaging 45% lead and 35 oz. silver per ton. No later production reported.

NORTH BECK MINING CO. OF SPANISH FORK UTAH

Officers: M. K. Nebo, pres.; S. N. Nelson, v. p.; H. A. Gardner, sec.-treas., 1134 Bueno Ave., Salt Lake City, with B. H. Brown, W. A. Jones, Edward Money, and R. H. Andrus, directors.

Inc. 1919, in Utah. **Cap.**, $10,000; 1c par.

Property: a group of silver-bearing claims in Spanish Fork section, Utah county.

O. K. EXTENSION MINING & REDUCTION CO. UTAH

Office: 222 D. F. Walker Bldg., Salt Lake City, Utah. **Mine office:** Milford, Beaver county, Utah.

Officers: A. J. McMullen, pres. and gen. mgr.; T. M. Farrell, v. p.; Chas. A. Weaver, sec.-treas., with R. H. Greenhalgh, directors.

Inc. Nov., 1899, in Utah. **Cap.**, 300,000 shares; 3c par; assessable; issued, 125,000; total assessments to date, $15,363. Annual meeting, second Tuesday in October.

Lands: 6 claims, 3 patented, 120 acres, near the Majestic mine, in the Beaver Lake district, show monzonite and quartz-porphyry, carrying 2 fissure veins, of 5 to 24′ estimated average width, traceable 150′. Opened by 7 pits and shafts of 15 to 510′ depth, and a 150′ tunnel, with 1,045′ of workings, showing

chalcopyrite estimated to average 2% copper. Inactive except for annual assessment work.

O. K. SILVER M. & M. CO. **UTAH**

David Keith, gen. mgr., Kearns Bldg., Salt Lake City, Utah. Thos. Kearns, pres.; W. G. Lamb, sec.-treas.

Inc. 1909, in Utah. **Cap.**, $100,000; shares 10c par; assessable; assessment No. 17 of ½c per share levied August, 1918. Stock listed on Salt Lake Exchange.

Property: 33 claims in Erickson mining district, Indian Springs (near Tintic Jn.), Tooele county.

Development: by a 280′ incline shaft, reported all in ore running better than 186 oz. silver and $4.70 gold per ton.

Production: in 1916, 5 cars of ore shipped netted $30,000. No recent report.

ORPHAN BOY MINING CO. **UTAH**

Idle. Milford, Utah.

Officers: James R. Craig, pres.; W. D. Williams, v. p. and mgr.; Chas. A. Doe, sec.-treas., with M. R. Williams and P. J. Evans, directors.

Property: in Star district, 20 miles S. W. of Milford, Beaver county, Utah, shows limestone, cut by quartz monzonite, with ore in veins and replacements. There are 11 claims, adjoining the Red Warrior and Mowitza mines, developed by 500′ shaft with 1,200′ of tunnels and workings from which considerable high-grade ore has been shipped. Vein, though narrow, has bodies of lead-carbonate ore carrying a little copper. Presumably doing only annual assessment work.

PALOMA EXTENSION MINING CO. **UTAH**

Office: 222 Judge Bldg., Salt Lake City, Utah. Lorin Hall, pres.; Willard Scowcroft, v. p.; John W. Scowcroft, sec.-treas.

Inc. in Utah. **Cap.**, $50,000; shares 5c par; assessable; last assessment, 1c. a share, delinquent, September 13, 1919; 700,000 shares outstanding. Listed in Salt Lake City. Shares sold at ½c. in 1919.

Property: 300 acres in Star mining district, Beaver county, shows N. E. fissures carrying silver-lead-copper ore. These fissures cross contacts between limestone beds running N. and dipping E., quartzite that runs E. and dips N., and a granite or quartz monzonite. Ore occurs where the contacts are crossed by the fissures.

PALOMA GOLD AND SILVER MINING CO. **UTAH**

Office: Judge Bldg., Salt Lake City, Utah. **Mine and works:** Moscow, Beaver county, Utah.

Officers: M. P. Braffet, pres.; H. W. Lane, v. p., with W. Scowcroft, H. B. Cole and B. F. Caffey, directors; J. H. Braffet, sec.-treas.; C. J. Graff, supt.

Inc. in Utah. **Cap.**, $100,000; shares 10c par; assessable; last assessment 1c. levied September 17, 1918. Stock is listed on the Salt Lake Exchange. Prices varied between ¼ and 3¼c. a share in 1918, and ½ to 3c. in 1919.

Property: 14 claims in Star district, near Moscow, said to cover 3,000′ along a limestone-monzonite contact intersected by 2 fissure veins, carrying silver, lead and copper ore.

Development: by 500′ of trenching and 900′ incline shaft, with development work in progress on 900′ level in May, 1919.

PANAMA MINING & MILLING CO. **UTAH**

Fred McCoy, mgr., Castleton, Grand county, Utah.

Property: 300 acres, 50 miles S. E. of Cisco and 6 miles from Utah-Colorado line, said to have a good showing of copper ore. In 1918, company started a 2,400′ tunnel to cut veins at depth; this was 200′ long at last accounts.

PENNUVA COPPER CO. **UTAH**

Office 1160 S. 8th W. St., Salt Lake City, Utah.

Officers: J. R. Austin, pres.; G. D. O'Connor, v. p. and mgr.; W. R. McPherson, sec.-treas.; W. N. Beatty and F. L. Hummel, directors.

Inc. 1916, in Utah. **Cap.**, $25,000; shares 25c par; outstanding, $19,101;

assessable. In December, 1919, the State Securities Commission granted company permission to sell 68,000 treasury shares.

Property: 21 claims, unpatented, 385 acres, situated on Promontory point, next to the Lakeview zinc mine and 2 miles from Salina on the S. P. R. R. The ground has not been thoroughly prospected, as it is covered by the beach gravels of Lake Bonneville (the ancient and larger Salt Lake).

Development: 200′ shaft on quartz shale bed showing bunches of chalcopyrite ore assaying 20-30% copper; also 110′ drift on 60′ level. Work was resumed on the 200′ level of the Redfield claim in December, 1919.

PLANETARY MNG. & MLG. CO. **UTAH**

Inactive. **Address:** T. E. Weyher, sec., 210 Judge Bldg., Salt Lake City, Utah.

Cap., $10,000; shares 10c par; assessable; reduced from $500,000 in November, 1917.

Property: claims near the old Century mine, N. W. of Kelton, Boxelder county, Utah. Development work is continued by assessments.

POLE STAR COPPER CO. **UTAH**

Offices: Vandergrift Bldg., Pittsburgh, Pa., and Newhouse Bldg., Salt Lake City, Utah.

Officers: P. S. Chambers, pres.; D. A. Rees, v. p.; A. E. Custer, 2nd v. p.; F. A. Duerr, treas.

Inc. Nov., 1916, in Delaware. **Cap.,** $1,500,000; shares $1 par. Statement rendered March 20, 1917, showed cash on hand and accounts receivable, $125,402.

Property: 15 claims, 5 patented, about 230 acres, in the Clifton or Deep Creek mining district, Tooele county, Utah, 167 miles S. W. of Salt Lake City. Gold Hill is the post office address, about 2 miles south.

Geology: country rock is monzonite with prophyry intrusions. East and west veins traverse the claims and are in turn cut by N.-S. dikes, the rich ore occurring at these contacts. Veins are said to be 4-12′ wide and ore to average 5-7% copper, 49 oz. silver, $4.65 gold, with about 12½% bismuth.

Development: by 9 shafts, 5 tunnels, several drifts and open cuts. Main vertical shaft is 336′ deep. In 1918 company was doing prospecting work on the 336′ level; no later report.

Equipment: includes 2 gasoline hoists, compressor, etc.

Literature sent out from Pittsburg is suspiciously lurid, though mine may have merit and officers be reputable.

PROGRESSIVE MINING CO. **UTAH**

Office: 229 South West Temple St., Salt Lake City, Utah. Mine near Milford, Beaver county, Utah.

Officers: L. B. Bohn, pres.; I. Lessing, v. p. and mgr.; C. T. Mixer, sec-treas. and cons. engr., Box 56, Salt Lake City; preceding, with F. J. Nichols, C. C. Crimson and Jas. Barrett, directors.

Inc. Aug. 20, 1906, in Utah. **Cap.,** $250,000; shares 50c par; assessable; fully issued. Total assessments to date, $10,000.

Property: 6 claims, 80 acres, patented, in the Star district, 8 miles from a railway, carrying argentiferous copper and lead ores. The mine has a 150′ incline shaft, with about 1,000′ of workings, developing a 3′ vein, said to carry ore assaying up to 8% copper, 35 oz. silver and $1 gold per ton. A few small shipments have been made.

Mine was under lease in 1916, but presumably idle from 1917 up to present time.

PROMONTORY MINING CO. **UTAH**

Described in Volume XIII. Name changed to United Promontory Mining Co., which see.

QUADMETAL MINES CO. **UTAH**

Address: 41 Broad St., New York. **Mine office:** 414 Judge Bldg., Salt Lake City.

Officers: R. F. Robertson, pres.; H. A. Stoneham, v. p.-sec.-treas., with Chas. A. Stoneham, N. I. Snyder, and Grant Snyder (gen. mgr.), directors.

Cap., $1,000,000; $1 par; issued 600,000 shares; assessable.

Property: 8 claims, patented, near Frisco, Beaver county, said to show silver-lead ore in fissure veins, dip 80° N. Orebodies said to vary in width from 20′ to 40′ and from 100′ to 200′ in length.

Development: by 700′ vertical shaft.

Equipment: includes a 50-h.p. electric hoist, compressor, and 150-ton flotation mill.

The mine was worked for several years previous to 1884 and reported to have produced $960,000. The present management started operating its mill late in 1918.

QUEEN OF SHEBA MINING CO. **UTAH**

Owned by J. W. Lawton, Chicago, Ill. W. D. Rawson, mgr.

Property: near Ibapah, in the Deep Creek district, about 29 miles S. W. of Gold Hill, includes the old Queen of Sheba mine. Ore carries free milling gold in a quartz vein said to be from 14-25′ wide.

Development: by 1,080′ tunnel and a 276′ raise, driven in 1914.

Equipment: includes 10-stamp mill and 1,700′ aerial tram. The mine is credited with past production of $150,000. Operated by lessees in 1917.

RED WARRIOR MINING CO. **UTAH**

Office: Providence Bldg., Duluth, Minn. **Mine office:** Milford, Beaver county, Utah

Officers: Leonidas Merritt, pres.; Alfred Merritt, v. p.; W. H. Borgen, sec.; E. R. Ribenack, treas., with Jas. T. Hale, John E. Merritt, Angus Buchanan and W. F. Acker, directors; Wilbur J. Merritt, supt.

Inc. Jan. 25, 1908, in Minnesota. Cap., $250,000; increased Jan., 1911, from $150,000, and again increased, January, 1917, to $600,000; $1 par; 210,000 issued. Listed on Duluth Stock Exchange and New York Curb. Annual meeting, second Tuesday in January.

Property: a silver-lead mine, 8 claims, 1 patented, 95 acres, in the Star district, eight miles from the Salt Lake Route. The claims show orebodies occurring along the bedding planes of limestone, one of which is 6′ thick, 50′ long, and proven for 600′ on dip; ore said to average 21% lead, 1% zinc, 18 oz. silver and 25c. gold per ton. In the deeper levels the mine has shown ore assaying 12% copper, 1% lead and 3 oz. silver per ton.

Development: by an 812′ vertical shaft with levels at 500′ and 675′ and a 200′ winze sunk on the vein from the 500′ level. There are also numerous old shallow shafts and tunnels, the mine having about 3,000′ of old and 4,000′ of new workings. These workings were estimated to show 20,000 tons of ore, with about 10,000 tons blocked out for stoping by the former management. The mine was operated from 1870 until 1889 and was re-opened 1907, by this company. Work was concentrated on the 500′ level, 1917.

The property of the Mowitza Mining Co., adjoining the Red Warrior, was purchased early in 1917.

Equipment: includes a hoist good for 1,500′ and a 3-drill compressor.

Probably idle, as company's funds are low, and mine is not yet self-supporting.

REVENUE CONSOLIDATED MINING CO. **UTAH**

Frisco, Utah. **Address:** John B. Taylor, 678 E. S. Temple St., Salt Lake City.

Property: 66 claims, 22 patented, 1,320 acres in Pine Grove district, T. 28 S. R. 16 W. on west side of Wah Wah Mtns., 20 miles S. W. of Frisco or Newhouse, stations on Milford branch of Salt Lake Route. Elevation 7,500′ at mine camp. Peaks 3,000′-4,000′ higher.

Geology: claims cover quartzite beds, overlain by 600′ of green shales, capped by 5,000′ of thickly bedded limestone, intruded by thin dikes and a boss of yellowish decomposed porphyry. These beds dip eastward into the mountains, at 20° to 40°, the west slope of the range being of similar structure, with igneous rocks forming the east side. A strong E. W. fault runs through the center of the property, dislocating the beds 1,000′ to the east, on S. of fault, and ending in a porphyry intrusion. Ores are lead and silver bearing and occur in fissure veins in quartzite. Four parallel N. W.-S. E. veins north of Pine creek are 3′-6′ wide,

have smooth walls, quartz filling and carry galena of concentrating tenor, with occasional masses of shipping ore. There are several other undeveloped parallel veins, but all end at the shale belt. South of the fault a parallel 6'-20' vein represents the probable faulted continuation of the Cliff vein north of the fault.

Development: active in 1904-05; work was resumed 1913, but stopped 1914. It comprises the 500' Buckbee and 600' Southside tunnels, 125' Cliff shaft with 200' drift work, 130' Tasor shaft and various lesser openings. The Revenue tunnel is to crosscut all these veins in depth and supply the mill.

Equipment: includes 300 cu. ft. compressor, steam engine, etc. Property promising, but idle, pending financing.

ROB ROY MINING CO. UTAH

Address: P. T. Farnsworth, 164 E. S. Temple St., Salt Lake City.

Mine near Beaver City, Utah, at mouth of Indian Creek Canyon. T. P. Farnsworth, Salt Lake City, owner. Developed to depth of 300'. Mine has produced very rich gold ore, but was closed down several years ago when the vein was cut off by faulting. Tunnel was to be driven south in hopes of finding orebody. No recent report, probably inactive.

SACRAMENTO MINING CO. UTAH

In liquidation. Glenn R. Bothwell, pres.

Declared a dividend of 0.9c. a share, payable August 1, 1919.

Property: located in Mercur district, paid out $308,000 in dividends before closing down in 1912. At that time there remained $10,000 in the treasury and the 1919 dividend was paid from this fund.

ST. CROIX CONS. MINES UTAH

Organized in August, 1917, to continue work of St. Croix Mines Co.

Address: Duluth, Minn., and 261 Broadway, New York City. **Mine address:** Milford, Utah.

Officers: M. J. O'Brien, pres.; A. D. MacIntyre, v. p.; W. M. Evered, sec.-treas., with David Graham, L. Davis, M. J. Filiatrault, and H. G. Middaugh, directors.

Inc. 1917, in Utah. **Cap.,** $600,000; $1 par; outstanding, 500,000 shares. Listed on New York Curb; 120,700 shares traded in 1919 at 50c. to $1 a share.

Property: 6 claims, 1 patented, about 90 acres, in Star district, Beaver county, 4 miles from Milford, shows 5 contact deposits between porphyry and a so-called white and blue lime. Copper-lead ore occurs as "chimneys," and shipments have run as high as $75 per ton.

Development: by 300' shaft and 400' tunnel, opening ground to depth of 500'. Workings total 1,500'.

Equipment: 35-h. p. gasoline hoist, and 4-drill compressor.

Production: intermittent since 1870; recent production about 250 tons annually.

ST. CROIX MINES CO. UTAH

Office: 601 Providence Bldg., Duluth, Minn. **Mine office:** Milford, Utah.

Officers: Hansen Evesmith, pres.

Inc. March 10, 1915, in Utah. **Cap.,** $1,000,000; 25c par; non-assessable. Is a holding company having part of stock of St. Croix Cons. Mines.

ST. MARY MINING CO. UTAH

Described in Volume XIII. Superseded by St. Croix Mines Co., which see.

SALT LAKE COPPER CO. UTAH

Office: 11 Broadway, New York. **Operating office:** McIntyre Bldg., Salt Lake City, Utah. Mine office: Lucin, Boxelder county, Utah.

Officers: Frederick Lewisohn, pres.; Walter Lewisohn, v. p.; E. C. Westervelt, treas.; other directors, S. W. Peck, E. H. Westlake, E. J. Macnamara, O. B. Van Sant and E. B. Corbet, mgr.

Inc. October 10, 1906, in Maine. **Cap.,** $2,200,000; shares $10 par.

Property: 108 claims, known as the Copper Mountain mine, at an elevation of 7,200' above sea level, in the Newfoundland district.

The Copper Mountain mine has a number of tunnels and shafts, the 1,500' main tunnel having a back of about 400'; a 500' tunnel planned to be driven 1,200', to enter the hoped-for sulphide zone, has not realized expectations. The

mine has upwards of 2 miles of workings, and is estimated to have in sight and blocked out, 75,306 tons of copper ore of 1.1% average tenor. For the last few years the mine has been worked by lessees. Approximately 3,000 tons ore, assaying ½% copper and 45% excess iron were shipped in 1918.

SANTA MARIA GOLD & COPPER MG. & REDUCTION CO. UTAH

Office: P. O. Box 517, Ogden, Utah. **Mine office:** Utah Hot Springs, Boxelder county, Utah. Don Maguire, pres. and mgr.

Inc. 1907, in Utah. **Cap.,** $500,000; shares $1 par.

Property: includes mill and smelter sites in the Sierra Madre district, a very rugged section of the Wasatch mountains. Land carries 7 fissure veins, practically parallel, with a strong cross-fissure, and a contact deposit. The veins range from 12 to 70′ in width, and ore contains chalcopyrite, associated with pyrite and occasional small amounts of galena, ore being mainly of concentrating grade.

Development: by the 2,000′ Clara Belle tunnel, cutting 3 veins, and planned to cut 5 more, with backs of 200 to 1,800′. The mine has about a mile of workings, showing ore developed regarded as sufficient to warrant a mill.

Equipment: includes a power house, air compressor, smithy and boarding house. Idle several years.

SANTAQUIN CHIEF MINING CO. UTAH

Reported merged with Santaquin King to form S. Cons. q. v. L. A. Martin, pres.; C. E. Martin, sec.-treas., at last accounts.

Inc. April 29, 1911, in Utah. **Cap.,** $100,000; shares 10c par; assessable. In treasury, April, 1916, 176,993 shares stock and $476 cash. Total debt reported as $1,955. Formerly listed in Salt Lake City.

Property: 7 unpatented claims, in Santaquin mining district, 65 miles S. E. of Salt Lake City, several miles from a railroad, and adjoining its twin brother, the Santaquin King on the south. Is said to show limestone cut by a well-defined fissure vein carrying silver-lead ore containing zinc blende.

Development: consists chiefly of 250′ of tunnels with 225′ of winzes. One tunnel is said to show 3′ of lead-zinc ore. At last accounts a contract let for extending the main tunnel 300′. Property is a prospect, but not in the "preferred" class. Idle in 1918. See Santaquin Cons. Mines Co.

SANTAQUIN CONS. MINES CO. UTAH

H. L. Pratt, sec., Boston Bldg., Salt Lake City. Presumably a consolidation of the Santaquin Chief, and Santaquin King mining companies, whose properties are in Juab county, Utah. An assessment of ¼c. was levied in May, 1919, to provide money for patenting the claims.

Inc. 1918, in Utah. **Cap.,** $1,000,000; 50c par; 1,585,978 issued. See titles noted above, for description of property.

SANTAQUIN KING MINING CO. UTAH

Letters returned from former office Newhouse Bldg., Salt Lake City, Utah. R. B. Young, pres.; Ben C. Rich, sec.-treas., at last accounts. See Santaquin Cons. Mines Co.

Inc. 1911, in Utah. **Cap.,** 1,000,000 shares; increased in 1912 to 2,000,000; 50 cts. par. In treasury May, 1916, 242,065 shares stock and $344. Listed in Salt Lake City.

Property: 9 unpatented claims, located in Santaquin mining district, 65 miles S. E. of Salt Lake City, 7 miles from a railroad, adjoins the Santaquin Chief on the north.

Ore: occurrence said to be similar to that of the Santaquin Chief.

Development: in May, 1916, consisted of 350′ of tunnels with total underground workings of 780′ estimated "1,500 tons of commercial ore in sight." Idle, 1918.

SEMINOLE COPPER CO. UTAH

Address: F. L. Wilson, Brooks Arcade Bldg., Salt Lake City, Utah.

Property: adjoining that of Western Utah Copper Co., near Gold Hill, Deep Creek district, Tooele county. Ore deposits said to be numerous and varied in character; tungsten ore was opened to depth of 135′, and molybde-

nite was also developed. The 50-ton mill was enlarged in 1918. Operated intermittently.

SHEEP ROCK MINING & MILLING CO. **UTAH**

Office: W. A. Wilson, 406 Dooly Block, Salt Lake City, Utah.

Officers: W. A. Wilson, pres. and treas.; C. W. Morse, v. p.; C. Browne, sec., with W. B. and F. B. Eiseman and L. A. Jeffs, directors.

Inc. Sept. 4, 1893, in Utah. **Cap.,** $100,000; 10c par; 450,000 issued.

Property: 10 patented claims, 177 acres, in Newton district, Beaver county, said to show a fissure vein in rhyolite. Ore contains gold and silver., with quartz and manganese gangue. Alunite is also found on the property.

Development by 300′ shaft and 1,000′ tunnel. **Equipment:** 25-h. p. electric hoist and compressor.

In development stage. No recent work done.

SILVER PEAK MINING CO. **UTAH**

Offices: J. R. Richards, mgr., Cedar City, Utah, R. B. Shepard, pres., 408 State St., Salt Lake City. T. F. Jennings, sec.-treas., Garfield, Utah.

Inc. July, 1915, in Utah. **Cap.,** $10,000; shares 1c par; 600,000 issued.

Property: the Blair mine, 6 claims, 120 acres, unpatented, near Pinto, in Pinto Iron mining district, Iron county, shows a contact deposit 8′-10′ wide carrying copper-lead ores with gold-silver values.

Development: 200′ shaft and 2 others. Dumps show 100 tons of $8 to $300 ore. Company doing assessment work only.

SILVER REEF CONS. MINES CO. **UTAH**

Inc. 1918, in Utah. Officers reported to be W. F. Snyder, Thos. Homer, R. L. Edwards, Alex. Colbath, and G. W. Snyder. An assessment of 1c. a share was levied in April, 1919, for development.

Property: located in the old Silver Reef district near Toquerville in southern Utah.

SINCLAIR CONSOLIDATED SILVER, INC. **UTAH**

Address: C. S. Cresser & Co., fiscal agents, 83 Pine St., New York.

Inc. 1920, in Delaware. **Cap.,** $1,000,000; non-assessable. National Security & Transfer Co., New York, registrar and transfer agent. Shares offered at 20c. in March, 1920.

Officers: Salvatore Bonomolo, pres.; Col. Weatherly, v. p.; W. G. Stoddard, treas.; M. E. Schek, sec.; with Ronald Ridgway and B. J. Boemerwald, directors.

Property: 10 claims in the Pinto district of Iron county, Utah, at the mouth of Chloride canyon. The vein runs S. E.-N. W. and dips 85° S. Silver-lead ore from the outcrop shipped to the Silver Reef mill is said to have yielded $75 per ton. Examined by E. J. Eddards.

Company prospectus contains this literary gem: "The formation of Chloride Canyon belongs to the mociene and quartinary ages, with pelsoaic intermingled. The porphyry lies on the east and has been wholly undisturbed, while the rhyolite on the west seems to have had some heavy movements. The porphyry is magnifurious, granite porphyry."

Only surface work has been done so far; tunnels are to be driven.

SOFFE SILVER MINING CO. **UTAH**

Letters returned unclaimed in May, 1917. Probably dead.

Directors: J. C. Soffe, pres., W. R. Soffe, v. p.; J. W. McKinning, sec.-treas., with W. J. Soffe, mgr.; A. J. Shulson, at last accounts.

Inc. May 7, 1916, in Utah. **Cap.,** $10,000; shares 1c par.

Property: 12 claims, unpatented, in Erickson mining district, Tooele county, 30 miles west of Faust Station on Salt Lake Route. Claims show high-grade silver-gold ore.

SOUTHERN PACIFIC GOLD & COPPER M. & M. CO. **UTAH**

Office: Walker Bank Bldg., Salt Lake City, Utah. Mine near Ogden, Weber county, Utah.

Officers: H. T. Strauss, pres. and gen. mgr.; W. C. Kellerman, sec.

Inc. July 20, 1903, in Utah. **Cap.,** $1,000,000; shares $1 par; assessable; issued 792,593. Shares are listed on the Salt Lake Stock Exchange.

Property: 12 claims, unpatented, 240 acres, 3 miles from a railway and about 8 miles north of Ogden, in the Sierra Madre district, reported to carry 25 orebodies in contact deposits between quartzite and gneiss. The main vein of about 50′ width, shows some oxidized ores, but mainly auriferous sulphides, including covellite, bornite and chalcopyrite, with some molybdenite, in a 6′ vein.

Development: by two incline shafts on the Wizard claim, and a main tunnel in 500′ in June, 1919, with about 1,000′ of workings, said to show ore assaying up to 15% copper, 37 oz. silver and $1.60 gold per ton. Company plans driving the tunnel an additional 200′.

SOUTHERN SWANSEA MINING CO. **UTAH**

Mine office: Silver City, Juab county, Utah.

Officers: Geo. Jones, pres.; Geo. A. Shepard, v. p.; Richard B Shepard, treas.; Emma C. Shepard, sec., 408 S. State St., Salt Lake City. R. E. Jones, supt.

Inc. July 31, 1907, in Utah. **Cap.,** $10,000; shares 1c par; issued, $8,500; assessable; last assessment, No. 8, one mill a share, levied November, 1919. Shares are listed on the Salt Lake Stock Exchange.

Property: 12 claims, unpatented, south of the Swansea mine and supposed to carry an extension of the Swansea vein, showing porphyry, quartzite and lime, with a fissure vein of 12′ estimated average width, traceable 1 mile, carrying auriferous and argentiferous oxidized and sulphide ores of copper and lead, developed by a 200′ shaft.

SOUTH STAR MINING CO. **UTAH**

Address: Chas. L. Alexander, pres.-mgr., Fergus Falls, Minn.

Officers: above with C. W. Cockroft, v. p.; L. C. Alexander, sec.-treas., and L. Davie, directors.

Inc. July 15, 1915, in Utah. **Cap.,** $100,000; 25c par; issued 200,000.

Property: 7 unpatented claims, about 90 acres, in South Star district, Beaver county, said to show copper, silver-lead ore in a contact deposit in limestone. Only surface development work has been done. Idle, except for assessment work.

SOUTH UTAH MINES & SMELTERS **UTAH**

Office: 165 Broadway, New York. **Mine office:** Newhouse, Beaver county, Utah.

Officers: Hugo Hoffstaedter, pres.; H. G. Robinson, sec.-treas., with E. P. Earle and Samuel Newhouse, directors; W. L. Heidenreich, gen. mgr.

Inc. Feb. 28, 1910, in Maine, as successor of Newhouse Mines & Smelters. **Cap.,** $5,000,000; shares $5 par; issued $4,300,000. **Debentures:** $919,000 of 6%, 20-year income bonds, convertible into stock at par, remaining from a $1,500,000 bond issue put out by the Newhouse Mines & Smelters. Interest on bonds is said to be payable annually, but only if and when earned, and then out of net profits of the year's operations. The old company defaulted in interest on its bonds, and the property was bought for $500,000 under foreclosure, old shareholders being given stock, share for share, plus a payment of $1 per share for new stock. The reorganization brought about $600,000 into the treasury, of which all but about $200,000 was required to liquidate the floating debt of the old company. The annual report for year ended June 30, 1918, showed an operating loss of $16,112, increasing a former deficit to $188,572, and gave current assets as $83,060 and current liabilities as $7,650. No report has since been issued.

Listed on Boston Stock Exchange and on New York Curb. Equitable Trust Co., New York, transfer agent; Windsor Trust Co., registrar. Annual meeting, third Monday in October.

Property the Cactus mine, 13 claims, with miscellaneous holdings, including the Midvale placer, 168 acres, water rights at Wah Wah springs, mill, town sites and grazing lands, total holdings of 7,882 acres. The Cactus mine shows monzonite-porphyry country rock, near a limestone contact, and ore is essentially an irregular mass of brecciated monzonite, carrying copper impregnations, including some oxidized ores in the upper workings, but at depth mainly chalcopyrite, associated with pyrite. There is about 168,000 tons of developed low-grade ore scattered about the mine that averages 1.30%

copper. Much of this ore will assay only 1.05%, while some of the smaller blocks consist of 1.75% ore. Such material can be profitably handled in the company's mill with flotation units, but as there seems to be no chance of finding additional orebodies it will not pay to reopen the mine and remodel the mill.

Development: by two working shafts of 600′ and 900′ depth, with levels at 100′ intervals, and connected on the 600′ level with a 6,300′ main haulage tunnel. The mine has upwards of 4 miles of workings.

Equipment: includes 200-h. p. steam plant, with a 150-h. p. hoist good for 600′, and a 40-drill air compressor, both operated electrically. There also is an auxiliary electric hoist on the second level.

The mine and mill are connected with the Salt Lake Route.

Mill: the 1,000-ton mill contains three 10x24″ crushers, 4 sets of rolls, 1 Huntington mill, 22 Harz jigs, 58 tables, 8 slimers, 16 Callow tanks, settling tanks and classifiers.

The old tailings were treated by Utah Leasing Co. on a royalty basis. In 1914 a $175,000 flotation plant was built for this purpose. The tailings were exhausted in 1919, and the company plans treating their ore reserves in this mill. The untreated tailings contained less than 10 lb. copper per ton.

Production: from 1906 to mid-1914, amounted to 22,412,082 lb. copper; 146,148 oz. silver and 6,443 oz. gold. Mine will not be reopened, but the company is free from debt and has about $70,000 in the treasury, in addition to the mine and mill equipment at Newhouse. It is on the lookout for mining properties worthy of development.

STAMPEDE MINES CO. **UTAH**

Address: A. T. Burton, sec., Beaver City, Utah.

Officers: B. F. Caffey, pres.; Archie MacFarland, v. p.; A. T. Burton, sec.-treas., with Sam. Glaser and R. H. Strickland, directors.

Inc. 1916, in Utah. **Cap.,** $100,000; shares 10c par; assessable; 800,000 issued.

Property: 14 claims, 250 acres, in Lincoln or Jarloose district, Beaver county, Utah, said to show fissures in limestone, dipping 40° and pitching N. 70° E. Sulphide ore reported to contain 0.09 oz. gold, 25 oz. silver, 21.5% lead and 2.46% copper. Shoot occurs at junction of 2 fissures. Development: shaft, down 235′ in November, 1918, cut ore whose persistence in depth is a favorable indication.

Equipment: 6-h. p. gasoline hoist, 140 cu. ft. compressor, etc. **Production:** 21 tons in 1916. A small mine with possibilities. Rail and smelter facilities nearby.

STOCKTON STANDARD MINING CO. **UTAH**

Address: W. N. Gundry, 523 Atlas Bldg., Salt Lake City, Utah.

Officers: C. F. Buehner, pres.; E. V. Anderson, v. p.; W. N. Gundry, sec.-treas., with F. Salzner, John Fetzer, A. P. Davidsen, and J. C. Fleury, directors.

Inc. May 16, 1916, in Utah. **Cap.,** $10,000; 1,000,000 shares 1c par; assessable, not more than 1c. per year; issued, 486,000 shares.

Property: 13 claims, 5 patented, 240 acres, in Rush Valley district, Tooele county, said to show a vein of silver-lead ore.

Development: by 200′ shaft, with 450′ drift in which a N.-S. fissure has been cut showing silver-lead ore for 60′. In 1918 $2,000 was spent by the company. In December, 1919, the shaft was being re-timbered, preliminary to a resumption of development work.

SYNDICATE MINING CO. **UTAH**

Property and assets transferred, May, 1919, to Syndicate Mining and Milling Co., which see.

SYNDICATE MINING & MILLING CO. **UTAH**

In May, 1919, property and assets of the Syndicate Mining Co. were transferred to this company; stockholders received share for share in the deal.

Address: Santaquin, Utah county, Utah. B. H. Bullock, pres.-mgr., Nora A. Bullock, sec.-treas.

Inc. 1919, in Utah. **Cap.,** $25,000; in 1,250,000 shares par 2c. Listed in

Salt Lake City. Assessable; assessment No. 18, $2.50 per 1,000 shares levied in May, 1919.

Property: 10 unpatented claims, near Santaquin, said to show a 20′ vein containing ore with gold, silver, and copper. The vein fissures are in limestone and orebodies are expected at vein intersections. Developed by 1,600′ tunnel. Property is a prospect, in which ore in commercial amount has not yet been found, though surface croppings are promising.

TALISMAN CONSOLIDATED MINING CO. **UTAH**

Address: P. O. Box 1065, Salt Lake City. **Mine office:** W. W. Crone, supt., Milford, Utah.

Officers: H. S. Joseph, pres.; S. S. Pond, v. p.; H. W. Brock, sec.; L. B. McCornick, treas., with L. B. Merriman and M. J. Morris, directors.

Inc. July 7, 1917, in Utah. **Cap.,** $100,000; shares 10c par; assessable; 300,000 issued.

Property: 20 claims; also Cedar Talisman and Empire mines under lease for 2 years, total 450 acres, in Star district, Beaver county, Utah.

Geology: fissures and contact deposits in limestone. Orebody is from 1 to 5′ wide and ore said to assay 10% lead, 15 oz. silver, and 10% copper, with some zinc and gold.

Development: by incline shafts 200 and 1,000′ deep. Workings total 5,000′. Reserves consist of 1,000 tons of high-grade and 40,000 tons of low-grade ore, the latter in the leased mines. No recent information, probably idle.

TECOMA CONS. MINING CO. **UTAH**

Address: 1407 Walker Bank Bldg., Salt Lake City. C. S. Woodward, manager.

Cap., $100,000 common stock, 10c par; and $40,000 preferred stock, $1 par. Listed on Salt Lake Exchange.

Property: 8 claims in Lucin mining district, Boxelder county. Ores carry gold, silver, lead, copper and zinc. Mine is reported to have yielded $1,000,000 since the Seventies. Reported, November, 1919, that work would be started shortly.

TOOELE GOLD HILL M. & M. CO. **UTAH**

Address: Peter Clegg, Tooele, Utah.

Officers: Peter Clegg, pres.; C. W. Bailey, v. p.; T. S. Marks, sec.-treas., with W. Carder and J. Donovan, directors.

Inc. April 7, 1917, in Utah. **Cap.,** $50,000; shares 10c par; 222,500 issued.

Property: 6 claims, patented, 110 acres, in Clifton district (Deep Creek), Tooele county, said to have a contact deposit in granite and limestone. Ore carries gold, silver, copper and lead.

Prospecting in August, 1917, and no news received about company since that time.

TREPHINE MINING CO. **UTAH**

A. P. Hanson and Robt. E. Mark, owners of majority of outstanding stock, called a meeting of stockholders October 6, 1919, at 902 Kearns Bldg., Salt Lake City, to elect officers to wind up affairs of company. They claim that no annual meeting has been held, nor officers elected since company was incorporated in 1899. The charter and franchise of company were revoked by State in April, 1910, for failure to pay annual license tax for 1909.

UNEVIDA GOLD MINING CO. **UTAH**

A. B. Lewis, pres.; W. S. McCornick, treas., 205 Center St., Salt Lake City; W. C. Ralston, Jr., sec.-mgr.

Inc. May 14, 1917, in Delaware. **Cap.,** $7,500,000; $1 par; non-assessable: 3,370,000 shares and $12,500 cash in treasury, October, 1918. Debts amounted to $89,000.

Company controlled several miles of alluvial and gravel ground along Carson river in Nevada, from which it was proposed to recover the amalgam lost from the old Comstock mills; also reported to have mining properties in Beaver county, Utah, and in Idaho. Details of company, organization and operations not obtainable, save in January, 1919, company brought suit against two former directors and others, charging them with having induced owners of leases, under

which company operated, to cancel and transfer them to Comstock Lode Recovery Corp.

UNION CHIEF MINING CO. UTAH

Office: Newhouse Bldg., Salt Lake City, Utah.

Officers: G. L. Bemis, pres.-mgr., Santaquin, Utah; Geo. Baglin, sec.; A. W. Larson, supt.

Inc. 1903, in Utah. **Cap.,** 1,000,000 shares; par 10c; assessable; assessment No. 7, 1c. a share, levied in January, 1919. Listed on Salt Lake Exchange. Share sold ¾-4c. in 1918; and up to 8c. in 1919.

Annual report for 1918 shows total receipts of $14,273, mainly from assessment No. 6. Disbursements were $14,270, leaving cash on hand, $2.92.

Property: 18 claims, 6 patented, 370 acres, in Santaquin mining district, shows lead-silver ore in vein reported to be about 6′ wide.

Development: over 8,000′ of tunnels and drifts. Reported to have found high-grade ore at 550′ depth in 1916, but as only picked samples seem to have been assayed, no averages can be given. Equipped with electric power line and compressor.

In 1918, 806′ of development work was done at a cost of $9.27 per foot; no orebody was found. Company plans sinking.

UNITED PROMONTORY MINING CO. UTAH

Officers: B. D. Siegfus, pres., 560 12 E. St., Salt Lake City; O. P. Peterson, v. p.; D. H. Wenger, sec.-treas., with L. W. Phillips, T. W. James, and W. C. Smaltz, directors.

Inc. in Feb., 1915, in Utah. **Cap.,** $7,000; 1c par; 100,000 shares in treasury, June, 1919. Company's name was formerly Promontory Mining Co.

Property: 14 unpatented claims, in Boxelder county, Utah, 7 miles N. of Promontory, on the S. P. R. R., shows vein 20′ thick in limestone-porphyry contact. Developed by 90′ shaft, and two tunnels, 200′ and 300′ long. Upper level showed some high-grade copper-silver ore. Company has been developing the mine for about 8 years, spending $3,000 in 1918.

Equipment: includes a compressor.

UNITED STATES METALS REDUCTION CO. UTAH

A close corporation, controlled by a Pittsburg syndicate. A 15-ton plant, 15 miles from Castleton, and 50 miles from Cisco, was built in 1918, to treat radium bearing ores. The company owns 37 claims. Details not available.

UTAH BALTIMORE CONSOLIDATED CO. UTAH

Mail returned, 1918, from former address. J. P. Evans, pres., 408 S. 13 E. St., Salt Lake City, Utah; J. M. Williams, v. p.; C. A. Doe, sec.-treas.; J. T. White, W. D. Williams, directors.

Inc. in 1916. **Cap.,** $1,000,000; shares 5c par; no indebtedness.

Property: 10 claims, 5 in Beaver county, known as the Mollie Pitcher group, 5 in the Rocky district, known as the Bill Williams group. Mollie Pitcher group has a 100′ shaft in vein of copper ore, said to be 60′ wide and of shipping grade. Loading station on R. R. about a mile from mine. Probably idle.

UTAH & EASTERN COPPER CO. UTAH

Idle. **Office:** 127 Church St., New Haven, Conn. **Operating office:** 508 McCornick Bldg., Salt Lake City, Utah. **Mine office:** Dixie, Washington county, Utah. **Works office:** Shem, Washington county, Utah.

Officers: Louis E. Stoddard, pres.; T. W. Farnam, sec.-treas.

Inc. 1901, in West Virginia. **Cap.,** $1,500.000, increased later to $3,500,000; shares $5 par, in $2,000,000 preferred and $1.500,000 common stock.

Property: 11 claims, patented, 220 acres, and a 40-acre smelter site, including the old Dixie mine, in the Tutsagubet or Cave Springs district, near Green river.

Geology: 5 replacement deposits in limestone, 1 of 40′ estimated average width, carrying cuprite, azurite, and massive malachite ores, said to give average assays of 15% copper.

Development: by a 775′ blind shaft, sunk from the breast of a 225′ tunnel. This tunnel caved, 1905, and it was necessary to run a new tunnel of 800′, to reopen the mine. Old workings said to show about 100,000 tons of ore.

Equipment: includes a small gasoline plant. The company has 2 smelters, 1 worthless; the new smelter has a 100-ton water-jacket blast furnace, with water power, secured from the Santa Clara river, 2 miles distant, and a small auxiliary steam plant. The smelter is at Shem, about 50 miles from Acoma, on the Rio Grande Western railroad, the nearest shipping point, and transportation for 14 miles of the distance is by traction engine.

Production: 1,448,597 lb. copper in 1904; 400,166 in 1905, and 391,779 in 1907. Property considered promising but is handicapped by lack of rail transportation. Worked by lessees, who have shipped several cars of 30% ore.

Letters returned unanswered, and no recent report received.

UTAH LEAD & COPPER CO. **UTAH**

Address: care H. M. Stonemetz, v. p., 53 State St., Boston, Mass. Mine office: Bingham Canyon, Utah.

Officers: Carl Brandt, pres.; Harry M. Stonemetz, v. p.; J. P. McDonough, sec.; J. H. Turnbull, treas., with Geo. E. Davis, directors.

Inc. Dec. 24, 1912, in Maine, as the successor of the Bingham Copper Co. **Cap.,** $500,000; shares $1 par; outstanding, 262,000 shares. Debentures $100,000, 6% convertible; outstanding, $37,750. Federal Trust Co., Boston, transfer agent; Paul Revere Trust Co., registrar.

Property: 13 claims, patented, about 102 acres, on the eastern slope of Carr Fork Canyon. Company also owns a one-half interest in the Diamond Extension, and one-half in the Diamond claims adjoining.

The property shows 3 fissure veins, several bedded deposits of silver-lead ore and a fissure vein of copper ore of less promise. A big outcrop near the W. end line is said to have yielded considerable high-grade gold and silver ore with lead carbonates, to former owner.

Development: by 2 tunnels, longest 1,200′, and 2 shafts on the Venice claim. There are about 3,000′ of workings, showing ore below commercial tenor generally, but with occasional streaks of ore assaying up to 70% lead and 15 to 30 oz. silver.

Equipment: includes a small air compressor. Property has been idle for some time.

UTAH LEASING CO. **UTAH**

Office: 804 Newhouse Bldg., Salt Lake City, Utah. **Mine office:** H. H. Adams, supt., Newhouse, Utah.

Officers: V. P. Strange, pres.; J. C. Dick, v. p.; D. R. Pingree, sec.-treas., with Herbert Salinger and F. W. Royer, directors. R. P. McDonald, auditor.

Inc. in Utah. **Cap.,** $30,000; shares 10c par; assessable; 250.000 issued.

Dividends: $25,000 in 1916; $47,500 in 1917; $22,500 in 1918.

Property: a lease from South Utah Mines and Smelters, on about 1,000,000 tons of copper-gold-silver tailing at the old Cactus mine, Newhouse, Utah.

Equipment: one 20-ton steam shovel, 750-ton plant including two 8′x48″, and one 6′x48″, Hardinge mills, 2 Dorr classifiers and 2 Minerals Separation flotation units.

Electric power is obtained from the Beaver River Power Co., at 44,000 volts, stepped down to 2,200 and 4,400 volts.

Production: feed to the plant assays about .52% copper, which is claimed to be the lowest head assay in the country; concentrate assays 21% copper, 0.07 oz. gold, 2 oz. silver. In 1915, 15,530 tons ore milled produced 86,941 lb. of copper; in 1916, 160,420 gave 1,286,011; in 1917, 207,270 gave 1,575,347; and in 1918 205,000 tons ore gave 1,489,851 lb. copper.

Reported in May, 1919, that tailings dump was exhausted, 700,000 tons having been treated during past 3½ years.

UTAH MINING CO. **UTAH**

Mine address: Fish Springs, Juab county, Utah; A. F. Rynder, sec., 77 R. St., Salt Lake City.

Property: old Utah mine, 25 miles S. of Gold Hill, a large producer of high-grade silver ores in former days. The old dumps are estimated to contain

200,000 tons of ore. Present company has built a 200-ton mill to treat this ore. Details of operation not available.

UTAH MINING, MILLING & TRANSPORTATION CO. UTAH

Address: Moscow, via Milford, Beaver county, Utah. Chas. T. Birchard, pres. and gen. mgr., at last accounts.

Property: includes the Hub and Lady Bryan mines, latter bought 1909, of Mathew Cullen et al., S. of the Burning Moscow, 6 miles from a railway, in the Star district.

Development: by a 400′ two-compartment main shaft, developing a vein variously reported as 2 to 30′ in width, carrying silver-lead carbonates, and a bedded deposit in limestone showing high-grade cuprite, from which small shipments of ore have been made. Ore said to carry $6-$7 in silver and gold with heavy percentage of iron. No recent returns. Probably idle.

UTAH NATIONAL MINES CO. UTAH

Address: G. W. Field & Co., 50 Broad St., New York.

Officers: F. E. McMillin, pres.; M. Butler, v. p.; T. L. Lloyd, sec.-treas., with D. C. Pettibone, George Henderson and J. T. Lloyd, directors.

Inc. Feb., 1917, in Delaware. **Cap.,** $1,000,000; shares $1 par; non-assessable. Listed on Boston Curb.

Property: the Silver King mine, in Newfoundland district, Boxelder county; and the Lady Bryan in the Star district, Beaver county, Utah.

Development: 3,000′ of work said to have been done in the Silver King, opening silver-gold-copper ore assaying over $60 per ton. In the Lady Bryan $16 ore is exposed to depth of 510′. Estimated reserves in May, 1917, were 75,000 tons. No recent information, probably idle.

UTAH-OREGON MINES CO. UTAH

Address: Price, Utah; John C. Forrester, pres. Levied an assessment of 1c. a share, and expected to start operating its milling plant to treat a large tonnage of free-milling gold ore late in 1919.

UTAH ORE SAMPLING CO. UTAH

Office: 820 Newhouse Bldg., Salt Lake City, Utah.

Officers: Jesse Knight, pres.; E. P. Ellison, v. p.; W. L. Mangum, sec.-treas., with J. W. Knight and R. E. Allen, directors. E. G. Jensen, gen. mgr.; Frank Burgner, gen. supt. at Murray.

Inc. Dec., 1909, in Utah. **Cap.,** $300,000; par $1; 215,000 issued.

Company owns and operates two ore-sampling mills at Murray and one at Silver City, with combined daily capacity of 1,000 tons of ore.

UTAH PLACER MINING CO. UTAH

Address: Box 92, Garfield, Utah.

Officers: Theo. Peterson, pres.; Leo. Erdman, v. p.; J. H. Butcher, sec.; Edward Helmerich, treas., with Geo. C. Phillips, and H. H. Murphy, directors.

Cap., $100,000; shares 10c par.

Property: 1,320 acres of placer ground on Grand river, Utah. Gravel is said to carry from 40c. to $3 gold per yard, also some platinum. One channel is 9 to 20′ deep. Idle in 1918, plans resuming work in 1920.

UTAH-RELIANCE MINING CO. UTAH

Office: 408 South State St., Salt Lake City, Utah. **Mine office:** Ibapah Tooele county, Utah.

Officers: J. G. Bywater, pres.; D. B. Tripp, v. p.; Richard B. Shepard, sec.-treas. and gen. mgr., with W. A. Langford and Samuel Divett, directors.

Inc. 1908, in Utah. **Cap.,** $5,000; shares 1c par; assessable; issued, $3,000, fully paid.

Property: 8 claims, unpatented, 160 acres, about 45 miles from a railway, showing porphyry and limestone.

Development: by a 175′ tunnel and a 100′ shaft, latter showing ore assaying up to 16% copper, 4 oz. silver and 40c. gold per ton.

Letters returned and no recent information available.

UTAH REVENUE MINES CORPORATION UTAH

Address: 527 5th Ave., New York.

Inc. in Delaware. **Cap.,** $4,000,000; par $1; outstanding, 3,000,000 shares. Holds 220,000 shares of capital stock of East Hecla Mining Co.

Property: 66 claims, 22 patented, about 1,320 acres, in Pine Grove Canyon, Beaver county; also 18 claims, unpatented, 200 acres, in American Fork district. The Pine Grove group shows quartzite cut by fissure veins with lead-silver-gold ore. There is a series of parallel and intersecting fissures caused by strong E.-W. faulting.

Development: several tunnels, longest about 600′, and shafts, deepest 200′, said to show considerable ore, mainly concentrating. Most of this work was done by others several years ago; the present management plans continuing development.

UTAH SILVER LEAD MINES CO. **UTAH**

Address: Walker Bank Bldg., Salt Lake City. J. H. Garrett, mgr.

Cap., $250,000; 25c par; issued 600,000 shares.

Property: 11 claims, 7 patented, in Morgan Argentine district, 7 miles from U. P. R. R. in Morgan county, said to have yielded lead-silver ore to value of several hundred thousand dollars in earlier years.

Present management has a bond and lease on property, from the Carbonate Hill Mng. Co., royalty paid to be applied on purchase price.

Development: Silver Zone and Blacksmith tunnels and extensive old workings now caved; new company has advanced the Silver Zone tunnel several hundred feet, and while doing this work shipped about 1,000 tons of ore assaying from 15.4% to 26% lead and from 3 oz. to 6.7 oz. silver. Management estimates 10,000 tons ore blocked out in this tunnel by present work. On the opposite side of the mountain from the Silver Zone tunnel, the Blacksmith tunnel, driven 1,000′, will tap the Silver Zone deposit several hundred feet below present workings, and will be the main haulage tunnel of the mine.

Company sold $25,000 stock in 1918, to provide money for a 4,000′ aerial tram from Blacksmith tunnel to a place down the mountain where it will be possible to load ore on wagons.

UTAH-UNITED COPPER CO. **UTAH**

Absorbed by Beaver Copper Co., which see. Described in Vol. XIII.

VALLEY VIEW MINING CO. **UTAH**

Address: 4725 S. State St., Murray, Utah. Albert Glover, Jr., sec., Sandy, Utah. Levied an assessment of $2 per 1,000 shares, February 17, 1919.

VICKSBURG GOLD AND COPPER CO. **UTAH**

Mine near Milford, Beaver county, Utah, leased June, 1916, to United States Mines Operating Co.

Property: 5 claims in Star district, covering 4,000′ of limestone belt cut by ore-bearing fissures.

Development: shallow, but some ore shipped May, 1916.

VICTOR CONSOLIDATED MINING CO. **UTAH**

Inactive. **Mine office:** Eureka, Juab county, Utah.

Officers: J. S. Wells, pres.; A. W. McCune, v. p.; J. A. Groesbeck, sec.; W. S. McCornick, treas., with J. H. Brown, directors. Vivian McCune, gen. mgr.

Inc. 1903, in Utah. **Cap.,** $375,000; shares 50c par; all issued, assessable, with 5 assessments levied and fully paid. Stock is listed on the Salt Lake Exchange. Prices: 3-3½c. in 1918; 3-10½c. in 1919.

Property: 5 claims, 38 acres, patented, including the Victor and Boss Tweed mines, carrying gold and lead-silver-bearing copper ore, developed to depth of 800′. The mine has been in the hands of lessees since 1909. Shipments reported to run 7% copper and 8 oz. silver per ton. No recent report.

VIPONT MINING CO. **UTAH**

Address: W. A. Wilson, sec.-mgr., 406 Dooley Block, Salt Lake City, Utah. **Mine address:** Oakley, Idaho.

Company owns 920 acres in Ashbrook district, in N. W. corner of Boxelder county, Utah, including the old Vipont mine. Development: by over 5,000′ of workings from which much ore has been shipped. No. 2 tunnel is 1,600′ in length. The ore is a replacement deposit in limestone, carrying gold and silver.

Equipment: including 100-h. p. engine and a compressor. Company

plans building a mill. Property is said to show a fair tonnage of ore assaying about 40 oz. silver and $1.80 in gold per ton, but is handicapped by a 25-mile wagon haul to Oakley, Idaho, the nearest R. R. point.

VOLUNTEER MINING CO. **UTAH**

Letters returned from last address. Milford, Beaver county, Utah.

Officers: W. C. Albertson, pres. and gen. mgr.; W H. Havenor, v. p.; S. G. Cole, sec.; H. E. Havenor, treas., asst. sec. and engr., with Geo. Havecamp, directors, at last account.

Inc. in Utah. **Cap.,** $50,000; shares 10c par; non-assessable; issued $25,550. Annual meeting, second Monday in May.

Property: 6 claims, unpatented, 600 acres, in the North Star district, seven miles from the Salt Lake Route. Claims show contact deposits between limestone and intrusive porphyry. The mine has only two 12′ pits and a 70′ tunnel. Company reported in 1916-17, operating a lease on the north end of the Lakeview Mining Co.'s property. No later information.

WASATCH BONANZA MINING CO. **UTAH**

Officers: Burdell Davis, pres., Provo, Utah; Wm. Davis, v. p.; Brigham Johnson, sec.-treas.; J. M. Buckner, Geo. A. Storrs, directors.

Inc. May, 1916, in Utah. **Cap.,** $10,000; 1c par.

Property: 4 claims, the Mayflower group in Decker Canyon, near Charleston, Wasatch county, Utah. No recent information.

WEDGE GOLD MINING & MILLING CO., THE **UTAH**

Office: 1102 W. 7th South St., Salt Lake City, Utah. Mine near Marysvale.

Officers: E. P. Mowers, pres.-gen. mgr.; N. W. Sonnedecker, v. p.; M. L. Grovenor, sec.-treas., with E. J. Schenck and K. D. Schenck, directors.

Cap., $300,000; shares $1 par; all outstanding.

Property: near head of Bullion canyon, 10 miles S. W. of Marysvale, Piute county. Mine contains a gold-bearing quartz fissure vein in latite; dip 15° S. E., strike N. E.-S. W. Orebody varies from ½″ to 20″ in width. Mine has been developed and worked chiefly under lease. Workings include a shaft, 400′ adit and 200′ of drifts. Shipments are of high-grade ore only.

WESTERN PACIFIC COPPER CO. **UTAH**

Office: care Wilson Bros., Brooks Arcade, Salt Lake City, Utah. **Mine office:** Callao, Juab county, Utah.

Officers: E. J. Yard, pres.; Jackson H. McChrystal, v. p. and gen. mgr.; Elroy M. Clark, sec.-treas.

Property: 320 acres, adjoin the Western Utah Copper Co., in the Willow Springs division of Deep Creek district, Tooele county, just over the Juab county line.

Development: by a shaft and 2 tunnels, 400′ and 1,200′ long, developing ore averaging about 13% copper, 23% lead and 22% iron, with small silver and gold content. In 1914 a rich strike was reported in a south drift run from the bottom of the 250′ shaft. The vein is said to be 15′ wide and a 100-ton sample ran 24.4% copper. Occasional small shipments of ore have been made.

Equipment: includes steam plant and air compressor. Reported that work will soon be resumed.

WESTERN PACIFIC MINES CO. **UTAH**

Property: 12 claims at Crater Island, 25 miles S. of Lucin, said to show a 5′ copper-gold-silver vein. Developed by several shafts, deepest 80′. Plans continuing development work. Examined, 1919, by A. G. Burritt, Salt Lake City.

WESTERN UTAH COPPER CO. **UTAH**

Office: 1109 Boston Bldg., Salt Lake City. **Mine office:** Gold Hill, Tooele county, Utah.

Officers: F. G. Rowley, pres., Pawtucket, R. I.; Duncan MacVichie, v. p.; G. R. Rawsbottom, sec.; C. G. Spittal, treas., also directors. Owen F. Brinton, manager.

Inc. 1906, in Nevada. **Cap.,** $2,500,000. $5 par; 499,500 issued.

Property: 5 groups of claims and 360 acres ranch land, a total of 716

acres, comprising the Gold Hill, Yellow Hammer, Calaveras, Tuolumne, and Ochre Springs groups; also the Redding Springs ranch, valuable for water.

The properties are situated in the Clifton district, Tooele county, reached by the Western Pacific and Deep Creek railroads, about 167 miles S. W. of Salt Lake City. Examined in 1917 by F. R. Weekes.

Geology: the claims cover a granite-limestone contact, with replacement deposits in limestone. See 'Economic Geology' for June, 1918.

Development: 700′ Gold Hill shaft recently sunk from 300′ level. Ore on 300′ level assays about 5½ oz. silver, 13% lead, and 2% copper. On the 700′ level the vein is 62′ wide.

The Calaveras and Yellow Hammer groups commenced shipping about July, 1919. The product from these groups is gold-copper-silver ore, with gold predominating.

Early in 1919, a 50-ton experimental mill, erected at Salt Springs, 27 miles from the mine at Gold Hill, treated copper-tungsten ore from the Yellow Hammer mine until in June, it was moved to the mine in order to treat second class ore. Smelter shipments averaged about 100 tons ore daily during 1919.

Shipments of silver-lead ore from glory hole operations, totaled 3,750 tons, January, 1920.

The Deep Creek railroad from Wendover, Utah, to Gold Hill, Utah, was completed March, 1917.

WESTERN UTAH EXTENSION COPPER CO. **UTAH**

Address: A. E. Custer, mgr., Walker Bank Bldg., Salt Lake City, Utah, or Gold Hill, Utah.

Officers: P. S. Chambers, pres.; D. A. Rees and A. R. Custer, v. p.'s; F. A. Duerr, sec.-treas., with John Pingree, directors. C. L. Glass & Co., Pittsburg, Pa., fiscal agents. B. T. Haywood, supt.

Inc. in Delaware. **Cap.**, $2,500,000; $1 par. Stock transferred at company's office.

Financial statement for year ending June 24, 1918, showed total assets of $2,652,441, of which property and development comprised $2,518,615.

Property: 15 claims, about 250 acres, at Gold Hill, Utah, adjoining the Western Utah Copper mine, in the Clifton district, Tooele county. Examined in 1917 by F. R. Weekes. Mine is said to contain a well defined fissure in limestone and granite, over 5,000′ long.

Development: by 2,500′ tunnel work and 300′ Mogul shaft, with good ore in drift on vein on 300′ level. Smelter shipments in June, 1919, said to assay about 4¾% copper and 3 to 6 oz. silver; 250 tons shipped in 1918 from development work.

Company plans developing an extension of its neighbor's orebody, and will sink shaft 1,000′ deep in near future.

WESTERN ZINC CO. **UTAH**

Probably dead. Was organized to operate a lease on the Lakeview Mining Co.'s property on Promontory Point, Utah, in 1916.

WEST JORDAN SMELTER **UTAH**

Owned by U. S. Smelting Co., at West Jordan, Utah.

WEST MERCUR MINES CO. **UTAH**

Offices: 11 Broadway, New York, and 827 McIntyre Bldg., Salt Lake City. **Mine office:** Ophir, Utah.

Officers: E. J. Macnamara, pres.; Edw. H. Eckhoff, sec.

Company was doing a small amount of development work at last account in a mine on the western dip of the Camp Floyd district. Reported in February, 1919, that suit had been brought against the company by Walter and Fred. Lewisohn, for $30,600 due on promissory notes.

Equipment: includes a 150-ton mill.

WHITE STAR MINING CO. **UTAH**

Mine office: Eureka, Juab county, Utah.

Officers: C. H. Thompson, pres.; P. A. Sorenson, v. p.; Emma C. Shepard, sec.; Bernard Rich, treas., and Harry Rich, directors.

Inc. 1898, in Utah. **Cap.,** $30,000; shares 10c par; assessable; with several assessments levied.

Property: 4 claims, patented, 80 acres, 3 miles from Eureka, the nearest rail point. The mine has a 100′ shaft and 100′ tunnel.

Company has apparently acquired a new property in the North Star district, Beaver county, from which in August, 1917, two cars of $52 ore were shipped and a compressor, hoist and other electrically driven equipment were installed.

The White Star mine in the Silver Island district, Western Tooele Co., is near the Kentucky-Douglas, Western Utah and Gethin Leroy mines, all active in 1917, though no later news has been received.

WIG MOUNTAIN MINING & MILLING CO. **UTAH**

Officers: George A. Storrs, pres., American Fork, Utah; George A. Brown, v. p.; J. W. Storrs, sec.-treas., John Curzon, and Jos. Thurgood, directors; F. Jardine, supt.

Inc. May, 1916. **Cap.,** $1,000,000; shares 1c par.

Property: the Jumbo group, 7 claims, on Wig mountain. Is a lead-silver prospect which was being developed in August, 1917. No recent returns received.

WILSON CONSOLIDATED MINING CO. **UTAH**

Offices: 208 Brooks Arcade Bldg., Salt Lake City, Utah, and Wendover, Tooele county, Utah. Clyde H. Wilson, pres.; Frank L. Wilson, sec.-treas.

Property: located in the Clifton section of Deep Creek district, Tooele county, 45 miles from Wendover, was the only mine in the U. S. which shipped bismuth ore in 1914. Reported to have shipped one 25-ton lot of 8% bismuth ore carrying gold and silver. Ore was hand jigged to bring shipment up to 20%.

Reported in 1919, that company had resumed operations.

WOLF MOUNTAIN COPPER CO. **UTAH**

Office: C. A. Harker, 705 Eccles Bldg., Ogden, Utah.

Officers: C. A. Harker, pres.-treas.; P. M. Parry, v. p.; with C. R. Cole, R. A. Eliason, and A. A. Allen, directors. S. A. Holmes, sec.

Inc. Jan. 31, 1914, in Utah. **Cap.,** $100,000; 10 par; assessable; 502,594 shares issued. Assessment No. 9, ½c a share, called, August, 1919.

Property: 640 acres, in Paradise district, 19 miles S. of Hyrum, Cache county, said to show a N.-S. fissure vein in quartzite, 45′ wide, dipping 37°, and carrying ore assaying 4½% copper, 1 oz. silver, and .01 oz. gold per ton. Examined by W. F. Mitchell, Don Maguire, J. T. Bacon and J. G. Lind.

Development: by four tunnels totaling 930′ of work; 33,000 tons of ore reported blocked out. Company making preparations to build a 50-ton mill so that the ore can be made profitable.

WOODMAN MINING CO. **UTAH**

Address: Gold Hill, Tooele county, Utah.

E. F. Woodman, pres.; T. J. Midgley, sec.

Property: the Frankie group, 2½ miles S. of Gold Hill, said to show low-grade copper ore.

Ore: occurs in a granite-limestone contact, and the ore will, it is said, average 2% copper, $1.20 gold, 2 oz. silver.

Development: by extensive tunnel work and a shaft. In 1918, production was about 2,000 tons, and net production about $30,000.

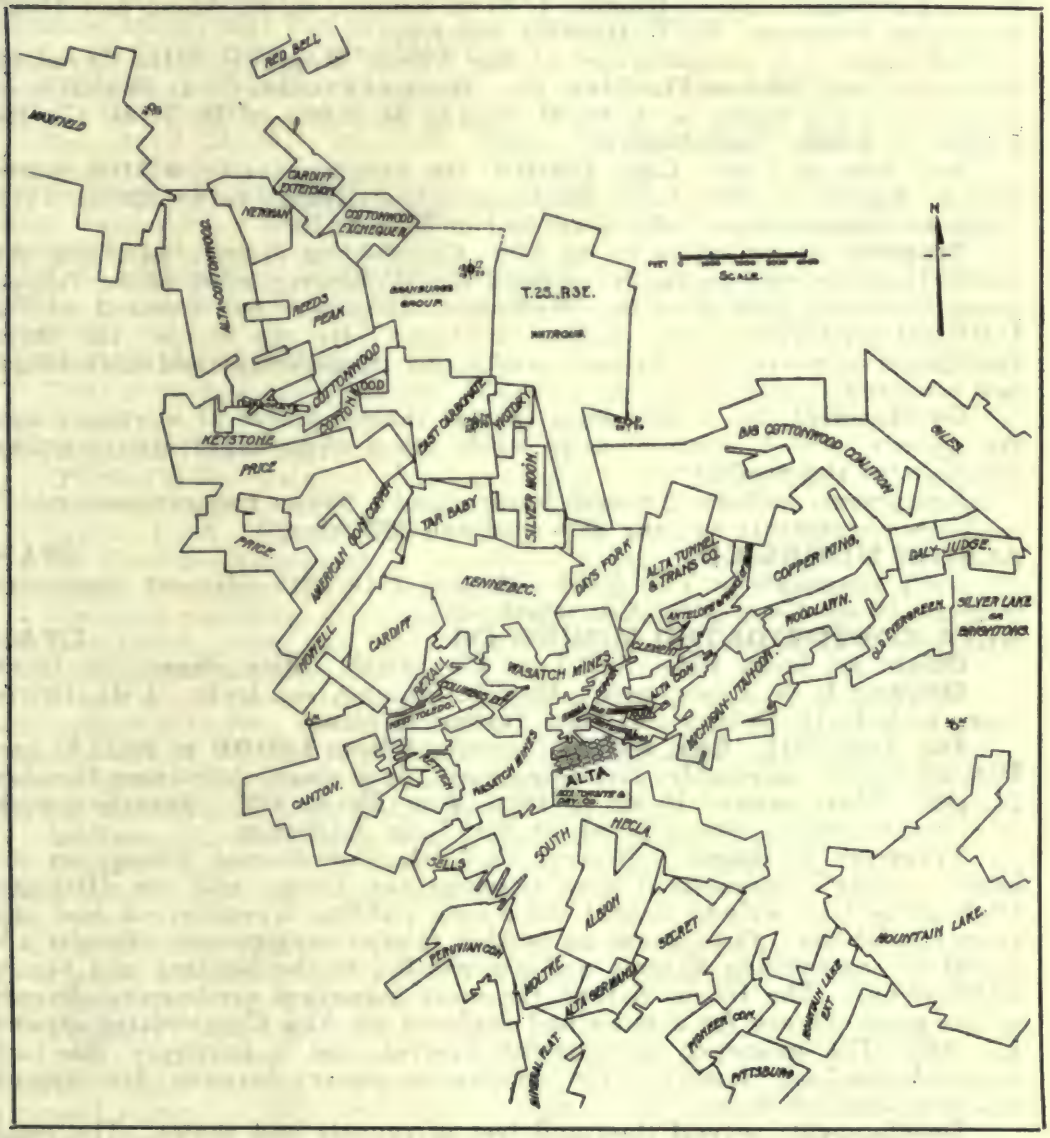
Company also owns the Cane Springs mine S. W. of Gold Hill, and the Alverado group E. of the town. In both groups a gold-bearing calcite vein occurs in the granite-limestone contact. The two mines have, it is said, produced $270,000. Seven men are employed at the Cane Springs mine.

ALTA-COTTONWOOD AND AMERICAN FORK DISTRICTS

Including Big Cottonwood and Little Cottonwood, whose combined output was 18,250 tons in 1919, compared with 35,269 tons in 1918.

ACME MINING CO. **UTAH**

Officers: Edw. Southwick, pres.; Jacob Evans, v. p.; H. Gardner, sec.-treas.; with John F. Bradshaw, Wm. E. Trinnamen, and Jas. Trinnamen, directors.



PROPERTIES IN ALTA-COTTONWOOD DISTRICT, UTAH

Inc. 1919, in Utah. **Cap.,** $100,000; par 10c.

Property: located in American Fork canyon.

ALBERTA MINING CO. **UTAH**

Office: American Fork, Utah.

Officers: Ammon Mercer, pres.; S. H. Roundy, v. p.; Jas. L. Mercer, sec., with M. F. Cowley, Nelson McCarty and David Davis, directors.

Inc. May, 1917, in Utah. **Cap.,** $30,000; shares 3c par; 500,000 shares held in treasury.

Property: 15 claims in Silver Lake mining district, said to carry good values in gold, silver, copper, lead and molybdenum. Developed by 135′ tunnel. A prospect.

ALBION CONS. MNG. CO. **UTAH**

Address: 161 So. Maine St., Salt Lake City, Utah. **Mine address:** Alta, Utah.

Officers: Geo. H. Watson, pres.-mgr.; Herman Bamberger, v. p.; with J. W. Harrington, Jesse Knight, J. Wm. Knight, R. E. Allen, and Hugh Trenholm, directors. H. T. Hatfield, sec.-treas.

Company is a consolidation of the Albion Mng. Co., Alta Germania Mines Co., and Mineral Flat Mng. Co. Basis of exchange was 3⅓ shares of A. M. Co., 6 2/3 shares of A. G. M. Co., or 3⅓ shares of M. F. M. Co. for 1 share of Albion Consolidated.

Inc. 1919, in Utah. **Cap.,** $100,000; 10c par; assessable; 810,000 shares issued. Listed on Salt Lake Exchange. Quotations: 4c to 22c in 1919. Original companies are fully described in Vol. XIII.

Property: about 581 acres, in Alta- Cottonwood district, adjoining the South Hecla ground on the S. includes the Wellington mine of the Albion group, formerly owned by the Wellington Mng. Co. and credited with a $1,000,000 production from shallow workings. By the merger the three contiguous properties are brought under one management and apex litigation obviated.

Development: by a 700′ shaft, several thousand feet of workings, and the Quincy tunnel, approximately 8,000′ long; this tunnel also provides drainage for the property.

Equipment: includes 2 power houses, and a 30-ton concentrator, which produces concentrate running 35% lead and 30% zinc.

ALBION MINING CO. **UTAH**

Fully described in Vol. XIII. Merged 1919 with adjacent companies to form Albion Cons. Mng. Co., which see.

ALTA CONSOLIDATED MINING CO. **UTAH**

Office: 201 Judge Bldg., Salt Lake City, Utah. **Mine office:** Alta, Utah.

Officers: R. S. Lewis, pres.; Max L. Stayner, sec.-treas.; J. D. Lewis, mgr., with F. H. Rolapp and John Dorius, directors.

Inc. Aug., 1911. **Cap.,** $600,000; increased from $300,000 in 1913; $1 par; $500,000 issued; assessable; last assessment, 2c a share, delinquent October 24, 1919. Share prices: 10-36c in 1918; 8 to 35c in 1919. Transfers made in company office. Stock listed on Salt Lake Exchange.

Property: 17 claims, 120 acres in Little Cottonwood district, in the heart of Alta's mineralized zone between the Emma and the Michigan Utah properties, include several old mines, yielding argentiferous lead and copper sulphides. Ores occur as bedded tabular replacement deposits adjacent to crosscutting fissures and are parallel to the bedding and fissure intersections. The Braine fissure, the most important ore-bearing channel of the camp, known for 2 miles and explored on Alta Consolidated ground for 800′. The existence of crosscut fissures and a porphyry dike are favorable geologic features. Ore occurs at contact between flat dipping quartzite and limestone.

Development: several thousand feet of tunnels and shafts. The main working, or Silver King tunnel is 300′ below the Brooklyn tunnel and an equal distance above the new Alfred tunnel. All recent development is from the main tunnel which follows in a general way the Braine fissure. Drifts east and west from this tunnel have raises to reach the ore. Shipments were made during 1915 from Hoboken lease and from small orebodies encountered in the company workings. During winter of 1917-18 several cars of ore were shipped; the ore assaying about 3% copper, 6.5% lead, and 17 oz. silver. In 1919 a good grade of ore was being developed on

the Hoboken fissure from the Copper Prince level. Shipments reported to average about one car, 50 tons a month.

ALTA COTTONWOOD MINING CO. **UTAH**

Address: Salt Lake City, Utah. A. O. Jacobson, pres.; Franklin Webb, v. p.; Val. S. Snow, sec.-treas., with J. C. Wood and R. S. Lewis, directors.

Inc. 1915. **Cap.,** $250,000; shares 25c par.

Property: 28 claims, 18 patented, known as the Argenta group, located in the Big Cottonwood district, 7 miles southwest of Park City. Claims adjoin the Maxfield mine on the south and the Cardiff on the north. At last accounts the company planned to start work on a long drainage and exploration tunnel that had already been driven 1,300′.

ALTA DIVIDE GOLD MINING CO. **UTAH**

Officers: A. F. Ellgren, pres.; L. H. Hardy, treas.; A. Y. Hardy, sec.; with C. W. Knudsen, and E. M. Tyson, directors.

Inc. April 22, 1916, in Utah. **Cap.,** $100,000; shares 10c par; 600,000 shares in treasury.

Property: 34 unpatented claims, in Big and Little Cottonwood districts, near Alta, shows gold values in a vein up to 30′ wide in a shale quartzite contact.

Development: commenced in Spring of 1916, and in 1918 the tunnel was 120′ long and $5 to $6 ore had been found. Idle in 1919, but work to be resumed.

ALTA-GERMANIA MINES CO. **UTAH**

Fully described in Vol. XIII. Merged 1919 into Albion Cons. Mng. Co., which see.

ALTA-MICHIGAN MINES CO. **UTAH**

Office: 161 So. Main St., Salt Lake City, Utah. **Mine office:** Alta, Utah.

Officers: same as South Hecla Mining Co.

Inc. in Utah. **Cap.,** $100,000; shares 10c par; assessable; outstanding, 25.713. First assessment of 1c per share levied October, 1917. Listed on Salt Lake Exchange. Share prices 2½c to 8c in 1918; ½ to 9½c in 1919.

Financial statement to January 1, 1917, showed total resources, $101,000, which included: mines and plant, $16,250; treasury stock, $74,287; and cash, $1,864; accounts payable, $1,000.

Property: 17 acres, in Little Cottonwood district, said to show silver-lead-copper-gold ore. Development work is carried on through the Quincy tunnel level of the South Hecla mine and some 5% ore is said to have been shipped. No later reports received.

ALTA MINING & DEVELOPMENT CO. **UTAH**

Address: 102 Mercantile Annex, Salt Lake City, Utah.

Officers: Chas. A. Walker, pres.-mgr.; J. R. Walker, v. p.; H. M. Chamberlain, sec.-treas., with Walter C. Lewis and John M. Moore, directors.

Inc. June 29, 1906, in Utah. **Cap.,** $600,000; shares $1 par; 326,500 held in treasury. Annual meeting 1st Monday in January. Columbia Trust Co., Salt Lake City, Utah, transfer agent.

Property: about 160 acres in the Alta Cottonwood district, at the head of Little Cottonwood canyon, includes the townsite at Alta between the Wasatch mines and the South Hecla. The management expects to continue a tunnel started in 1907, for 3,600′ to explore the ground under the townsite at a depth of 500′. Several contacts and well-defined fissures are said to cross the property. Presumably idle since 1917.

ALTA PRINCE MINING CO. **UTAH**

J. S. Johnson, pres.; C. W. Frees, sec.-treas., 739 E. 21st St., South, Salt Lake City, Utah.

Cap., 1,000,000 shares, par 25c; 30,000 shares in treasury.

Property: 2 claims, patented, at Alta, Salt Lake county, between the Michigan-Utah and the Prince of Wales Mining Co.'s property. Development tunnel 1,065′ at 500′ depth. No recent information.

ALTA SUPERIOR M. & M. CO. **UTAH**

Office: Provo, Juab county, Utah.

Officers: A. E. Ahlander, pres.; N. A. Nelson, sec.

Inc. March, 1909, in Utah. **Cap.,** $50,000; shares 5c par; assessable. Previously known as Mineral Flat Extension M. & M. Co.

Property: 2 miles S. of Alta, Little Cottonwood district, Utah, showed 3′ vein of copper ore, also silver-lead ore.

Development: by tunnel and shaft with drifts on vein.

Reported, June, 1919, to show good ore in the 530′ tunnel.

ALTA TIGER MNG. CO. **UTAH**

Address: 420 Boston Bldg., Salt Lake City. **Mine office:** Alta, Utah. J. E. Phillips, pres.; Daniel Phillips, v. p.; A. T. Sanford, sec.-treas.

Inc. 1915. **Cap.,** $7,000; divided into 700,000 shares; assessable; with 20,000 remaining in the treasury. Assessments called 1918 and 1919. Listed on Salt Lake City Exchange. Shares sold ¼ to 1c in 1919.

Property: the Tiger patented claim, 6 acres and an interest in the Highland Chief claim, in the Alta-Cottonwood district, north of the town of Alta. The management intended to work the Tiger claim ground through the Highland Chief claim tunnel. The tunnel was cleaned out in the summer of 1915 when it was found that the Tiger ground had been mined to a considerable extent in early days. The work since has been devoted to the unexplored ground. One shipment made in 1916; claimed to have assayed 18% lead and 16.8 oz. silver per ton. Reported, June, 1919, that work had been resumed on the property.

One of the many Utah mining companies that does not reply to requests for information.

ALTA TUNNEL & TRANSPORTATION CO. **UTAH**

Office: 618 Newhouse Bldg., Salt Lake City, Utah.

Officers: John C. D. Clark, pres.; M. P. Braffet, v. p.; John Cain, sec.; F. V. Bodfish, gen. mgr., with V. E. Lollin and Geo. N. Wagner, directors.

Inc. Sept., 1911, in Utah. **Cap.,** $1,000,000; shares $1 par; 800,000 issued; assessable; assessment No. 9, 1c per share, called June, 1919. Shares varied from 5 to 12½c in 1918; 5 to 20c in 1919.

Property: 250 acres, includes the Lucky Dutchman group of 16 claims and the old Alta tunnel ground. Ore occurs in fissure veins in limestone with stringers of ore said to assay 9.7% copper, 21% lead and 13½ ozs. silver per ton.

Development: by drifts and raises which have opened up several rich veins. Company is driving a mile-long drainage and transportation tunnel (3,550′ long in September, 1918) to open its own and adjoining properties, with portal 3,500′ from Silver Fork on the Big Cottonwood, and 8,500′ above sea level. Tunnel will be 600′ lower than any mine workings of the district and will cut all the great veins of the section.

Equipment: 50-h. p. motor and compressor, drills, a 10′ fan for ventilating purposes, a 2-mile power line, boarding house and other buildings.

No reports issued by company.

ALTA-UTAH MINES CO. **UTAH**

Address: 161 So. Main St., Salt Lake City, Utah.

Officers: G. H. Watson, pres. and gen. mgr., Alta, Utah; H. Bamberger, v. p.; J. W. Harrington, sec.-treas.

Company was organized late in 1917.

Property: an old mine in the Cottonwood district, near the South Hecla. Developed by tunnels, one in 400′, and another 200′. The latter shows high-grade ore. No. 3 tunnel yielded a carload of 3% copper and 15 oz. silver ore.

AMERICAN CONSOLIDATED COPPER CO. **UTAH**

Office: Judge Bldg., Salt Lake City, Utah.

Officers: John C. Barnard, pres.; L. L. Smith, v. p. and mgr.; D. C. Dart, sec.-treas.; with J. W. McKinney and L. R. Wardrop, directors; G. Malmborg, supt.

Inc. 1907, in Utah. **Cap.**, $600,000; $1 par; changed to 1,000,000 shares; 10c par, October, 1917. Stock listed on Salt Lake Stock Exchange. Prices, 3-14c in 1918; 3½-8c in 1919.

Property: 19 claims, 1 patented, in Big Cottonwood district, adjoins the Cardiff and Howell on the west.

Development: several tunnels, longest 2,200′, driven to cut the Silver King & Garfield fissures, showing heavy mineralization. Samples said to assay 48% zinc, with lead, gold and silver values.

Equipment: includes compressor, drills and mine buildings. Operations resumed December, 1914, after an idleness of several years. Late in 1918, reported, following 2½′ of vein matter. Closed down December, 1918, but reopened May, 1919.

AMERICAN CONS. MINES CO. **UTAH**

Address: 3 Stock & Mining Exchange Bldg., Salt Lake City, Utah.

Officers: Geo. E. Hemphill, pres.-mgr.; J. D. Blue, Jr., v. p.; J. W. Storrs, sec.; C. M. Beck, treas.; with F. Hardinge, directors.

Inc. 1918. **Cap.**, $1,500,000; $1 par; outstanding, 1,400,000 shares; assessable. Assessment No. 3 called in October, 1919. Listed on Boston Curb.

Property: 22 claims, 400 acres in American Fork mining district, comprising the silver-lead properties of the Earl & Eagle Mng. Co., and Bog Mng. Co. The veins carry silver-copper ore, as well as silver-lead.

Development: mainly by tunnel with total workings of 4,000′. The Earl & Eagle tunnel was over 2,000′ long at last accounts. The Bog tunnel 600′ long has yielded some shipping ore in former years. Property is still a development proposition.

AMERICAN FORK EXPLORATION CO. **UTAH**

A merger of the Wild Dutchman M. & M. Co., and the Fissures Expl. Co.

Address: American Fork, Utah.

Officers: W. E. L. Dillaway, mng. dir. and treas.; J. E. Rothwell, W. B. Farmer, J. B. Hubbard and F. J. Justin, directors; Peter Miller, supt.

Inc. in Utah. **Cap.**, $300,000; $1 par. 150,000 issued. Listed on Boston Curb.

Property: company owns a lease on the Dutchman mine; also a lease on the Pacific mine of the Pacific Gold M. & M. Co.

Development: by upper and lower tunnel following the Pacific fissure and cross fissures. Estimated value of ore reserves is $1,000,000. Ore is high in lead and silver; while copper ore carrying gold is being developed.

Equipment: in Oct., 1917, a new 200-ton mill, costing $100,000, started treating dump ore. Houses were erected for staff and employees, also necessary shops, 300-ton concentrate bins, assay-office, etc.

Production: during the season of 1918, $89,881 was realized from crude ore and concentrate shipped.

AMERICAN MINING CO. **UTAH**

Office: 400 Ness Bldg., Salt Lake City, Utah.

Officers: A. A. Crome, 1st v. p. and gen. mgr.; Wm. Crome, sec.-treas.

Inc. 1896, in Utah. **Cap.**, $50,000; shares 10c par; assessable; all issued; 28 assessments levied to end of 1918. Annual meeting 3rd Monday in May.

Property: 10 patented claims, on Scott Hill, in Big Cottonwood district, 5 miles from a railroad. Ore occurs as sulphides in lime. Orebody is from 2″ to 2′ wide and average assays run from 5-18% copper, 10 oz. silver and $3.50 gold.

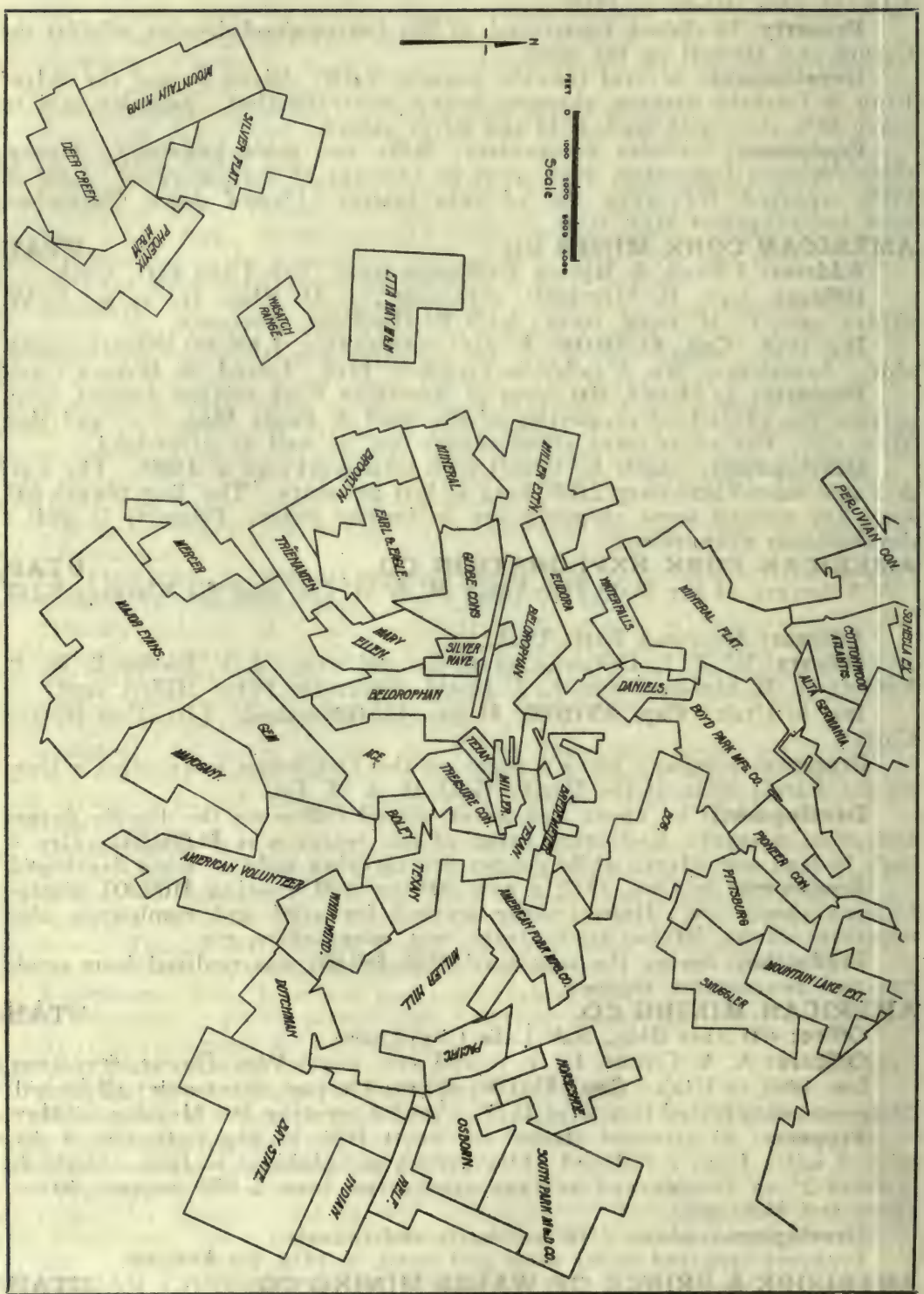
Development: about 2,000′ of shafts and tunnels.

Property reported under lease and bond, in 1918, for $100,000.

ANTELOPE & PRINCE OF WALES MINING CO. **UTAH**

Not incorporated. Controlled by Walker Bros., of Salt Lake City. **Cap.**, $1,250,000; shares $1 par; 400,000 shares held in treasury.

Property: 9 claims, patented, in the Alta-Cottonwood district, cover a mile of the Prince of Wales fissure, worked years ago to a depth of 900′,



PROPERTY MAP OF AMERICAN FORK DISTRICT, UTAH

and said to have produced $1,000,000 from one shoot alone, being the "bone of contention" in a celebrated lawsuit in the seventies.

Development: 930′ incline shaft and 600′ "Annie"' tunnel. In 1915 lessees continued the tunnel several hundred feet, cutting the vein 140′ below bottom of shaft. Vein where cut is said to have shown good ore containing silver chloride and galena. Company planned to continue the work of the lessees. No recent report.

ARGONAUT MINING & SMELTING CO. **UTAH**

Address: 310 Kearns Bldg., Salt Lake City, Utah.

Officers: Wm. Chipman, pres.; Hugo B. Anderson, v. p.; J. Tracey Wootton, sec.-treas.; J. H. Wootton, mgr., with John Hower, directors.

Inc. February, 1917, in Utah. **Cap.,** $50,000; shares 5 cts. par; assessable; 515,000 shares outstanding. Annual meeting, 2nd Tuesday in January.

Property: 7 claims, 140 acres, in American Fork canyon, claimed to carry a fissure vein of lead sulphide and iron carbonate, with a 4″ shoot of lead ore, assaying about $25. Developed by tunnel, 90′ long, to be extended 200′ at last report.

BANKERS MINES CO. **UTAH**

Offices: J. A. Maxfield, Maxfield Apts., Salt Lake City, Utah.

Officers: Noble Warrum, pres.; J. A. Maxfield, v. p.-sec.; A. D. Williams, treas., with M. B. Connell, B. Y. Golding and Aquilla Nebeker, directors.

Inc. November, 1916. **Cap.,** 1,000,000 shares; 10c par; 500,000 shares in treasury.

Property: 39 claims, about 780 acres, adjoins the Logger mine in Big Cottonwood Canyon, and is near the old Maxfield mine.

Development: by a tunnel which is expected to cut the Logger vein at 900′ in.

BAY STATE MNG. & DEV. CO. **UTAH**

Address: American Fork, Utah county, Utah.

Officers: Geo. B. Tyler, pres. and mgr.; J. H. Wootton, v. p.; J. W. Storrs, sec.-treas., with A. Chipman and E. J. Bennett, directors.

Cap., $1,000.000; shares 5c par; assessable; last assessment, No. 5, of ½c called June 14, 1917. Stock listed on Salt Lake Exchange. Prices range ½-1¼c in 1918; ¼-½c in 1919. Financial statement from April 26, 1917, to October 12, 1918, shows total receipts of $12,361; of which $392 was from ore sales, and $11,490 from assessments. Cash on hand, October 12, 1918, was $210.

Property: at American Fork canyon, 22 claims, unpatented, 18 miles from the railroad. Company claims to have 1,000 tons of ore on the dump averaging 5 to 8% lead and 8 to 10 oz. silver, and 210 tons of ore averaging $75 per ton.

Development: is by tunnel with about 1,200′ of workings.

BELOROPHON MINING CO. **UTAH**

Address: A. T. Sanford, Boston Bldg., Salt Lake City, Utah. Carl Ferlin, mgr., has a bond and lease on the property.

Cap., $100,000; shares 10c par par; 960,000 shares issued.

Property: 250 acres adjoining the Live Yankee group on the north in American Fork canyon, Utah. The Live Yankee and other veins are said to cross the claims.

Ore: occurs in fissures in quartzite and in contact between lime and quartzite, carrying gold, copper, silver and lead.

Development: by 800′ tunnel. A small mill was built in 1918, and ore shipments reported, August, 1919. The property is not operated in the winter months on account of the deep snow.

BIG COTTONWOOD COALITION MINES CO. **UTAH**

Officers: W. G. Romney, pres., 271 4th Ave., Salt Lake City; E. J. Jeremy, v. p.; C. E. Robertson, sec.-treas., 777 7th Ave., Salt Lake City; with R. Papworth, Jr., W. H. Hurd, W. C. Hurd, and H. J. McKean, directors.

Inc. in Utah. **Cap.**, $250,000; 25c par; approximately 700,000 shares issued; assessable; three one cent assessments called, last one, in March, 1919. Listed on Salt Lake City Exchange. Share prices 4-5c in 1919.

Property: 61 claims, in Big Cottonwood Canyon district, has been undergoing development in a quiet way for about 6 years. About $40,000 has been spent.

Development: 135′ incline shaft with 210′ of workings from which 50 tons of sorted silicious copper ore was shipped before work was stopped. Development is now concentrated on a lower tunnel, 2,450′ long in January, 1920, with the face at a vertical depth of 1,000′.

Equipment: includes compressor, drills, etc.

BIG COTTONWOOD CONSOLIDATED MINING CO. **UTAH**

Office: Boston Bldg., Salt Lake City, Utah.

Officers: J. F. Dunn, pres.; F. J. Fabian, v. p.; Thelma L. Tuttle, sec.-treas., with Judge Chas. C. Dey, J. E. Johnson and P. F. Keyser, directors.

Inc. Sept., 1909, in Utah. **Cap.**, $250,000; shares 25c par; assessable: 1,000,000 shares issued; listed Salt Lake Exchange. Shares 1-3c in 1918; ½ to 2¼c in 1919. Annual meeting, 1st Monday in October. One cent levied February, 1919.

Statement for year ended October 1, 1918, shows total expenditures of $9,720. Cash on hand amounted to $2,868.

Property: 11 claims in South Fork, Big Cottonwood district, carry auriferous and argentiferous lead and copper ore. Driving the Victor cross-cut tunnel to cut fissure veins in lime and quartzite. Total workings, 2,233′, to October 1, 1918. No ore reserves developed as yet. Property is a prospect.

BIG COTTONWOOD COPPER & GOLD MINING CO. **UTAH**

Mail returned, 1919, from former mine office at Brighton, Salt Lake county, Utah.

Officers: Col. Nicholas Treweek, pres. and gen, mgr.; W. Mont Ferry, v. p., 164 E. St., Salt Lake City; J. Leonard Burch, sec.-treas., with J. E. Galligher and John S. Bransford, directors, at last accounts.

Inc. in Utah. **Cap.**, $1,500,000, increased 1906 to $3,750,000; $5 par. Is operated as a close corporation.

Property: 140 acres, adjoining the Mountain Lake Consolidated Mining Co., on the southeast, and carrying same ore zone, near the head of Big Cottonwood canyon, and also in the Snake Creek district.

Development: by a shaft, showing ore assaying up to 8% copper, with small gold and silver values, and a long tunnel with about 2,000′ of workings. Mine apparently has considerable bodies of sulphide ore, averaging about 5% copper and $2 per ton in combined gold and silver values.

BIG KING MINING CO. **UTAH**

Office: 519 Newhouse Bldg., Salt Lake City, Utah.

Officers: S. A. Parry, pres.; H. B. Cole, v. p.; H. H. Harris, sec.-treas., with B. P. Critchlow and G. R. Halstead, directors.

Inc. June, 1916, in Utah. **Cap.**, 600,000 shares; 25c par; 240,000 shares in treasury, August, 1917. Stock listed on Salt Lake Exchange, but trading suspended, February, 1917, by the listing committee.

Property: 24 claims, 480 acres, in Big Cottonwood Canyon, reported to show 3 well-defined fissure veins, carrying copper, silver and iron manganese ore. A prospect.

BOG MINING CO. **UTAH**

Described in Vol. XIII. Consolidated, 1918, with the Earl & Eagle Mng. Co., to form the American Cons. Mines Co., which see.

BOLEY MINING CO. **UTAH**

Office: Newhouse Bldg., Salt Lake City, Utah.

Officers: E. G. Jensen, pres.; J. A. Stallings, treas.; Chas. Read, v. p.; J. H. Woodmansee and J. C. Jensen, directors. Arnold Herlin, sec.

Cap., 1,000,000 shares.

Property: 7 claims, in American Fork mining district, adjoining the

Texan, Whirlwind and Miller Hill properties. Mine is to be developed at a depth of 1,000′ by the Texan Mining Co.'s 1,300′ tunnel. Is a prospect.

BOSTON DEVELOPMENT CO. **UTAH**

Office: 502 Boyd Park Bldg., Salt Lake City, Utah.

Officers: F. H. Vahrenkamp, pres. and gen. mgr.; Thos. Austin, v. p.; Richard Winder, treas., with S. S. Stillman and B. F. Fitzgerald, directors; R. B. Garff, sec.; A. Boulais, supt.

Cap., $500,000; shares $1 par; assessable.

Property: the old Maxfield mine on N. side of canyon, in Big Cottonwood district, 3 miles north of the Cardiff mine, taken over on a $250,000 bond and lease, 1914. The Maxfield mine, discovered in 1872, is one of Utah's well-known early day mines, and is credited with a production of over a million dollars in gold, silver, copper and lead. The present management is said to have spent $70,000 in 1915, in unwatering and equipping the mine.

Ore: above the water level is silver-lead carbonate; below, it is galena, containing gold, silver and copper. Orebodies vary in width from 6″ to 24′.

Development: mainly by tunnels. The mine is about worked out above the main tunnel, which was driven north and west, a total of 4,000′. New management planned systematic development work including the sinking of the 1,900′ incline shaft.

Equipment: includes 2 air compressors, pumps and electric power.

Production: shipped steadily in 1916. Ore from 1,800′ level averaged $50 a ton. In 1917 ore was mined from a 20′ shoot, 700 tons of $65 ore being shipped.

BRANBORG MINING CO. **UTAH**

Idle. **Office:** Judge Bldg., Salt Lake City, Utah.

Officers: J. C. Barnard, pres.; D. C. Dart, v. p.; L. R. Waldrop, sec.; J. W. McKinney, F. W. Price, directors.

Inc. April, 1915. **Cap.,** 500,000 shares; 10c par.

Property: 11 claims, 220 acres, located at Big Cottonwood. A prospect.

CANTON MINING CO. **UTAH**

Probably dead. Owns the Canton group of claims in Alta Big Cottonwood district.

Incorporators: W. W. Armstrong, pres. of Nat'l Copper Bank, Salt Lake City; James Farrell and Duncan MacVichie.

Property: the Canton group, 500 acres, adjoining the Cardiff, Wasatch, Crown Prince and Frederick Mines.

Development: tunnel work aggregates about 3,000′. Reported to have produced considerable tonnage of ore running from 100 to 250 oz. of silver.

CARBONATE CONSOLIDATED MINES **UTAH**

Address: Woolley Brothers, brokers, Newhouse Bldg., Salt Lake City.

Officers: Leo Neilson, pres.; D. A. West, sec.-treas.

Inc. in Utah. **Cap.,** $1,000,000; $1 par; 600,000 issued. Listed on Salt Lake Exchange, but no quotations given.

Property: 19 claims in Big Cottonwood district. Surface workings said to have yielded $1,250,000 years ago. According to report all litigation has been settled, and development work will be started when funds are on hand.

CARDIFF MINING & MILLING CO. **UTAH**

Office: 1105 Newhouse Bldg., Salt Lake City. **Mine office:** Alta, Utah.

Officers: Ezra Thompson, pres.-gen. mgr.; Lynn H. Thompson, v. p.; J. D. Murdoch, sec.-treas.; with F. W. Price and T. A. Reamer, directors. M. J. Dailey, supt.

Inc. 1906, in Utah. **Cap.,** $500,000; $1 par; assessable; all issued. Last assessment of 1c per share delinquent June 1, 1914. Listed on Salt Lake Exchange. Shares $1.95 to $5.10 in 1918; $1.50 to $2.95 in 1919.

Revenue in 1919 was $240,697, and expenses were $125,806.

Dividends: initial of 25c Oct. 15, 1915; 25c June 1, Sept. 1, and Dec. 1, 1916; 25c Aug. 1, 1917; 20c Oct. 1, 1918; 15c Dec. 24, 1919; total $1.60 per share, or $800,000.

Property: 14 claims, partly patented, 18 miles from railway, in the Alta Cottonwood district, 6 miles from Salt Lake City, includes the Mountain Chief group, N. W. of the Columbus Rexall.

The Cardiff is now one of the richest silver-lead mines of Utah. After being idle for years, a new prospecting tunnel was started in 1914. This tunnel cut a bedded orebody, averaging 10′ thick, on a limestone-quartzite contact, at a point where it was intersected by a fissure vein. The orebody was opened for a length of 235′ and for 795′ on its dip (22°) developing 250,000 tons of $30 ore. New orebodies on the same contact, were cut at intersections of other fissures. One orebody found 800′ S. of the main working winze is 5 to 9′ wide and is continuous for over 200′ along its strike.

Development: by main haulage tunnel, and an 1,180′ inclined shaft, which follows the ore down along the limestone bedding plane. A new 235′ shaft in quartzite hanging wall, has recently been completed. Ore reserves of 200,000 tons of $30 ore were blocked out January, 1917. Present reserves estimated to be large enough for an output of 100 tons daily for 3 years.

Equipment: includes compressor, drills, electric power, dwellings, machine and blacksmith shop.

Production: amounts to 125 tons daily of $45 to $50 ore during the summer months, but is only 30 to 40 tons when the winter snows cover the ground.

Output in 1919 was 6,520 tons of ore yielding 102,043 oz. silver, 3,111,000 lb. lead, 106,982 lb. copper, and 952,917 lb. zinc.

COLUMBUS EXTENSION MINING CO. UTAH

Consolidated with Rexall Silver & Copper Co. to form the Columbus-Rexall Con. Mines Co., which see.

Described Vol. XII.

COLUMBUS-REXALL CONS. MINES CO. UTAH

Is a consolidation of the Columbus Extension and Rexall Silver and Copper Mng. Co., described in Vol. XII.

Office: 309 Kearns Bldg., Salt Lake City, Utah. **Mine office:** Alta, Utah.

Officers: L. Greene, pres.; M. R. Evans, v. p.-mgr.; F. B. Cook, sec.; S. A. Whitney, treas., with H. W. Lane, Fred A. Price and John Gallacher, directors. C. M. Evans, supt.

Inc. July 15, 1915, in Utah. **Cap.**, $600,000; $1 par; 586,234 shares issued; assessable. Columbia Trust Co., N. Y., registrar and transfer agts. Annual meeting, 1st Monday in June. Listed on Salt Lake City Exchange. Shares jumped from 13c in July to $2 in September, 1917. Prices in 1918 were $1.05 high, 25c low. In 1919, 45c high, 23½c low. An initial dividend of 2½c a share was paid December 30, 1918.

Property: 14 patented claims, 12 acres, in the Little Cottonwood district. Ore is copper with some galena.

Development: by 5,500′ tunnel with total workings of 13,000′. An orebody was cut in July, 1917, at a point 5,000′ from the tunnel portal at depth of 1,350′; the ore occurs in limestone, near the quartzite contact. This orebody yielded 1,900 tons of ore, assaying 13.9% copper, 3.8% zinc, 0.37 oz. gold, and 32.9 oz. silver per ton. Late in 1919 a drift from the main tunnel cut ore at 75′, and passed through 16′ of high-grade ore. A raise above the 800′ level in December, 1919, showed 6′ of 41 oz. silver and 19% lead ore. A connection was being made with the Cardiff, early in 1920.

Equipment: includes tramway and motors.

Production: shipments to April 21, 1919, totaled 7,223 tons of first-class ore with net smelter returns of $233,402, and 861 tons of second class ore with net smelter returns of $7,793. Ore is treated by the Murray smelter. Lack of transportation facilities has kept down shipments. Early in 1920, company shipped over $40,000 worth of ore.

The total output in 1919 was 1,337 tons of ore, 7,842 oz. silver, and 148,950 lb. copper, worth $39,688 gross.

COTTONWOOD ATLANTIS MINING CO. **UTAH**

Office: 420 Vermont Bldg., Salt Lake City, Utah. **Mine office:** Alta, Utah.

Officers: Samuel Neff, pres.; R. O. Dobbs, v. p.-gen. mgr.; J. H. Moss, sec.-treas.; with Geo. F. Busch and R. C. Middlewood, directors.

Inc. July, 1915, in Utah. **Cap.,** $100,000; 10c par value; 900,000 shares issued.

Transfer office: 420 Vermont Bldg., Salt Lake City. Annual meeting in May.

Property: 6 claims, 50 acres, in the Little Cottonwood district. Ore which carries lead, silver, gold and copper occurs in shoots at the intersection of two orebearing fissures with a thrust fault contact having a limestone foot wall and a quartzite hanging wall. This contact courses South 15° East and dips 25°. The developed portion of the Atlantis property was sold to the Louise Mining Co. in November, 1917.

It is the plan of the company to crosscut to the thrust contact as has been done at the Cardiff mine two miles north.

COTTONWOOD KING MINING CO. **UTAH**

Office: 502 Boyd Park Bldg., Salt Lake City, Utah.

Officers: A. Anderson, pres.; A. L. Thomas, Jr., v. p.; H. H. Harris, sec-treas., with H. P. Hucy, G. H. Webb, C. R. Halstead and J. W. McLaughlin, directors. A. B. Gattrell, mgr.

Inc. July 2, 1915. **Cap.,** $150,000; shares 10c par; 150,000 shares in treasury. Assessment No. 5, ¼ per share levied August, 1918. Listed on Salt Lake Exchange.

Property: 28 claims, 560 acres, and a bond and lease on the Giles property of 31 claims, located between Big Cottonwood and Park City, Utah. Bond calls for $600,000, with no payments due for 2 years.

All the property of the Big King Mining Co., bought, 1917, by exchange of stock share for share, property 52 claims, 1,040 acres, adjacent to Cottonwood King ground.

Development: 2,100′ of tunnels and 187′ shaft with 500′ of workings. Management states that on account of faults, 600′ of development done in 1916-17 proved disappointing. In 1918 the Sunnyside tunnel was advanced 100′. Work was resumed in May, 1919. Property is still in a prospective state. It adjoins the Daly Judge and Silver King Coalition of Park City.

COTTONWOOD METAL MINING CO. **UTAH**

Office: 503 Utah Savings and Trust Co. Bldg., Salt Lake City, Utah.

Officers: W. M. Ferry, pres.; E. E. Watrous, v. p.; S. J. Truman, sec.-treas., with E. P. Watrous, and H. R. Watrous, directors.

Inc. in Utah. **Cap.,** $100,000; 10c par; 205,000 shares paid for property and organization expenses. The balance is to provide funds for development work. Listed on Salt Lake Exchange. Shares sold 1-3½c in 1918; 6c in 1919.

Property: 38 full claims, 760 acres, known as the Watrous group, in the Big Cottonwood district, said to be crossed by six large fissures which cut the series of sandstone, shale, quartzite and limestone. These fissures run N. 35°-40° E., dip 60° to the N. W., and are cut by E. and W. fissures. Orebodies are found at these intersections especially in the soluble white lime. The deposits of the district are bedded deposits by replacement.

Development: by 1,070′ tunnel that has cut 3 fissures. It is the plan of the company to continue the tunnel to cut all the fissures. The Silver King fissure is expected within 500′.

Equipment: 4-drill compresor, blacksmith shop, and houses.

Management frankly states that property is a prospect, and that they will spend the money in honest development. Prof. J. H. Webber of Salt Lake City says that there is much first-class territory to prospect.

DAYS FORK MINING CO. **UTAH**

Office: 608 Boston Bldg., Salt Lake City, Utah.

Officers: Henry Harker, pres.; M. T. Ellison, v. p.-mgr.; E. O. Lee, sec.-treas., with H. E. Booth and B. H. Cannon, directors.

Inc. April, 1911, in Utah. **Cap.,** $60,000; 10c par; 475,000 shares outstanding.

Property: 5 claims, 85 acres, in Big Cottonwood mining district, said to show gold, silver, and copper ore in fissure veins. **Development:** about 1,000′ of tunneling. Is a prospect.

EARL & EAGLE MINING CO. **UTAH**

Described in Vol. XIII. merged with American Cons. Mines Co., which see.

EAST HECLA MINING CO. **UTAH**

Office: 1119 Boston Bldg., Salt Lake City, Utah. **Mine office:** Alta, Utah.

Officers: J. B. Taylor, pres.-gen. mgr.; E. J. Broberg, v. p.; W. Hansen, Jr., sec.-treas.; D. J. Cook, supt.

Inc. in 1916, in Utah. **Cap.,** 1,000,000 shares; 10c par.

Property: a group of claims at Alta, adjoining the South Hecla mine, said to show a prominent outcropping vein and about 3′ of ore in a shaft sunk on it. Ore carries copper, lead, silver and gold values.

Development: a tunnel, 250′ long, being driven to cut the downward extension of the vein beneath a 75′ shaft, that shows copper ore.

Management doing exploration work at last accounts.

EMMA CONSOLIDATED MINING CO. **UTAH**

Dead.

Former officers: G. G. Rice, pres.; Wm. Barret Ridgely, v. p.-treas.; Judge H. D. Rummel, 2d v. p.; I. H. Weinberg, sec.; J. J. Beeson, gen. mgr.

Inc. 1917, in Delaware. **Cap.,** $3,000,000; $1 par; 2,668,693 issued. Was the holding company, owning more than 98% of the outstanding capitalization of Emma Copper Co. and over 80% of Old Emma Mines Co. Also bought the lease on Old Emma Mines Co. ground from the Old Emma Leasing Co. (now dissolved), which ran until September, 1917.

Emma Copper Co.

Controlled through ownership of over 98% of outstanding capitalization by the Emma Cons. Mng. Co.

In 1918 the company after shipping a few hundred tons of ore went into the hands of a receiver, and in 1919, the Emma Silver Mines Co. was formed as a reorganization of the Emma companies, assuming their debts and assets.

EMMA SILVER MINES CO. **UTAH**

Mine address: Alta, Salt Lake county, Utah.

Officers: C. S. Burton, pres.; John Dern, v. p., Salt Lake City; Frank B. Cook, sec.-treas.; with J. E. Galligher, John M. Hayes, and A. L. Hoppaugh, directors. Geo. H. Dern, mgr., Jas. Quirk, supt.

Inc. 1919, in Utah. **Cap.,** $5,000,000; $1 par. Listed on Salt Lake Exchange.

Company is the offspring of Emma Cons., Old Emma Mines Co. and the Emma Copper Co., which were controlled by Emma Cons. In 1918 Emma Cons., which had been fostered by George Graham Rice, went into the hands of a receiver and one of the results was the formation of the Emma Silver Mines Co. Shareholders in the Old Emma companies were given the "privilege" of exchanging one share of old stock for three of new on payment of 10c. a share on the old stock or one share of new for one of the old with no assessment; receiving 20c a share cash for each of the old. Some of the shareholders of Emma Cons. had paid as high as $3.75 a share for this stock in 1916; it afterwards fell to a few cents per share.

The new company after paying all debts of the old company is said to have started business with $100,000 and 1,000,000 shares of stock in the treasury and no debts. As there are many who still have faith in the unexplored part of the property, it is hoped that the new management will bring this old and much abused mine into the productive class.

Property: included 11 claims in Little Cottonwood district and the adjoining Vallejo and Joab Lawrence groups, bought 1915 in exchange for 352,000 shares of stock. The company had a lease on the Emma mine owned by the Old Emma Mines Co., which see.

History: the Old Emma mine was a famous early-day producer, having shipped over $6,000,000 worth of lead-silver ore in the 60's and 70's, from above the 300′ level. It was sold to the Emma Silver Mng. Co., for $5,000,000 and soon afterwards the orebodies appeared worked out, or cut off by a fault. After vain attempts to find the orebodies below the fault, the mine lay idle until 1915.

Chas. S. Herzig made a geological study of the property with the deduction that it contained a faulted portion of the Old Emma bonanza orebody, whereupon diamond drilling was started. Under direction of J. J. Beeson, geologist, the Emma vein was located, 1916, at about 250′ below where it had been cut off by the fault, and the displaced segment of the orebody opened up.

Development: by 1,700′ tunnel, 400′ shaft and drifts on several levels.

Management diamond drilled in 1917, in the hopes of locating the downward extensions of 4 other orebodies, all presumably cut off by the Montezuma fault. In November a mineralized zone 50′ wide was passed through, assaying a few ounces of silver.

Early in 1920, a winze from the bottom level opened 5′ of ore assaying 40% lead and 180 oz. silver per ton. Shipments were begun shortly thereafter.

Production: from Jan. to Nov., 1917, 8,400 tons were shipped with average net returns of $30 a ton.

ETTA MAY MINING CO. **UTAH**

Address: Frank Jardine, mgr., American Fork, Utah.

Officers: B. H. Neilson, pres., Frank Jardine, v. p. and mgr.; Milas Johnson, sec.-treas., with Nelson Miller and T. E. Tullis, directors.

Stock assessable; assessment of ½c per share levied in 1918.

Property: in American Fork district, said to show lead-silver ore, with some copper. Developed by a 250′ tunnel.

FISSURES EXPLORATION CO. **UTAH**

Company no longer in existence. Entire stock issue owned by American Fork Exploration Co., which see.

FREE COINAGE MINING & MILLING CO. **UTAH**

Letters neither answered nor returned from office: 69 Commercial Bldg., Salt Lake City, Utah. Mine near Alta, Salt Lake Co., Utah. L. A. Evans, pres.; D. H. Wenger, sec.-treas.

Inc. 1896, in Utah. **Cap.,** $125,000; shares 25c par; assessable, with 2 assessments levied.

Property: 4 claims, 3 patented, in Little Cottonwood canyon, 2 miles from a railroad, developed by shaft and tunnels, showing lead and copper ores.

GLENWOOD MINING CO. **UTAH**

Office: 1102 West Seventh South St., Salt Lake City, Utah.

Officers: E. P. Mowers, pres. and gen. mgr.; N. W. Sonnedecker, v. p.; M. L. Grovenor, sec.-treas.

Inc. Feb. 21, 1901, in Utah. **Cap.,** $30,000; shares 10c par; assessable; increased 1912, to $125,000, shares 25 cts. par.

Property: 8 claims, patented, in Big Cottonwood district, 6 miles from a railroad, opened by shafts and tunnels, with about 1,600′ of workings. No recent information.

GLOBE CONS. MINING CO. **UTAH**

John Cleghorn, pres.-gen. mgr., Boston Bldg., Salt Lake City, Utah.

Property: located in American Fork Canyon, said to show limestone cut by fissure veins with lead-silver ore.

Developed: by tunnels—main tunnel had a length of 800′ early in June, 1919. Management claims to have a good tonnage of milling ore.

GOLD HILL MINES DEVELOPMENT CO. **UTAH**

Main office: 425 Atlas Block, Salt Lake City, Utah. **Mine office:** American Fork, Utah.

Officers: Theo. Nicholes, pres. and gen. mgr.; A. J. Weber, v. p.; H. J. Fitzgerald, sec.-treas.

Inc. July, 1916. **Cap.,** $1,000,000; par $1; 300,000 in treasury; 290,000 sold. Increased 1916 from $50,000; 10c par; assessable.

Property: 9 claims in American Fork district, Utah county, on Miller Hill. Ledge said to show copper ore, with lead, gold and silver.

Development: by 3 short tunnels, lowest driven to open ore found in upper tunnel.

GRATER CONS. MINES CO. **UTAH**

Address: 201 Ness Bldg., Salt Lake City, Utah.

Officers: J. A. Maxfield, pres.; C. F. Johnson, v. p.; B. D. Field, sec.-treas.; with Geo. W. Robbins, and Peter Crystal, directors.

Inc. Feb., 1919, in Utah. **Cap.,** $1,500,000; $1 par; outstanding, 120,500 shares.

Property: 76 claims in Big Cottonwood Canyon. Company has an ambitious scheme of driving a 5-mile tunnel to cut several fissures; the tunnel would pass under the Maxfield, Dolly Varden, Kennebec, Flagstaff, Prince of Wales, Woodlawn, and other mines.

The project may have merit, but the advertising matter sent out may prove misleading to the uninitiated.

GREAT COPPER KING MINING CO. **UTAH**

Inc. Aug., 1904, in Utah. **Cap.,** $50,000; shares 10c par; issued, $47,500, assessable; last assessment 1/10 ct. delinquent March 7, 1914.

Property: 10 claims, unpatented, including 4 claims, 1 fractional, held under bond and lease, near the mouth of Little Cottonwood canyon, 7 miles from Alta.

Development: by shallow shafts and a 330′ tunnel, with about 800′ of workings, showing auriferous and argentiferous copper and lead ores. Ore occurs in fissure veins as contact deposit in granite and quartzite.

Samples taken from main tunnel on 300′ level said to assay from 19-33% copper. J. E. Smith, a director, was developing property under contract in 1916. No later information.

GREAT WESTERN GOLD & COPPER CO. **UTAH**

Merged with Mountain Lake Mining Co. and Thor Mining Co. under title of Great Western Mines Co., which see.

GREAT WESTERN MINES CO. **UTAH**

Office: Knight Bldg., Provo, Utah.

Officers: Jesse Knight, pres.; J. W. Knight, v. p.; W. L. Mangum, sec.-treas., with Jas. H. Moyle, W. I. Snyder, R. A. Brighton and K. S. Jordan, directors.

Inc. 1916, in Utah. **Cap.,** $150,000; 10c par; outstanding 1,270,000 shares. Listed on Salt Lake City Exchange. Company is a merger of the Great Western Gold & Silver Co., Mountain Lake Mining Co., and the Thor Mining Co., all described in Vol. XI, Copper Handbook.

Property: 98 claims, in the Big Cottonwood and Snake Creek districts, in Salt Lake and Wasatch counties.

Ore: gold, silver, copper and lead, mainly in contact deposits; no estimate of ore in sight.

Development: 500′ of shafts, 8,500′ of tunnels, 350′ winzes and raises, and 2,000′ of crosscuts. Ten cars of copper ore said to have been shipped from the property. Company has a transportation agreement with the Snake

Creek Mining & Tunnel Co., a subsidiary of the Judge Mining & Smelting Co., for use of the 14,000′ tunnel.

HOWELL MINING CO. **UTAH**

Office: 209 Felt Bldg., Salt Lake City, Utah.

Officers: T. L. Walden, pres.-mgr.; M. J. McGill, v. p.; J. H. Deming, sec.-treas.; with J. M. Howell and T. H. Paull, directors.

Inc. in 1910. **Cap.**, $600,000; shares, $1 par; 555,000 shares outstanding; assessable. Assessment No. 6, 1c a share payable, August, 1919, and No. 7, 1c a share, payable November, 1919. $1,250 in treasury, June 20, 1919. Shares sold 3½-17c in 1918; 7-12½, in 1919 **Listed on Salt Lake Exchange.**

Property: an old mine, formerly known as the Baby McKee, 7 patented claims, in the Alta-Cottonwood district, about 25 miles S. E. of Salt Lake City, adjoins the Cardiff property on the east. Claims cover strike of Howell vein, said to be traceable on property for over a mile, with strike N. E.-S. W. and 4′ width. Country rock is quartzite and limestone. **Ore:** silver, copper, lead, zinc and antimony, said to average $20 to $50 per ton.

Development: 150′ of shafts, and over 1,800′ of tunnels. The main tunnel is in over 1,400′. Shipments were made prior to 1910. Development work only is being done: several small fissures have been cut.

IOWA COPPER MINING CO. **UTAH**

Address: Park City, Utah.

Officers: L. R. Perry, pres., Forrest City, Iowa; D. G. Scott, v. p.-gen. mgr.; R. T. Kimball, sec.-treas., with J. Carson and D. E. King, directors. Dave Scott, supt.

Cap., $100,000; 10c par; 750,000 issued; assessable; last assessment, 1c per share, levied May, 1919. Ore sold, 1917, was valued at $5,740, and in 1918, at $2,277.

Property: 4 patented claims, and 2 unpatented claims, 180 acres, in Big Cottonwood district, 1,000′ N. W. of Silver King Coalition.

Development: by tunnel, with 200′ incline in ore and several hundred feet of workings, mainly along a limestone quartzite contact.

In 1917 a compressor and other mining machinery was installed. Several shipments were made, yielding as high as $900 per carload. Company is working only 3 or 4 men, and shipped 125 tons in 1919. Reported November, 1919, that during the past year, $2,500 had been spent on new equipment, and 550′ of new work done.

JULIAN MINING & MILLING CO. **UTAH**

Dead. Described Vol. XIII. Formerly operated at American Fork.

KENNEBEC CONSOLIDATED MINING CO. **UTAH**

Address: 1105 Newhouse Bldg., Salt Lake City, Utah.

Officers: Ezra Thompson, pres.; Jas. D. Murdoch, sec., with A. T. Sanford, Shand Smith and P. S. Keogh, directors.

Inc. in 1901. **Cap.**, $400,000; shares 1c par; 63,390 shares in treasury.

On the basis of 3c per share on their holdings, shareholders subscribed to a loan bearing 8% in June, 1917.

Property: 30 patented claims, about 400 acres, in the South Fork of the Big Cottonwood district, adjoins the Cardiff on the east and west and the Wasatch Mines and Columbus Rexall on the south.

Development: by a 700′ incline shaft, a 3,000′ lower tunnel and an upper tunnel.

Property is an old-time, but very small silver-lead producer. Inactive for some time, but in June, 1919, company levied an assessment of 3c per share to provide money for resumption of work.

KENNEBEC MINING CO. **UTAH**

Company reorganized in October, 1917, under name of Kennebec Consolidated, which see.

LAST CHANCE MINING CO. **UTAH**

Address: Newhouse Bldg., Salt Lake City, Utah.

Officers: Jas. A. Hauerbach, pres.; F. O. Horn, sec.-treas.

Cap., $25,000; 10c each; assessable; 200,000 shares issued. Company is reported out of debt and amply financed.

Property: 1 patented claim adjoining the Cardiff, in the Big Cottonwood district, near Alta.

Development: 400′ tunnel and 150′ winze. Ore is said to assay 60-70% lead, and 50-75 oz. silver. Employs 3-4 men steadily on development. Management hopes to enter shipping list in 1920.

LOGGER MINING CO. **UTAH**

Officers: R. D. Maxfield, pres.-mgr.; Jas. Marlow, v. p.; D. J. Bloem, sec.-treas., with J. M. Hamilton, and Henry Erickson, directors.

Inc. July, 1915. **Cap.**, 1,000,000 shares; 1c each. Stock listed on Salt Lake Exchange. Quoted 1¾-2c in 1919.

Property: the Logger mine in Big Cottonwood canyon, adjoining the Maxfield mine, shows a 1′ fissure vein, developed by a 475′ adit, a winze sunk on the vein from the 200′ point and a crosscut at 350′ from portal, exposing ore. Assays said to return $16.47 gold, 13.4 oz. silver and 11% copper.

A lower tunnel was started 100′ below upper tunnel, 1916, and is reported to have cut the vein seen above with several other small veins of ore, assaying from $50-$240 per ton in copper, gold and silver. Development work was resumed in 1919.

LOUISE MINING CO. **UTAH**

Address: 420 Vermont Bldg., Salt Lake City. **Mine address:** Alta, Utah.

Officers: Samuel Neff, pres.; R. O. Dobbs, v. p.-sec. and gen. mgr.; David Neff, treas.; with J. H. Moss, G. F. Busch and R. C. Middlewood, directors.

Inc. Nov. 16, 1917, in Utah. **Cap.**, $100,000; 10c par; assessable; outstanding, 501,600 shares.

Property: 7 patented claims, 70 acres, in the Little Cottonwood mining district at Alta, said to show silver-lead ore with some copper and gold.

Development: by three tunnels, 800′, 450′, and 250′ in length with total workings of 2,500′.

Management plans to thoroughly develop the property.

MAJOR EVANS MINING CO. **UTAH**

Mail returned, 1918, from former address, 440 Boston Bldg., Salt Lake City, Utah. C. B. Felt, pres.; R. Leo Bird, sec.

Inc. 1915, in Utah. **Cap.**, $100,000; 10c par; assessable; treasury, 440,000 shares. Listed in Salt Lake City.

Property: 42 claims in American Fork mining district, said to show copper-lead-silver ore. Is a prospect. Probably idle.

MARY ELLEN MINING & MILLING CO. **UTAH**

Address: American Fork, Utah.

Officers: W. C. Boley, pres.; T. S. Priday, v. p.; J. W. Storrs, sec.-treas.; with R. C. Boley and T. M. Allman, directors.

Inc. 1909, in Utah. **Cap.**, $100,000; 10c par; assessable; 650,000 issued.

Property: 7 claims, 125 acres, in American Fork district, Utah, said to show a vein in quartzite and limestone. **Ore:** is partly sulphide, and contains lead, silver, and gold.

Development: by tunnels totaling 700′. Idle for 3 years, but work resumed in 1917. No report since.

MAXFIELD MINE **UTAH**

Operated by Boston Development Co.

MICHIGAN-UTAH CONSOLIDATED MINES CO. **UTAH**

Office: 411 Felt Bldg., Salt Lake City, Utah. **Mine office:** Alta, Salt Lake county, Utah.

Officers: Norman W. Haire, pres. and gen. mgr.; H. R. MacMillan, v. p.; N. A. Robertson, sec.; L. H. Farnsworth, treas.; with Frank B. Cook, C. A. Gillette, and W. J. Halloran, directors. R. R. Van Valkenburgh, supt.

Inc. April 26, 1915, in Utah, as a reorganization of the Michigan-Utah

Mining Co. **Cap.**, 1,500,000 shares; 25c par; assessable; assessment, 2½c a share, called November, 1919; 1,328,255 shares issued. Listed on Salt Lake Exchange. Sales, 9-23c in 1918; 8-15c in 1919. Columbia Trust Co., registrar. Annual meeting, 2nd Monday in February.

Gross earnings in 1917 were $226,408; all from ore sales.

Property: 72 claims, 42 patented, 1,200 acres, including a millsite, in the Big and Little Cottonwood mining districts. Claims show Paleozoic sediments cut by granite, the ore occurring in fissure veins in limestone, and as contact metamorphic deposits between limestone and granite, having a general strike of N. 65° E., and a dip of 32°. There are 5 distinct and parallel veins showing average widths of 2½′ and traceable 5,000′, reported to carry copper, lead, zinc, silver and gold values, averaging $25 per ton. Ores are carbonates at and near surface, succeeded below by sulphides.

Development: principally by tunnels, all workings being in the oxide and carbonate zones, but sulphides are proven to occur in depth by workings of the Columbus Consolidated Mining Co., near by. Total underground openings aggregate over 50,000′, about one-half being tunnels, drifts and crosscuts that are all in ore, raises and winzes aggregating 10,500′ additional. Ore is transported by aerial tramway to Tanners flat, 5 miles from the mine, thence by narrow-gauge railway to Wasatch, where connection is made with the Salt Lake & Alta standard gauge road which runs to the Midvale smelter. The tram has a maximum capacity of 200 tons daily.

The Copper Prince tunnel has been driven under property about 2,000′, exposing several large orebodies.

Equipment: includes two 90-h. p. hoists, and everything necessary for mining 150 tons daily. Air is supplied by the Wasatch Power Co. from Little Cottonwood creek.

Buildings include machine shop, carpenter shop, several dwellings and a smithy, located underground as a measure of protection from snowslides, which are of frequent occurrence in this region.

Production:

Year	Gold Oz.	Silver Oz.	Copper Lb.	Lead Lb.	Receipts Net
1915	67	43,146	99,066	515,296	$29,901
1916	154	90,816	364,685	916,851	130,342
1917	227	148,318	384,906	1,865,379	244,125

The mine was worked continuously throughout 1918, and in July, 1919, production was about one car of ore daily, the company, like many others, being short of miners.

Part of the property was operated under lease by the Triangle Mng. Co., a close corporation, which see.

MILLER MINES DEVELOPMENT CO. UTAH

Office: 804 Newhouse Bldg., Salt Lake City, Utah.

Officers: J. H. Leavell, pres.; G. H. Ryan, v. p.; H. W. Ragland, sec.-treas.; with M. P. Kirk, and L. D. Foreman, directors. J. C. Fitzgerald, supt.

Inc. in Utah. **Cap.**, $1,000,000; 10c par; 543,500 issued.

Property: Miller mine, 11 claims, 10 patented, 70 acres, at Miller Hill, in American Fork district, operated under 5 years' lease and bond from M. Mng. & Sm. Co.

Geology: replacement deposit in upper Cambrian limestone. Orebody said to be 600′ long and of good width. Ore carries lead and zinc carbonates, and is reported to assay 0.73 oz. gold, 20.7 oz. silver, 43.95% lead, 17.2% iron, and 6.1% zinc.

Development: by tunnels 300 to 1,200′ long to depth of 400′ with total underground workings of about 15,000′. No recent report.

MILLER MINING & SMELTING CO. **UTAH**

Office: 406 Dooly Block, Salt Lake City, Utah. W. A. Wilson, gen. mgr.

Property: in American Fork canyon, under lease and bond to Miller Mines Dev. Co. q. v.

MINERAL FLAT EXTENSION MINING & MILLING CO. **UTAH**

Name changed to Alta Superior Mining & Milling Co., which see.

MINERAL FLAT MINING CO. **UTAH**

Fully described in Volume XIII. Consolidated with Albion Cons. Mining Co., which see.

MONARCH MINES CO. **UTAH**

Title changed from Plentiful M. & M. Co., 1916.

Address: American Fork, Utah.

Officers: Chas. Ohran, pres.; F. W. Wright, v. p., with W. A. McBride, E. J. Seastrand, and J. A. Kauffman, directors. J. Watt Storrs, sec.-treas.

Inc. June, 1915, in Utah. **Cap.,** $30,000, increased March, 1916, to $40,000; increased November, 1917, to $62,500; shares 5c par; 600,000 issued; assessable.

Property: 9 claims, 186 acres, near American Fork, Tooele county, in Lakeside mountains, shows galena and carbonate ore in fissure vein cutting blue and gray limestone, with N.-S. strike and dip of 70° W. Pay ore reported to have been cut in 1916, at 140′ depth in a 40′ vein of lead carbonates. A 2½′ streak is said to assay 78% lead and 10 oz. silver.

Development: by 3 incline shafts, deepest 193′. **Ore reserves:** 100,000 tons estimated as blocked out.

Equipment: includes 2 motor trucks. Company does not reply to requests for information.

MONETAIRE MINING CO. **UTAH**

Office: 405 Newhouse Bldg., Salt Lake City, Utah.

Officers: D. J. Williams, pres.; N. V. Jones, v. p.; B. F. Cummings, sec.-treas.; with W. H. King and D. W. Cummings, directors.

Inc. Sept. 19, 1912, in Utah. **Cap.,** $250,000; shares 25c par; assessable; 885,000 shares outstanding. Annual meeting third Tuesday in January. Listed in Salt Lake City.

Property: 2 patented claims, 6 acres, in Little Cottonwood mining district, said to show lead-zinc ore, with some molybdenum, in fissure veins in limestone and quartzite. Veins strike E. W. and dip almost vertical. Ore shipped said to have returned $17 per ton. No recent shipments reported.

Development: 127′ vertical shaft and tunnels, with about 1,000′ of workings. Claim to have 20,000 tons of ore blocked out.

Equipment: includes an electric hoist.

NEVA MINING CO. **UTAH**

Office: 400 Boyd Park Bldg., Salt Lake City, Utah. **Mine office:** Brighton, Utah.

Officers: A. H. Rock, pres.; C. E. Cole, v. p.; Walter Steadman, sec.

Inc. 1906, in Utah. **Cap.,** $75,000; shares 15c par; assessment No. 7, 1/5c levied October, 1918. Stock is listed on Salt Lake Exchange. Sales ¼ low, 1c high, 1918; ¼-½ in 1919.

Property: 5 unpatented claims, adjoining the Cardiff on the W., show silver-lead-gold ore in a fissure vein, running E. W. along a quartz-lime contact and said to give assays of 45% lead, 30 oz. silver and 0.1 oz. gold. Developed by incline shaft and tunnel. Operations were resumed in 1915 and shaft sunk to intercept the Cardiff contact lode.

Property in dispute with the Cardiff Mining Co. was won by the Neva, and is considered valuable. Operations are carried on by small assessments.

OLD EMMA LEASING CO. **UTAH**

Dissolved April, 1917. Assets consisting of 416,667 shares of Emma Cons. Mines Co. stock were distributed to stockholders at ratio of 3 shares of O. E. L. for 1 share of Emma Cons. Was a George Graham Rice promotion.

OLD EMMA MINES CO. **UTAH**

Emma Consolidated Mining Co. owned 80% of the outstanding capitalization.

Property was leased for 14 months from July, 1916, to Old Emma Leasing Co.; which was dissolved in April, 1917. Lease sold to Emma Cons. Mining Co. Company went into hands of receiver in 1919. Property now controlled by Emma Silver Mines Co., which see.

OLD EVERGREEN M. & T. CO. **UTAH**

Address: at last accounts was care H. G. McMillan, gen. mgr., 649 E. South Temple St., Salt Lake City, Utah.

Cap., $300,000; shares $1 par; all outstanding.

Property: 12 patented claims, 3 miles N. E. of Alta, in the Big Cottonwood district. Mine is an old-time producer of gold-copper ore, with 2,700′ drainage and transportation tunnel. Idle.

OSBORN CONSOLIDATED MINING & MILLING CO. **UTAH**

Dead. Described in Vol. XIII.

PACIFIC GOLD MINING & MILLING CO. **UTAH**

Office: American Fork, Utah.

Officers: J. L. Craig, pres.; Jas. Chipman, Jr., v. p.-treas.; H. C. Johnson, sec.-mgr., with A. B. Stevenson, A. K. Thornton, directors.

Inc. 1900, in Utah. **Cap.,** $100,000; shares 10c par; assessable; 400,000 shares outstanding. Annual meeting, first Monday in February. Financial statement for 1918 showed balance in bank, $1,306; Liberty bonds, $2,000.

Property: Blue Rock group, 7 patented claims, 120 acres in American Fork mining district, shows quartzite and limestone, carrying several fissure veins varying in width from 17″ to 15′. Veins strike N. 30° E. and dip 50° N. W.

Ore: lead-silver sulphide, estimated by management to average 50% lead, 25 oz. silver, .02 oz. gold, 1.5% zinc, 15% iron, 0.1% copper, 22% sulphur.

Development: by 3 tunnels 300′, 700′ and 1,000′ long with about 5,000′ of workings, estimated to show 100,000 tons of ore blocked out for stoping, December, 1915. January 1, 1919, reported to have 7 month's ore supply blocked out. Main fissure was cut at depth of 500′. Property was leased to the Fissures Exploration Co (controlled through stock ownership by American Fork Exploration Co.), on a royalty basis. Royalties received in 1918 totaled $10,842.

Equipment: includes a hydro-electric-generating plant, installed in Dec., 1916, at a cost of $20,000. A 200-ton mill constructed during 1917 treated about 70 tons per day in 1918, concentrates netting $37 per ton.

PATHE MINING CO. **UTAH**

Address: American Fork, Utah.

Officers: John E. Berg, pres.; L. A. Anderson, v. p.; Boise A. Wells, second v. p.; S. L. Anderson, sec.; S. T. Shelley, treas., with W. F. Anderson and Abner Chipman, directors.

Inc. March, 1917, in Utah. **Cap.,** $10,000; shares 1c par.

Property: the Silver King Nos. 1 and 6 claims in American Fork district. No recent information; probably idle.

PERUVIAN CONS. MINING CO. **UTAH**

Office: 53 S. West Temple, Salt Lake City. Henry Welling, pres.; J. P. Clays, sec.

Property: a group of claims near Alta, from which company shipped 11 cars of $18-$25 lead-silver ore during summer of 1919.

PITTSBURGH CONSOLIDATED MINING & MILLING CO. **UTAH**

Officers: Mrs. E. Tarbet, pres.-mgr., 160 First Ave., Salt Lake City; H. H. Green, v. p.; J. G. Doolittle, sec.-treas., with B. Snyder and P. S. Keoch, directors; J. Benton Leggatt, cons. engr.

Inc. 1903. **Cap.,** $500,000; $1 par; 300,000 issued.

Property: 9 claims, 8 patented, in both Salt Lake and Utah counties, mainly on the American Fork side of the divide. **Ore:** occurs in fissure veins.

Development: on the Pittsburgh fissure, by 3 tunnels from American

Fork canyon. A 500′ upper tunnel is credited with a production of 11,000 tons under former management. The tunnels are in 500′ and are connected by winzes and raises. Operations were resumed in 1914 after an examination of the property by J. Benton Leggatt. In No. 2 tunnel a 12′ orebody of solid lead-zinc sulphide is said to be exposed, assaying 25% lead, 34% zinc, 40c. gold, 5 oz. silver, 26% sulphur and 5% iron.

In 1915 the 3 tunnels were connected and drifts run along the several fissures. A fourth tunnel, started to tap the Pittsburgh fissure 150′ lower than No. 3, will be driven 1,200′ and is to serve as a means of transportation. A wagon road was built to Alta in 1916.

Equipment: includes necessary mine buildings and dwellings. Idle since 1916.

PRICE MINING CO. **UTAH**

Office: Room 1 Mackintosh Block, Salt Lake City, Utah.

Officers: F. W. Price, pres.; M. R. Evans, v. p.; J. H. Woodmansee, sec.-treas.

Inc. April, 1915. **Cap.**, $250,000; shares 25 cts. par; assessable; last assessment. 1c a share, delinquent, Oct. 6, 1919. 700,000 issued. Stock is listed on the Salt Lake Exchange. Shares sold 1-3¼c in 1918; 1¾-10c in 1919.

Operating expenses in 1916 were $8,000.

Property: 17 claims, 300 acres, in South Fork canyon, Alta-Cottonwood mining district, considered to carry the Cardiff contact, which is intersected at right angles by several fissure veins. Samples taken from first fissure crossed assayed 34% lead, 20% zinc, 9% copper, and 300 oz. silver per ton. The streak of ore is 4″ to 16″ in width. No work has been done on it.

Development: by 400′ and 500′ tunnels. A prospect.

Equipment: includes an electric compressor.

PRINCE OF WALES MINING CO. **UTAH**

Address: Walker Bros., Salt Lake City, Utah.

Property: at Alta, 60 acres, was closed down, 1914, when a snowslide destroyed its equipment. Mine has 950′ incline shaft from which $2,000,000 worth of ore was mined, 1870-1875, until the influx of water stopped operation. Alta T. & T. Co. tunnel will entirely drain the ground.

Partly reopened, July, 1917, and 19 tons of $100 ore shipped, and in 1918 several carload shipments of ore made.

QUEEN LEASING CO. **UTAH**

Address: Alta, Utah. Col. C. R. Greene, mgr. Has a lease on part of the Cardiff mine.

RED BELL MINING CO. **UTAH**

Office: 519 Newhouse Bldg., Salt Lake City, Utah.

Office: S. A. Parry, pres.; M. E. Price, v. p.; H. H. Harris, sec.-treas.

Inc. Nov., 1916. **Cap.**, 800,000 shares; 10c par; 340,000 shares in treasury.

Property: 16 claims in Big Cottonwood canyon, about 1 mile E. of the Old Maxfield mine, reported to have produced rich silver-lead ore.

Development: by 150′ tunnel, said to have penetrated a 12′ porphyry dike carrying lead, iron, and copper. Started making shipments in 1918.

RED CLOUD MINING CO. **UTAH**

F. N. Leonard, mgr. Property at American Fork includes the Eudora, First Chance, and Red Cloud claims and 2 millsites.

Development: by 675′ tunnel in quartzite, said to show 5′ of silver-lead ore. In June, 1919, was preparing to ship ore.

REED'S PEAK MINING CO. **UTAH**

Office: 1 Mining Exchange Bldg., Salt Lake City, Utah.

Officers: Frank Andrews, pres.; W. J. Bardsley, v. p.; F. A. Stiefel, sec.-treas., with Robt. Kimball, E. W. Hulse, T. L. Mitchell, and L. G. Schwalenberg, directors.

Inc. Feb. 14, 1907, in Utah. **Cap.**, $50,000; shares 10c par; outstanding April, 1917, 489,000 shares; assessable. Listed on Salt Lake Exchange. Shares, 1¼ low, 2½ high, 1918, and 1½-4¾ in 1919.

Financial statement for fiscal year ended September 30, 1916, last available, shows: receipts, $18,191; expenditures, $9,799; cash balance, $8,391.

Property: 21 unpatented claims, 420 acres, 12 miles from a railroad, located on South Fork in Big Cottonwood mining district, said to show silver-lead ore in fissure veins in limestone.

Development: by tunnels, upper 450′ long, lower 1,450′ long. Objective of lower tunnel is the intersection of the Birthday No. 1 fissure with a N.-S. fissure at a depth of 800′ from surface; this intersection is expected to be reached within a short distance; Birthday fissures Nos. 1 and 2, said to have been productive of shipping ore on upper levels.

Equipment: includes a compressor, machine drills and electric power.

A few tons of ore have been shipped from development work; property is a prospect. In June, 1919, a 1c assessment was levied to provide funds for resuming work.

REXALL SILVER & COPPER MINING CO. **UTAH**

Consolidated, 1916, with Columbus Extension Mng. Co., and now known as Columbus-Rexall Cons. Mines Co., which see. Described Vol. XII.

ST. PATRICK MINING & MILLING CO. **UTAH**

Idle. **Office:** 855 Sherman Ave., Salt Lake City, Utah. **Mine office:** Hughes Canyon, Salt Lake county, Utah.

Officers: D. A. Buck, pres.; H. H. Patterson, v. p.; B. A. M. Froiseth, sec.-treas.

Inc. March 17, 1906, in Utah. **Cap.,** $50,000; 20c par; issued, 180,000 shares.

Property: 6 claims, unpatented, 7 miles from railroad, in Big Cottonwood mining district, opened by shaft and tunnel, with about 750′ of workings, showing gold and silver-copper ore. Annual assessment work only being done.

SCOTIA MINING CO. **UTAH**

W. E. Weihe, pres.; Jas. H. Douglas, v. p., Ogden, Utah; Jas. S. Morgan, sec.-treas., with A. A. Beesley, A. L. Pratt, O. G. Pratt, and R. G. Pratt, directors.

Cap., $500,000; 10c par; 200,000 shares issued.

Property: in Honeycomb Gulch, of Big Cottonwood, shipped a few carloads of lead-silver ore in 1918. Reported that controlling interest has passed to Messrs. Dunn and Fabian, of Salt Lake City.

SECRET MINING & MILLING CO. **UTAH**

Offices: 618 Newhouse Bldg., Salt Lake City and Alta, Utah. Reported "dead" in Copper Handbook, Vol. X. Reorganized and rejuvenated in 1915.

Officers: R. W. Clough, pres.; W. M. Minor, v. p. and treas.; H. S. Harper, sec., with E. R. Phelps and W. H. Clough, directors.

Inc. about April, 1906, in Utah. **Cap.,** $300,000; increased in 1915 to $600,000; shares $1 par. In 1919, increased number of shares to 1,000,000; par 10c. Listed on Salt Lake Exchange. Share sales 1c, 1918.

Property: 15 claims, 300 acres, 100 patented, at Alta, Little Cottonwood mining district, adjoining the Albion on the S. E., said to show lead-silver ore. Country rock is quartzite.

Development: by tunnels; reported in April, 1916, that an 80′ tunnel would be extended to cut the surface showings at a depth of 800′. The company is also reported as having obtained the right from the Albion to drive a crosscut into Secret ground from a point 2,500′ in from the portal of the Albion tunnel. An upper tunnel is in 500′. Workings total 700′. No orebodies large enough for production have been found. In May, 1919, work was again resumed after a period of idleness. Property is in the speculative class.

SELLS MINING CO. **UTAH**

Address: Judge Bldg., Salt Lake City, and V. S. Snow, supt., Alta.

Officers: John Zink, pres.; John Gallacher, v. p.; W. H. Weyher, sec.-treas., with A. W. Joerger, directors.

Inc. 1914, in Utah. **Cap.,** 600,000 shares; 25c par; 400,000 issued In May, 1916, there was $3,994 in the treasury; debts amounted to $13,500 on the property and $24,446 on the 6 patented claims, latter amount was due September

1, 1916. Assessment No. 4, of 1c a share was levied in March, 1919. Last assessment, 2c a share, delinquent October 18, 1919.

Listed on Salt Lake City Exchange. Shares 8½ low, 21 high in 1918; 4 low, 13½ high in 1919.

Property: 16 claims, 6 patented, in the Alta-Cottonwood mining district, 8 miles from a railroad, said to cover 1,800′ to 3,000′ along the mineralized zone passing through the South Hecla property which adjoins on the west.

Ore: carries silver lead, zinc and copper, in fissure veins in limestone and in contact deposits between limestone and granite; veins strike N. E. S. W.

Development: mainly through the Dwyer tunnel of the South Hecla company, also a 200′ shaft, 2,200′ of tunnels and 600′ of raises. Connection has been made with the old Lexington tunnel, giving another opening to the Sells and improving ventilation. Shipments average about 2 cars per week.

Early in 1920 a 125′ raise above the tunnel level opened an orebody said to sample $14.50 gold and 240 oz. silver per ton, with 4% copper.

An aerial tram, 2,000′ long, costing $10,000, to carry 10 tons per hour, was erected in 1918. This should permit transportation during the winter. Is a speculative mining venture that has promising ground.

Company has remained courteously non-communicative to requests for information.

SILVER FLAT MINING CO. **UTAH**

Presumably dead. **Property:** the old Nebraska mine in Delta Creek, Silver Lake section, American Fork, Utah, shows silver-lead ore in fissures in limestone cut by porphyry dikes.

Ore: complex silver-copper-lead, high in zinc.

Development: by 1,200′ of tunnels. No recent information.

SILVER MOON MINING CO. **UTAH**

Office: 27 Latimer Block, Salt Lake City, Utah.

Officers: A. L. Headbug, pres.; Wm. Crome, sec.-treas.

Inc. Jan. 29, 1912. **Cap.,** $10,000; shares 2c par; assessable. Last assessment levied August 15, 1919. In treasury, May, 1916, 200,000 shares and $780 in cash; no debts. Listed in Salt Lake City.

Property: 7 unpatented claims in the Big Cottonwood district.

Ore: carries silver, gold, lead. Little development has been done. Four men employed. Property is a prospect.

SILVER SIDE MINING CO. **UTAH**

Address: American Fork, Utah.

Officers: J. E. Beveridge, pres.; A. O. Jacobson, v. p.; W. Holmes, sec.-treas., with H. P. Huey and M. M. Beaver, directors.

Inc. 1916, in Utah. **Cap.,** $50,000; shares 5c par.

Property: 5 miles up American Fork canyon, is said to show silver-lead ore in contact deposit between limestone and quartzite.

Development: by tunnels and shallow shaft. No recent information.

SOUTH CARDIFF MINING CO. **UTAH**

Address: George N. Lawrence, pres., 420 Boston Bldg., Salt Lake City; W. H. King, v. p.; Allen Sanford, sec.treas., and George A. Steiner, directors.

Inc. April 9, 1916, in Utah. **Cap.,** 1,000,000 shares; 450,000 in treasury.

Property: 10 claims, 160 acres in Cottonwood district, adjoining the Cardiff, Howell & Monte Cristo, and the Canton Mining Co. holdings, is supposed to carry extension of Cardiff fissure. No recent information; probably idle.

SOUTH HECLA EXTENSION MINING CO. **UTAH**

Office: 161 So. Main St., Salt Lake City, Utah.

Officers: the same as South Hecla Mng. Co.

Inc. in Utah. **Cap.,** $100,000; shares 10c par; assessable; outstanding $53,879. Listed in Salt Lake City. Shares 1½-5c in 1918; 2¾-5c in 1919.

Assets at January 1, 1917, totaled $101,747, including $32,085 for property and plant, $19,422 for development and $46,122 for treasury stock. Current assets were $4,118, against current liabilities of $1,747. Later figures not available.

Property: 37 acres, in the Little Cottonwood district, adjoining South

Hecla Mining Co., said to show silver-lead-copper-gold ore. Development is being done through the Quincy tunnel level of the South Hecla mine. Is in the prospect class.

SOUTH HECLA MINING CO. **UTAH**

Office: 161 So. Main St., Salt Lake City, Utah. **Mine office:** Alta, Salt Lake county, Utah.

Officers: Geo. H. Watson, pres.-gen. mgr.; Herman Bamberger, v. p.; J. W. Harrington, sec.-treas., with A. B. Watson, and H. C. Edwards, directors.

Inc. Sept. 14, 1910, in Utah. **Cap.,** $500,000; $1 par; assessable; issued $262,920. Geo. H. Watson & Co., registrar. Annual meeting, second Wednesday in September.

Listed on Salt Lake Stock Exchange. Shares, 63c low, $1.30 high, 1918; $1.30-2.70 in 1919.

Company was organized as a merger of the South Columbus Consolidated Mining Co., and Alta-Hecla Mining Co., and holds properties formerly held by the Bingham-Centennial, Alta-Quincy, Columbus Wedge, Ivanhoe and Lilburn mining companies. Company exchanged stock on the basis of 1 share of South Hecla for 5 shares of South Columbus, and 1 share of South Hecla for 5 shares of Alta-Hecla.

Assets at end of 1918 totaled $627,420, including $202,534 for property, $236,995 for treasury stock, and $51,662 discounts. Net earnings in 1918 amounted to $69,849, all from ore sales, and exclusive of $3,855, royalties received. Initial dividend, 15c per share, paid August 10, 1916; last dividend, 15c a share, paid September 5, 1919.

Property: 41 claims, partly patented, 584 acres, in the Little Cottonwood district. Claims carry 8 well-defined ore-bearing fissures in granodiorite and limestone, running N. 70° E., dipping 70° N. and contact deposits between limestone and granite. The 3 orebodies under development, one in the Kate Hayes, the others in the Wedge fissure, are reported by the management to average 20′ in width, and to carry malachite, azurite and tetrahedrite in the surface zone, succeeded by chalcopyrite, galena and sphalerite, estimated by the management to average 1% copper, 15% lead, .05 oz. gold and 35 oz. silver per ton. No. 1 shoot of the Kate Hayes is 940′ long; No. 2 proven for 300′ long.

Development: is by two main working tunnels, the Quincy and Dwyer: the Dwyer, 2,000′; Alta-Quincy, 1,800′; South Columbus, 1,400′; Rustler, 1,200′; Scott, 1,700′; Neversweat, 150′, and the White, of 700′. The mine as a whole has about 7 miles of workings, lighted by electricity; new work in 1918, totaled 1,333′. Main development during 1918 was on the 500′ level of the Wedge vein, which was opened up for 160′ above the 500′ level. A total of 4,000 tons shipped in 1918 averaged 0.02 oz. gold, 10.4 oz. silver, and 5.3% copper. Milling ore was opened on other levels, but management desired to stope only smelting ore. In May, 1919, a new body of sulphide ore was reported found in the Dwyer tunnel.

Equipment: includes a 60-h. p. electric plant, with a 10-h. p. hoist good for 200′, and a 2-stage compressor. Buildings include a shop building, housing smithy, machine and carpenter shops, with a 3-story boarding house and 5 dwellings.

Production: company in 1916 shipped 7,962 tons of ore containing 267 oz. gold, 164,619 oz. silver, 1,236,357 lbs. lead, 55,366 lbs. copper, 738,473 lbs. zinc and 782,059 lbs. iron. Lessees marketed 1,097 tons of ore containing 34 oz. gold, 16,493 oz. silver, 218 lbs. lead, 5,361 lbs. copper, 157,854 lbs. zinc, and 47,089 lbs. iron. In 1918, combined output by company and lessees was 9,232 tons ore, yielding 165 oz. gold, 112,920 oz. silver, 238,985 lb. lead, 577,773 lb. copper, 137,556 lb. zinc, and 4,261,888 lb. iron.

In 1919 the output was 7,703 tons of ore yielding 107 ounces gold, 77,029 ounces silver, 51,424 lb. lead and 361,428 lb. copper, all of a gross value of $140,299. The year's operations show a loss of $5,554.

SOUTH PARK MINING & DEVELOPMENT CO. **UTAH**

Office: O. A. Relf, pres.; J. Tracy Wootton, sec.-treas.

Inc. May 24, 1916. **Cap.,** $50,000; shares 5c par; assessable. Last assess-

ment, ½c a share, delinquent, September 27, 1919. $3,000 issued. Listed in Salt Lake City.

Property: 17 claims, 14 patented, in American Fork mining district, said to show iron carbonate containing silver and lead.

Development: by tunnels, crosscutting the formation. Work has usually been suspended during the winter months, and resumed in May. At that time in 1919 main tunnel had a length of 700′, and a drift was started on an orebody showing 450′ from the portal.

SWASTIKA MINING CO. **UTAH**

A. H. McKnight, pres.-mgr.

Operates a property in Honeycomb gulch, near Alta, formerly owned by Bishop L. G. Hardy, of Salt Lake City. Reported to have opened a large deposit of low-grade ore by several thousand feet of workings.

TAR BABY MINING CO. **UTAH**

Office: 523 Atlas Block, Salt Lake City, Utah. **Mine office:** Alta, Salt Lake county, Utah.

Officers: J. M. Matsen, pres. and gen. mgr.; R. W. Savage, v. p.; W. N. Grundy, sec.-treas.; A. P. Davidson and J. W. Brewer, directors; H. D. Greene, supt.

Inc. 1911, in Utah. **Cap.,** 500,000 shares, increased June, 1916, from 400,000; 20c par; outstanding, 483,000 shares. Listed on Salt Lake City Exchange. Shares 1½c. low, 5¾c. high in 1918; 2c.-7½c. in 1919. Assessment No. 21, 1c. per share, levied in February, 1920.

Property: 6 claims, in the Alta-Cottonwood district, on the south fork of Big Cottonwood. The purpose of the enterprise is to cut the Cardiff lime-quartzite contact by working through the Victor company's tunnel, whereby an additional depth of 500′ will be gained. No ore in commercial amount has yet been found.

TEXAN MINING CO. **UTAH**

Office: 400 W. 7th South St., Salt Lake City, Utah.

Officers: Chas. Tyng, pres.; Frank Nelson, sec.

Inc. in Utah. **Cap.,** $1,000,000; shares $1 par; outstanding, 825,000. Listed in Salt Lake City. Share prices 1c-8c in 1918. No quotations, 1919.

Property: 200 acres in American Fork district, said to show silver-lead-copper-gold ore. A tunnel was driven over 1,000′ in the Texan mine, while the Miller Hill tunnel is in 2,100′; both tunnels are in quartzite. No commercial orebodies have yet been found. Probably idle.

THOR MINING CO. **UTAH**

Merged, 1916, with Great Western Gold & Copper Co. and Mountain Lake Mining Co., with title of Great Western Mines Co., which see.

TRIANGLE MINING CO. **UTAH**

Went into receiver's hands, Jan., 1919. N. W. Haire, receiver, 411 Felt Bldg., Salt Lake City, Utah. **Mine address:** Alta, Utah.

Officers: Howard C. Fields, pres.; Wm. C. Stewart, v. p.; Irma R. Fields, sec.-treas.; Howard H. Fields, mgr., with Harry A. Marsh and Wm. C. Lidvall, directors.

Inc. July 15, 1917. **Cap.,** $25,000; shares $1 par; 6,201 outstanding. Operated as a close corporation. Annual meeting, first Saturday in September.

Company operated a lease on part of the property of the Michigan Utah Consolidated Mines Co., which see.

Production: in 1915 was 2,000 tons; in 1916, 5,000 tons averaging $25 per ton.

UTAH CENTENNIAL MINING CO. **UTAH**

Address: Pleasant Grove, Utah.

Officers: J. E. Thorne, pres.; L. L. Nelson, v. p.; D. Noble, sec. and treas.; J. W. Thorne, J. E. Thorne, C. Thorne and L. L. Nelson, directors.

Inc. 1907. **Cap.,** $1,000,000; shares 5c par; outstanding, 250,000 shares; assessable; last assessment, $5 per 1,000 shares, called in May, 1919. Annual meeting in April.

Property: 10 claims in American Fork Canyon, American Fork district.

Fissure vein carries gold, silver, lead, copper ore. Developed by a 450′ tunnel and reported to have struck a few inches of high-grade silver-lead ore. Property is a prospect undergoing development.

VICTOR MINING CO. **UTAH**

Address: 702 McIntyre Bldg., Salt Lake City, Utah.

Officers: C. R. Greene, pres. and gen. mgr.; Lee Case, v. p.; R. B. Rankin, sec.-treas., with H. V. Greene, and E. C. Davies, Jr., directors.

Inc. in Utah. **Cap.**, $20,000; 5c par. Listed on Salt Lake Exchange.

Property: adjoins the Tar Baby and Cardiff in the Alta-Cottonwood district. After driving a crosscut, work was stopped owing to war conditions. In 1919, the company started development work through the Tar Baby tunnel. Property examined by J. Fewson Smith.

WASATCH MINES CO. **UTAH**

Office: 713 Judge Bldg., Salt Lake City, Utah. **Mine office:** T. W. Blake, supt., Alta, Salt Lake county, Utah.

Officers: A. H. Cowie, pres.; A. C. Ellis, Jr., v. p.; W. O. Williams, sec.-treas., with H. G. Williams, W. S. Cooper and L. K. Cowie, directors.

Inc. Feb. 8, 1913, as a merger of the Columbus Consolidated Mining Co., Flagstaff Copper Co., and Superior-Alta Mining Co. **Cap.**, $1,000,000; shares $1 par; issued 358,905 shares; assessable, limited to two 5c. levies a year. Consolidation of these properties was effected on the basis of 160,000 shares for Columbus Consolidated Co., 100,000 shares for Flagstaff Co., and 40,000 shares for Superior-Alta. Stock is listed on the Salt Lake Stock Exchange. McCornick & Co., Salt Lake City, registrar. Annual meeting, second Thursday in June.

Property: 60 claims, 40 patented, about 900 acres, and millsites at Tanner's Flat and at the mouth of Little Cottonwood canyon, on the E. flank of the Wasatch mountains.

Geology: claims show a number of fissure veins cutting through limestone, shale and quartzite; also numerous bedded and contact deposits between limestone and quartzite. The bedded deposits contain the principal orebodies, which range from 30 to 100′ in width, several hundred feet long, and carry up to 11% copper, 18% lead, 15% zinc, 66 oz. silver and $4 gold per ton. Outside of the shoots the ore is generally pockety and mainly below payable tenor.

The Flagstaff group carries several ore channels, one of which is said to range up to 300′ in width and to be traceable 2,000′, and is developed by the 5,000′ Tom Moore tunnel. This tunnel also cuts 6 smaller veins and has a 450′ crosscut to the N. E., with about 13,000′ of workings. Other workings include the 500′ Burgess tunnel, 1,200′ Burnswood tunnel, 1,200′ Flagstaff tunnel, and the 700′ Flagstaff shaft. The mine was a notable producer of silver-lead carbonates in early days.

The Columbus Consolidated group shows a vein, known as the Braine fissure, of about 12′ average width, opened by 2 tunnels, 1,250′ apart, on practically the same level.

Development: about 3 miles of workings connected with the main 5,100′ drainage tunnel, 4,000′ down the canyon, planned to unwater the Columbus and adjoining properties. The Holland and Columbus tunnels are connected on the Braine fissure, the first-named with electric traction. There are also 3 other tunnels and several shallow shafts. The output consists of copper ore, silver-lead ore and concentrating ore. The mine is wet and has a 600-gal. pump.

Shipments have assayed from 34c to 70c gold; 8 to 51 oz. silver; 5 to 6% lead; 5 to 14% copper, 6 to 14% excess iron per ton, yielding from $20 to $60 per ton.

A Pelton water wheel works under a head of 494′, taking water through a 20″ and 22″ steel pipe line of 4,500′ length, developing 660 h. p., which is transformed into electricity by two 300-k. w. dynamos and carried to the mine by a 4½-mile transmission line. At the mine there are four 25 h. p. hoists good for 600′ each, 10-drill Nordberg and two 5-drill Ingersoll-Sergeant air compressors, a machine shop and a sawmill.

The 150-ton concentrator is equipped with a Gates gyratory crusher, 2 sets

of Rogers rolls, six 3-compartment jigs and 7 Wilfley tables, the mill putting about 4 or 5 tons into 1. A cyanide unit was installed in 1915.

Development work above the tunnel level proved disappointing and the management has concentrated all energy on the deep drainage tunnel to be driven 5,000′, about 500′ below the present lowest workings and which will make deep mining easy and profitable; the tunnel is from a few hundred up to 1,500′ below other properties in the district. Company derives sufficient funds to cover operating expenses from the sale of electric power and compressed air to most of the mines in the district.

In November, 1919, the main tunnel was in over 5,100′. Progress in the limestone is 7-8′ daily with 2 shifts.

WASATCH UTAH MINING CO. **UTAH**

Company probably out of business as mail was returned, 1919, from former addresses: Kearns Bldg., Salt Lake City, and mine office, R. D. No. 4, Landy, Utah.

Officers: at last accounts, F. L. Palmquist, sec.-treas.; J. L. Kraft, L. Moody, A. W. Manz, J. Hyldahl, E. Tressing, Asa Bacon, J. W. Reihman, directors.

Inc. October, 1902, in Nevada. **Cap.**, $1,000,000; par $1; assessable; all issued.

Bonds: authorized, $100,000; issued, $35,000. Annual meeting, second Monday in June.

Property: 51 claims, 14 patented, known as the Consolidated Jefferson mine, 9 miles from railroad, near mouth of Little Cottonwood canyon; also 40 acres dumping ground. Mine has two systems of veins, a narrow E.-W. fissure in hornblende schist with high-grade gold, silver and copper ore, and a large N.-S. quartz fissure about 8′ wide containing ore running from $2 to $5 gold per ton, which is all milled.

Development: by adit and glory-hole into 500′ stope.

Equipment: includes compressors, buildings, experimental 5-stamp mill with Wilfley and vanner, large mill with crusher, Chilean mill, plates and amalgamator.

WEST TOLEDO MINES CO. **UTAH**

Office: 146 S. West Temple St., Salt Lake City. **Mine office:** Alta, Utah.

Officers: A. L. Hurley, pres.; J. A. Foley, v. p.; E. W. Hulse, sec.-treas., with A. O. Jacobson and P. M. Magregor, directors. J. A. Foley, mgr.

Cap., $50,000; shares 10c par; outstanding 452,000 shares. Listed on the Salt Lake Stock Exchange. Shares 2c-11c in 1918; 3c to 14c in 1919.

Property: 11 claims in the Little Cottonwood district, Salt Lake county.

Development: chiefly by the Superior and Frederick tunnels which are to be extended to cut several known mineralized veins. The Frederick tunnel is over 3,000′ long. Grade of ore so far found is reported to be low. Property is in a line with Cardiff and South Hecla in both of which the overthrust contacts have proven ore bearing. Developing in 1919.

WHIRLWIND CONSOLIDATED MINING CO. **UTAH**

Office: 400 W. 7th St., Salt Lake City, Utah; Harry Kreuse, supt., American Fork, Utah.

Officers: Chas. Tyng, pres.-mgr.; Frank K. Nelson, sec.

Inc. April 24, 1916, in Utah. **Cap.**, $250,000; shares 25c par; 800,000 shares issued. Listed on Salt Lake Exchange. Shares 1c-5c in 1918; ¾c-2¼c in 1919.

Property: 7 claims, unpatented, 110 acres, in the American Fork mining district, adjoining the Miller Hill on the West, 20 miles from a railroad, said to show silver-lead ore.

Development: by 2 tunnels; one 1,000′ long was reported to have cut some lead carbonate ore at 760′ in.

Installation of machinery and power was planned and stock offered public for 7c a share in May, 1916. No recent information, presumably inactive.

WOODLAWN COPPER MINING CO. **UTAH**

Office: 305 Atlas Blk., Salt Lake City, Utah. Mine near Brighton, Salt Lake county, Utah.

Officers: H. W. Lawrence, pres.; E. S. Hills, v. p.; George N. Lawrence, sec.-treas.; W. J. Lawrence, mgr., with C. R. Long, directors.

Inc. 1899, in Utah. **Cap.,** $700,000; shares 10c par; assessable. Listed on Salt Lake Exchange.

Property: 7 claims, patented in the Big Cottonwood district, 18 miles from a railroad, show lead, zinc, silver and copper ore, whose value is mainly in lead.

Development: work was resumed in 1915, after an idleness of several years; the main tunnel was 1,650′ long in September, 1919; there are also several shorter tunnels. Various fissures cut by the main tunnel are being explored by drifts, raises, etc., and some good ore sacked and shipped.

BINGHAM DISTRICT.

ALPINE GALENA MINING CO. **UTAH**

Owned and operated by Alpine and Provo men.

Property: in Alpine Canyon, near Bingham, contains ferruginous lead ore, in bunches in black limestone.

Development: by 312′ tunnel and incline shaft. Planned to drive tunnel to reach blowout 350′ below surface. No recent report; probably idle.

BINGHAM AMALGAMATED COPPER CO. **UTAH**

Fully described in Volume XIII. Succeeded by United Bingham Copper Co., which see.

BINGHAM ANACONDA COPPER CO. **UTAH**

Mail returned, 1918, from former address, 11 Main St., Salt Lake City, Utah. Mine in Markham Gulch, Bingham, Utah.

Officers: E. McCarrick, pres.; B. B. Gray, v. p.; P. L. Meyers, sec.-treas.; above, with A. Gustaveson and R. E. L. Collier, directors.

Cap., $1,000,000; shares 10c par. Owns a group of claims in Bingham district. Probably idle.

BINGHAM CENTRAL MINING CO. **UTAH**

Idle. At Bingham Canyon, Salt Lake county, Utah. This company and the Bingham Standard Copper Co. were controlled by the Bingham Central Standard Copper Co., which sold its stock holdings, 1909, to Utah Metal Mining Co., receiving stock in latter company which is now controlled by the Utah Metal & Tunnel Co., which see. Described Vol. X.

BINGHAM CENTRAL STANDARD COPPER CO. **UTAH**

Organized as a holding company, controlling, through ownership of practically entire stock issues, the Bingham Central Mining Co. and Bingham Standard Copper Co. Sold these subsidiary stocks, 1909, to the Utah Metal Mining Co. for 300,000 shares of latter, which was escrowed until 1911 and extended upon payment of 10,000 additional shares until November 8, 1912, and subsequently to January 1, 1914, to permit building by Utah Metal Mining Co. of a $150,000 aerial tramway from the western end of the big tunnel to the International smelter at Tooele. On release of escrow, 1914, company was to be wound up, but prevented by minority stockholders, who attempted to recover property, claiming irregular disposition of the company's assets. Stock valueless.

BINGHAM COALITION MINES CO. **UTAH**

Address: 102 Exchange St., Portland, Me. **Mine office:** Bingham Canyon, Utah.

Officers: Geo. F. Fowler, pres., Springfield, Mass.; H. P. Sweetser, treas.; A. T. Hastings, mgr.

Inc. 1916, in Maine. **Cap.,** $1,000,000, increased 1916 to $1,500,000; $1

par. Bonds, $150,000. Stock listed on New York and Boston Curbs. State Street Trust Co., Boston, and Registrar & Transfer Co., New York, registrar and transfer agents.

Property: is a merger of the Butler Liberal, Red Wing, and Massasoit properties, about 50 claims, in Markham and Freeman gulches. The claims carry the Florence Erie, Julian, Red Wing and other fissures, all of them good producers in the upper levels.

Development: by crosscut tunnels with about 5 miles of workings cutting the above named fissures (veins) containing lead ores with silver, copper, and gold values. **Equipment:** includes 200-ton Red Wing mill.

Production: in 1917 was 127 oz. gold, 29,249 oz. silver, 57,684 lb. copper, and 1,625,830 lb. lead. No later figures received.

BINGHAM COPPER BOY MINING CO. UTAH

Out of funds and idle several years, with no sale or market for the stock, so far as known. See Vol. XI, Copper Handbook.

BINGHAM EMPIRE MINES CO. UTAH

Officers: Jesse Knight, pres., with A. M. Knight, W. L. Mangum, K. S. Jordan, G. A. Storrs, E. G. Jensen, directors.

Inc. July 31, 1915, in Utah, for development of property in the Bingham district. **Cap.**, $10.000; shares 1c par; 484,000 shares in treasury.

BINGHAM MINES CO. UTAH

Office: 60 Congress St., Boston, Mass. **Operating office:** 404 Dooly Blk., Salt Lake City, Utah; Joseph Hyland, supt., Lark, Utah.

Officers: Jas. P. Graves, pres.; Henry N. Sweet, v. p.; M. K. Billings, sec.; Thos. S. Woods, treas., with Alfred B. White, Arthur W. Chesterton and Lewis B. McCornick, directors. Imer Pett, gen. mgr.; Fred R. Sands, purch. agent.

Inc. April 6, 1908, in Maine. **Cap.**, $1,500,000; $10 par; all issued.

Is a reorganization of the Bingham Consolidated Mining & Smelting Co., stock being exchanged, share for share, on payment of $3.50. Controls about 95% of the outstanding stock of the Eagle & Blue Bell Mining Co., a dividend payer, of Eureka, Juab county, Utah; also controls the Yosemite Mines Co., of Bingham Canyon, Salt Lake county, Utah. Purchased the entire capital stock of the Victoria Cons. Mng. Co. in 1914 and the property was conveyed to the Bingham Mines Co. in November, 1917. The Victoria property consists of 49 acres mineral land at Eureka, adjoining the Eagle and Blue Bell.

First National Bank, Boston, and Chase National Bank, New York, registrars. Federal Trust Co., Boston, and Guaranty Trust Co., New York, transfer agents. Stock listed on Boston Stock Exchange and New York Curb. Sales in 1919, at $10¼. Annual meeting, third Wednesday in April, at 97 Exchange St., Portland, Maine.

Company has liquidated its bonded indebtedness of $1,480,790, besides having paid for the property of the Victoria Cons. Mng. Co.

Comparative Balance Sheet:

Assets—

	Real Est. & Mines	Cons. & Equip.	Mining Stocks	Cash & Loans	Accts. Rec.	Supplies Ins., etc.	Total
1918.....	$1,308,329	$41,398	$845,366	$19,766	$89,568	$11,949	$2,316,376
1917.....	1,049,714	39,986	861,830	188,203	82,782	16,058	2,238,575
1916.....	962,280	33,462	663,022	85,158	67,998	12,640	1,824,551

Liabilities—

	Capital Stock	Accts. & Notes Pay.	Reserve Deprec.	Reserve Depletion	Surplus	Total
1918.....	$1,500,000	$66,370	$17,595	$366,535	$365,877	$2,316,376
1917.....	1,500,000	2,392	12,248	79,908	644,028	2,238,575
1916.....	1,411,000	1,079	12,248	.....	400,224	1,824,551

Comparative Operating Statement:

	1918	1917	1916
Ore shipments, gross value	$390,821	$364,336	$283,490
Deduct smelting, freight, etc	137,408	113,398	78,229
Net receipts from ore	$253,413	$250,938	$205,261
Other revenues (royalties, etc.)	36,481	57,324	46,181
Gross earnings at properties	$289,894	$308,262	$251,442
Operating expenses	149,290	120,569	107,691
Net earnings	$140,604	$187,693	$143,751
Mine development	59,961	37,680	23,904
Net operating gain	$80,643	$150,013	$119,847
Dividends on mining stocks	83,629	365,788	65,912
Net gain and income	$164,272	$515,802	$185,759

Dividends: initial dividend of 50c and Red Cross dividend of 25c a share, paid July 2, 1917; 50c paid October 5, 1917; 5 dividends of 50c, or $2.50 in 1918, and two dividends to October 1, 1919, a total of $4.50 per share, or nominally $1 annually. Total is $674,500.

Property: the Dalton & Lark and Commercal mines, 60 claims, patented, 430 acres mineral land, in the Bingham district, and 596 acres non-mineral lands. Also 92% of Eagle & Blue Bell Mining Co. and control of Victoria Cons. Mng. Co. at Tintic, as already noted, and the Yosemite Mines Co.

Development: at Dalton & Lark and Commercial mines is extensive, there being many miles of workings. New work in the first named in 1918 amounted to 2,755′, compared with 3,670′ in 1917. The Commercial mine has not been worked for 3 years. It is considered that a large quantity of ore will be developed in the Brooklyn, Lead Mine, and Lark veins below the Mascotte tunnel. Lessees extract ore from old workings in the Dalton & Lark and Commercial, and shipped 4.862 tons during 1918, yielding the company a royalty of $32,153. In 10 years they have produced 1,332 oz. gold, 481,258 oz. silver, 2,060,088 lb. lead, and 7,960,157 lb. of copper.

Equipment: at Dalton & Lark—25-h. p. steam plant, hoists, 25-drill compressor, shops, etc., and spur line with electric locos connecting with the D. & R. G. At Commercial, hoist, 10-drill compressor, and other machinery, all electrically driven.

Production: of Dalton & Lark, exclusive of lessees:

Year	Ore, tons	Gold oz.	Silver, oz.	Lead, lb.	Copper, lb.
1917	25,776	1,872	139,241	679,007	1,681,848
1916	27,710	1,900	154,036	736,992	1,502,865
1915	44,975	3,399	188,216	1,221,219	2,244,078
1914	49,867	3,613	188,905	1,110,762	3,738,773
1913	38,988	2,995	179,117	1,122,955	2,745,818
1912	49,987	3,731	225,763	1,427,780	3,777,320

Company is in hands of engineers who have made splendid progress in handling difficult financial and mining problems.

Eagle & Blue Bell Mining Co.

Subsidiary of Bingham Mines Co.

Office: 60 Congress St., Boston, Mass. **Operating office:** 404 Dooly Block, Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: Jas. P. Graves, pres.; Henry N. Sweet, v. p.; Imer Pett,

asst. treas.-gen. mgr.; Thos. S. Woods, treas., with Fred H. Williams and Duncan MacVichie, directors. Myron K. Billings, sec. Wm. Owens, mine supt.

Inc. Sept. 1898, in Utah. **Cap.**, $250,000, increased, March, 1910, to $1,000,000; $1 par; issued 893,146 shares.

In March, 1910, issued 644,347 shares of new stock at 50c to take up a floating debt of $269,925 and put $50,000 in the treasury, for working capital. Is controlled, through stock ownership, by Bingham Mines Co. First National Bank, Boston, registrar; Federal Trust Co., Boston, transfer agent. Stock is listed on the Boston Curb. Annual meeting, first Saturday after first day of October.

Financial Statement, years ending December 31:

Year	Gross Earnings	Expenses at mine	Freight, treatment etc.	General	Net Profit	Divi'ds.
1919.....	$621,322	.....	.....	.....	$128,310*	.....
1918.....	1,090,303	$297,212	$462,199	$42,162	288,730*	$267,943
1917.....	1,069,603	223,827	353,970	14,577	393,359*	357,258
1916.....	531,451	160,369	207,456	8,849	154,776	89,314
1915.....	.....	.....	.....	....	143,345	133,972

* After deductions for Federal taxes.

Working Capital:

Year	Current assets	Current liabilities	Net current assets
1918.....	$156,121	$34,548	$121,573
1917.....	264,933	86,534	178,399
1916.....	67,580	.....	.....

Dividends: 20 cents in 1913; 15 cents in 1914; 15 cents in 1915; 10 cents in 1916; 40 cents in 1917; 30 cents in 1918; 10 cents in 1919. The total to end of 1919 is $1,250,405.

Property: 17 patented claims, 73 acres, includes a 9-acre millsite carrying the water right to a spring having a flow of about 30 gal. per minute. Lands lie between the Centennial-Eureka, Victoria and Chief Consolidated mines, on the Victoria-Grand Central ore zone, in the Mammoth Limestone.

Geology: chamber deposits in limestone, carry silver-lead ores containing gold and some copper. The lime is cut by numerous fissures, at all angles, with mainly vertical dip, carrying pipes, shoots and erratic deposits of ore at the intersections of fissures and bedding planes, in massive blue limestone. The mine has considerable bodies of silicious copper ore, lead sulphides and carbonates. Pay shoots vary from 6 to 100′ in width. Average assays of dry ore: 0.230 oz. gold; 12.99 oz. silver; 0.31% copper; lead ore assayed: 0.13 oz. gold, 16.81 oz. silver and 17.05% lead.

The mine workings indicate 4 separate ore channels striking northerly and southerly, and occasionally joined together by immense ore deposits made along easterly and westerly cross faultings. The ore occurrence shows a great similarity throughout, giving the zone a width of over 600′, but each channel apparently has its characteristic mineral association.

History: according to C. H. Blanchard, pres. of the D. & B. Mines Co., ore was discovered by 30′ shaft, and mill erected before ore development warranted, with consequent abandonment. Relocated several times, and property developed by 1,200′ tunnel, that eventually found downward extension of oreshoot cut by shaft. Profitably worked till panic of '93; later reopened and all ore in sight taken out and mine was idle until sold to Bingham Mines crowd, who sank deep winze from tunnel; extracted all ore in sight and ran into debt for $300,000; Hornblower & Weeks assumed debt, taking company notes, and installed Imer Pett as manager and Wm. Owens as supt. New management followed for 800′ a thin, iron-stained seam on the 1,000′ level and found immense body of pay ore, making it one of the big mines of Tintic.

Development: has been extensive in the last few years; the 3-compart-

ment shaft is 2,018′ deep, with levels at 700, 1,000, 1,350, 1,550, 1,700 and 1,875, and blind levels at 1,100, 1,200, 1,300, 1,425 and 1,538′.

In 1918, two main deposits supplied most of the output. One of these is the 1,550 orebody, which, although irregular in occurrance, extends up to 1,350′ and down to 1,845′. Stoping is over 900′ long. The other orebody is in the North Extension claims, and is found mainly below the 1,000 north drift. Stoping on this ore is also extensive, but its full size is not yet known. New work in 1918 totaled 5,519′, compared with 4,783′ and 3,086′ in the two previous years.

Equipment: includes a 180-h. p. double-drum hoist, good for 2,000′ depth, a 100 h. p. tubular boiler and a 4x6″ electric triplex pump. The mine was electrically equipped throughout and a 250 h. p. air compressor and 225 h. p. electric hoist installed in 1916. Electric power is supplied by the Utah Power & Light Co.

Production:	Ore, tons	Gold, oz.	Silver, oz.	Lead, lb.	Copper, lb.
1919	22,274	1,641	389,526	4,908,342	4,409
1918	42,190	2,605	579,075	9,389,376	16,012
1917	36,146	2,819	519,880	9,069,091	4,089
1916	25,594	987	347,501	5,714,776	577
1915	26,744	1,226	441,263	8,275,734	3,806
1914	32,736	1,444	554,411	8,588,565	31,443
1913	35,244	7,514	417,279	4,664,362	129,062

Victoria Consolidated Mining Co.

Owned by Bingham Mines Co. Mine at Eureka, Tintic district, Juab county, Utah.

Property: the Snowflake and Victoria mines, 7 patented claims, 49 acres, at Eureka, which contain chamber deposits of silver-lead ore in limestone. The ore shoots and streaks are of variable size, up to 100′ in width. Copper, occurring as chalcopyrite and tetrahedrite is found with the galena.

Development: includes 1,200′ shaft with several thousand feet of workings. Has compressor, 112 h. p. hoist, and uses electric power. Property is operated through No. 1 shaft of the Eagle & Blue Bell. New work in 1918 amounted to 2,313′, opened a disappointing tonnage of new ore.

Production:

Year	Ore, tons	Gold, oz.	Silver, oz.	Lead, lb.	Copper, lb.	Net profit
1918	6,790	1,048	139,304	176,019	165,508	$44,319
1917	13,543	2,875	338,751	515,993	119,553	122,297
1916	7,339	1,894	79,047	657,416	15,261	35,451
1915	3,071	248	17,985	232,016	.....	.....

Yosemite Mines Co.

Subsidiary of Bingham Mines Co.

Property: 12 claims, patented, in the West Mountain mining district, Bingham Canyon, Utah.

Development: by the Yosemite shaft connecting with the Mascotte tunnel on the 2,200′ level and the 1,650′ Paradox tunnel. In 1918 new work totalled 1,799′. Greater depth was attained on the two ore-shoots in the Lead Mine vein, but conditions were found to be much the same as on the upper levels. The annual report for 1918 says: "The results so far attained in the development of this property are by no means satisfactory."

Production:	Ore, tons	Gold, oz.	Silver, oz.	Lead, lb.	Copper, lb.	Net smelter return
1918	2,010	80	10,189	314,258	21,034	$18,422
1917	795	34	5,849	220,644	10,608	12,301
1916	839	36	5,047	121,776	11,005	9,375

BINGHAM-NEW HAVEN C. & G. MNG. CO. **UTAH**

Absorbed by the Utah Metal & Tunnel Co., and property described thereunder.

BINGHAM-TOOELE MINING CO. **UTAH**

Address: 307 Utah Svgs. & Trust Co., Salt Lake City, Utah.

Officers: S. D. Huffaker, pres.; H. L. Dodd, sec.-treas.; M. T. Awoki, supt., Box 136, Bingham, Utah.

Inc. May 27, 1915, in Utah. **Cap.**, 100,000; 10c par; assessable.

Property: 13 claims, 187 acres, in Middle Canyon, Tooele county. Company was driving a tunnel, 1,600′ long, in May, 1919, to "encounter a bonanza" of copper ore. Is a prospect.

CONGOR GOLD & COPPER MINING CO. **UTAH**

Office: 506 Auerbach Bldg., Salt Lake City, Utah. Mine near Bingham Canyon, Salt Lake county, Utah.

Officers: Glen R. Bothwell, pres. and gen. mgr.; R. C. McConaughy, v. p.; Frank E. Loose, sec., with E. F. Jenkins and C. G. Hall, directors, at last accounts.

Cap., $1,000,000; shares $1 par.

Property: 10 claims, 150 acres, adjoins the Bingham Amalgamated on the north, in Bingham Canyon, Salt Lake county, Utah. Developing 3′ vein from 4,000′ tunnel of Montana Bingham Co., working about 100′ from face of tunnel. Mine reported to have about 100,000 tons of ore exposed, running from $6 to $50 per ton and averaging $14.

Company had a contract with the Montana Bingham Consolidated Mining Co., shipping its ores through the Miller Ore Transportation tunnel of that company to the Denver & Rio Grande railroad tracks at a cost of 25c per ton of ore and 12½c per ton of waste. Probably idle.

EAGLE & BLUE BELL MINING CO. **UTAH**

A subsidiary of Bingham Mines Co. and described thereunder.

FORTUNA MINING & MILLING CO. **UTAH**

Inactive and property sold to Montana Bingham. See Vol. XIII.

GENERAL EXPLORATION CO. **UTAH**

Alfred Frank, gen. mgr., Newhouse Bldg., Salt Lake City, Utah.

Officers: Alfred Frank, pres.; E. L. Newhouse, Jr., v. p.; O. Bamberger, sec.-treas. (all of Salt Lake City), with John MacGinniss, of Butte, directors.

Inc. in Utah, in June, 1915. **Cap.**, 10,000 shares; $1 par; 7,500 outstanding.

Company operated the Ohio Copper Co. property until it was taken over by the reorganized Ohio Copper Co. of Utah. Royalties aggregating upwards of $500,000 were paid, and lessees are said to have made large profits.

GREAT DIVIDE MINES CO. **UTAH**

Inactive. **Office:** 521 Atlas Block, Salt Lake City, Utah.

Inc. Aug. 15, 1903, in Utah. **Cap.**, $2,000,000; $5 par. Company controlled Western Mining & Milling Co. and Homestead Tunnel & Copper Co.

Property: 108 claims, mainly patented, 1,735 acres, 600 considered as well mineralized, with 160 acres mill and smelter sites, lying on the Tooele side of the Oquirrh mountains and on the summit of the range, west of the holdings of the Utah Consolidated. Property shows Cambrian quartzite, monzonite-porphyry and altered limestone, with a number of fissure veins and contact deposits between limestone and quartzite. Claims cover 11,600′ on the westerly course of the mineralized limestone beds of Bingham. This tract is 2 1/6 miles from E. to W. and 10,800′ N. S., and contains the apexes of many ore-bearing fissures, and the westerly extensions of the ore-bearing limestone bed worked in the Utah Consolidated, Bingham New Haven, Utah Apex and Yampa Mines.

Development: includes the 400′ Homestake tunnel in Pine Canyon, 525′ North tunnel at 6,600′ elevation, and the 2,457′ Spring tunnel. These tunnels are prospect work only, but ore is cut in the last named at 1,050′ and shows a 5′ width for 40′ along the drift and in a 25′ raise. A vertical E. W. fissure 100′

wide is also cut at 2,250′ from the portal and shows kidneys and stringers of silver-lead ore.

Equipment: includes a 35-h. p. electric plant, with a 1-drill compressor, and there are 10 buildings, including a small power house, 2 smithies, a bunk house, stable and dwellings. Electric current is taken from the Telluride Power Co., over this company's private line from the sub-station at Bingham. Property was under lease and bond to the Homestake T. & C. Co., which expired July 1, 1919. No later information.

HIGHLAND BOY GOLD & COPPER MINING CO. **UTAH**

Controlled by Utah Cons. Mining Co., and described under that title.

INTERMOUNTAIN MINING & INDUSTRIAL ASS'N **UTAH**

Thos. B. Crawford, sec., Ouray, Colo.

Inc. 1905, in Arizona. **Cap.**, $5,000,000; par $1.

Property: Mystic Shrine group of claims, at Bingham, which adjoins property of Utah Copper Co. Evidently idle, and for sale.

KEYSTONE EXTENSION MINING CO. **UTAH**

Mine near Bingham, in West mining district, Salt Lake county, Utah. Company inactive for some time owing to heavy flow of water in mine workings. Property covers about 3,000′ of the Keystone vein outcrop and shows ore said to average $14 per ton in gold, silver, lead and copper values, from surface down to bottom of 165′ shaft.

Development: by inclined shaft with drifts on vein opening up stopes from which shipments have been made. The Montana Bingham Consolidated Mining Co. was to open the ground by its deep tunnel, thus eliminating pumping costs and heavy wagon-haul charges on ore shipped.

MINERAL LANDS CO. **UTAH**

Idle. **Office:** 102 Exchange St., Portland, Me. Carl W. Smith, treas.

Inc. 1913, in Maine. **Cap.**, $100,000; $5 par. Company owns large interest in Bingham Coalition Mines Co., also Vespasian-Hoogly group of claims in Markham gulch, Bingham, and other mining interests. Treasurer reports, March, 1919, that company has a substantial surplus.

MONTANA-BINGHAM CONSOLIDATED MINING CO. **UTAH**

Office: 66 West Broadway, Salt Lake City, Utah. **Mine office:** Bingham Canyon, Utah. J. Benton Leggatt, gen. mgr.

Officers: C. G. Ballentyne, pres. and mng. dir.; E. A. Vail, v. p.; J. B. Mossman, sec.-treas., with W. E. Hubbard, Imer Pett, L. B. McCornick, and J. B. Leggatt, directors.

Inc. July, 1910. **Cap.**, $3,000,000; $1 par; issued, 2,385,802; assessable. An assessment of 10c a share, levied March, 1918; one of 3c in November, 1918, and a third, 2c in May, 1919. Annual meeting, first Tuesday in March. Owns 156,000 shares of Bingham Amalgamated C. Co stock. Debentures: $200,000, 6%: $178,600 outstanding; due June 1, 1918; extended to June 1, 1919.

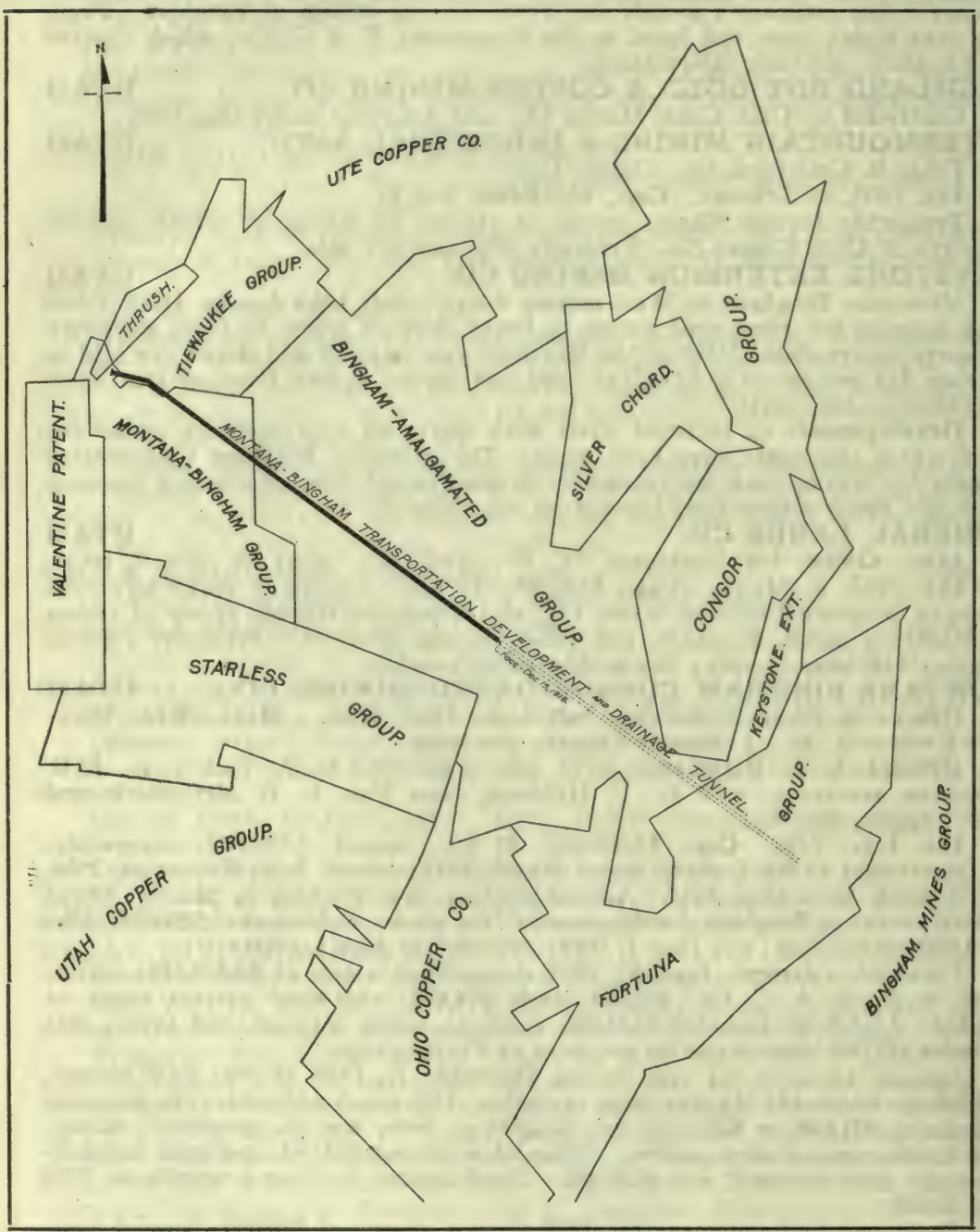
Financial statement, June 30, 1919, shows fixed assets of $3,428,756; investment in the B. A. C. Co., $52,650; cash, $14,645, with total current assets of $36,422. Liabilities included $120,066, accounts, notes, interest, and taxes; this includes $75,000 balance due on purchase of Fortuna mine.

Income statement for year ending December 31, 1918, shows: total income, $38,240, of which $31,325 was from ore sales. Office and administrative expenses wiped out, $31,548, or 82%; of this $13,500, or 35%, was the president's salary, and $5,560, general office salaries. Mine labor totaled $53,043, and total expenditures for mine and mill was $135,481. Total income for first 6 months in 1919 was $8,008.

Profit and loss statement for 1918 show a charge of $10,000, "special compensation to president—for surrender of life position in Honolulu, for loss through sacrifice sale of personal effects and property, and to cover expenses of moving to Salt Lake City," he also received 50,000 shares of capital stock as part compensation.

In 1919, a committee representing the minority stockholders' interest was "instrumental in causing the cancellation of the contract which employed the president and general manager for five years with a salary of $15,000 per annum

for two years and $25,000 per annum for three years thereafter, of which contract a little more than one year had run; also has been instrumental in causing economies in the overhead expenses of the company to the extent of several hundred dollars per month."



PART OF BINGHAM DISTRICT, UTAH

Property: consists of 335.5 acres, patented, in the West Mountain mining district (Bingham), Salt Lake county, Utah, comprising the Fortuna group of 23 claims, 170.8 acres, in the Keystone and Dalton gulches, and the Thrush claims, 6.2 acres, underlying the town of Bingham; (2) the Eddie group of 4

claims, 50.3 acres in Bingham Canyon; (3) leases and options on the Valentine patent and Tiewaukee group, 10 claims, 114 acres, in Bingham Canyon.

The Montana-Bingham Transportation & Drainage tunnel over 5,540′ long, enters the mountain in the N. W. corner of the Eddie group, within 50′ of the D. & R. G. railway, and runs S. E. through the Eddie group, then through the Bingham Amalgamated Copper Co. group and the Congor Cons. Mng. company's ground to the Fortuna group. This tunnel crosscuts, nearly at right angles, the Eddie and Cleveland veins of the Eddie group, the Copper Glance and Manifay veins of the Bingham Amal. group, the veins of the Conger group, the Chester and Virtick veins of the Keystone Extension Co.'s group and the Sierra Grande, Fortuna and Mayflower veins of the Fortuna group. The three last named veins, are cut 470′ vertically, or 1,400′ on the dip, below the lowest of the 3 long drift tunnels of the old Fortuna mine, but the S. rake of the orebodies opened in the old mine, carries them 1,700′ or more south of this tunnel. Extensive lateral development was done to block out ore. The Mayflower vein at this horizon shows an oreshoot estimated by the manager to be 700′ long, 22′ thick, and 1,400′ on the dip, equal to 1,500,000 tons of 2% ore with an equal amount between the M. B. tunnel and the Mascotte (of the Ohio Co.), 550′ vertically below it.

Geology: the Fortuna group, the most important holding of the company, shows an intruded sheet of monzonite-porphyry in tilted series of quartzite and limestone beds, traversed by four nearly parallel veins following the strike and dip of the monzonite sheet or of the quartzite bedding, occasionally cutting across and accompanied by some fracturing and crushing. These veins are 2′ to 25′ thick, and carry streaks and shoots of pyrite, with varying copper value, as chalcopyrite and chalcocite. Southern workings have shoots of silver-lead ore and in Eastern end of workings lenses of ore occur that are 20′-50′ thick and carry 2% copper.

These veins are opened by the 4,200′ Keystone tunnel and 3 other tunnels comprising the old workings of the Fortuna mine.

Tiewaukee mine: 9 claims, 45 acres, is explored by a main tunnel, over 1,000′ long, cutting several bedded veins, large stopes of old workings north of it, contain much milling ore. Pillars left in stopes show 18.9% lead, 6% copper, 27 oz. silver per ton. Tiewaukee shaft is 90′ vertical, connecting with a drift from the main tunnel, while shaft continues as an incline on the bedded vein.

The Valentine mine, also in Bingham Canyon, has been an irregular shipper from an orebody assaying 4% copper. It has a 500′ tunnel and 225′ shaft, cutting a vein of silver-copper ore.

Company has contracts with Bingham Amalgamated C. Co. and will receive 10% of net proceeds on all ore shipped through the tunnel; from Keystone Extension Mng. Co., 25c per ton of ore and 12½c per ton for waste; from Bingham-Congor C. Co., 15c p. t. of ore or waste; from Fortuna Mng. Co., 25c p. t. ore and 15c per ton for waste; also an agreement with Col. E. A. Wall to handle Starless ores when drift from tunnel has been extended on one of Montana-Bingham veins into Starless ground; 300,000 gallons water per day is flowing from tunnel, which is valuable for milling, etc.

Production: Nov., 1918, to July 9, 1919, was 1,547 tons of ore yielding $20,720 net smelter returns. About half of this ore was mined by leasers.

Work was resumed in June, 1919, after a shutdown of four months. Shipments for 1919 totaled 4,763 tons of ore containing 220 oz. gold; 14,667 oz. silver; 99,051 lb. lead; 358,212 lb. copper, all of a gross value of $110,390. Operations for 1919 resulted in an expenditure of $15,829 over and above ore returns.

NEW ENGLAND GOLD & COPPER MINING CO. UTAH

Went into hands of receivers in 1915.

Office: 67 Milk St., Boston, Mass. **Mine office:** Bingham Canyon, Salt Lake county, Utah.

Officers: Jas. S. Williams, pres.; E. E. Abercrombie, v. p. and managing director; Geo. F. Bradstreet, sec.-treas.; preceding, with Woodford Yerxa, Francis H. Dowse and Geo. Bancroft, directors.

Inc. June, 1899, in Colorado. **Cap.**, $2,000,000; shares $10 par; issued, $1,294,467.

Bonds: $500,000 authorized, at 6%; issued, $390,000. Paid a 10% stock dividend, October, 1908. Federal Trust Co., Boston, registrar; Geo. F. Bradstreet & Co., transfer agents. Annual meeting, first Monday in June.

Property: the Bingham group of 9 fractional claims, 18 acres, in the Bingham, or West Mountain district, Utah, south of the Boston Consolidated, and near the Utah Metals property. The company also owns a group of 4 claims at Goldfield, Nev.

The old Nast mine of the Bingham group shows porphyry cut by 3 fissure veins, of 30″ average width, opened by the 1,600′ Nast tunnel and the 1,670′ Benton tunnel, both in ore, and 2 shafts, 1 of 159′, with a total of about 6,000′ of workings. Ores said to average 30% lead, 10% zinc, 15 oz. silver and $4.50 gold per ton, with small and variable percentages of copper.

Equipment: includes a steam plant with 2 hoists, 1 of 30-h. p., good for 800′ depth. The concentrator has a 4x12″ crusher, 2 rolls, 2 Hartz jigs and 1 Wilfley table, operated by commercial electric current.

Production: was 2,108 tons of lead concentrates and 165 tons of copper ore, 1907, but property was closed down, late 1907; mine was worked on only a small scale, 1908 to 1910, securing 936 tons of ore, giving net smelter returns of $36,986. In 1910, the Utah Metal Mining Co. sued this corporation for $700,000 damages, alleging tresspass and illegal ore-extraction. A survey proved that company was not guilty of tresspassing and suit was cancelled.

In 1911 the mine produced milling silver-lead ore, yielding 150 tons high-grade concentrates per month, netting the company $25,874. In 1913 output was reduced to 8,360 and the mine was shut down by reason of western creditors forcing their claims. The Trust Co. holding mortgage securing the bonds, foreclosed same, December, 1915, at request of the bondholders and a reorganization of the company was contemplated. Interest, amounting to $46,800 on bonds has not been paid since February 1, 1914.

NEW UTAH BINGHAM MINING CO. **UTAH**

Described in Vol. XIII. Property and assets acquired by New York Bingham Mining Co., which see.

NEW YORK BINGHAM MINING CO. **UTAH**

Acquired property and assets of New Utah Bingham Mining Co.

Office of treasurer: H. A. Bellows, Suite 711, No. 53 Park Row, New York City. **Mine office:** Bingham Canyon, Utah.

Officers: T. B. Beacher, pres.; H. A. Bellows, treas.; R. L. Reisch, sec.; with F. T. Bellows, J. W. Thompson, E. S. Burns and H. F. Hoevel. directors.

Inc. Nov. 19, 1918. **Cap.**, $200,000; shares 20c. par; 73,648 shares outstanding, March, 1920.

Bonds: of old company outstanding when property was taken over, $14,000. Stock was exchanged share for share. Annual meeting, November 17.

Property: 20 claims, 19 patented, 130 acres adjoining the Telegraph of the United States Mining Co., in Bingham Canyon, Utah. Claims cover about 3,000′ along the footwall portion of the Jordan limestone ore-bearing zone of Bingham. The large orebodies of this district are found in fissures within the limestone, or along limestone contacts, and the Jordan belt is the most productive of the 3 belts known in the camp; 16 fissure veins have been opened. Before the company acquired the property a number of promising veins carrying ore in the porphyry, but too narrow to be valuable, had been exposed. These veins pass into the limestone and are expected to have large orebodies at the contact. Ore is mainly silver-lead.

Development: consists of about 15,000′ of work, mainly by 3 tunnels. In the Turngren tunnel, over 1,300′ long, 8 veins from 1 to 4′ thick have been cut, 7 showing ore and 2 of them worked. These two veins run north, are parallel and contain high-grade ore in the Spanish mine and along the outcrop in the company's ground. The Harrison tunnel, 600′ long, is in quartzite and will crosscut the Rough and Ready veins, which are opened by 3 other tunnels higher

up the mountain, all showing ore. Work on these veins has been discontinued and all work concentrated on the Giant Chief.

The Giant Chief vein is a fault fissure, developed by a 200′ shaft from which further exploration is being conducted on the 150′ level; 600′ of drifts and cross-cuts driven in 1915 from this point have at 800′ depth in the sulphide zone cut 7 fissures encountered in the higher workings. These veins carry oxidized mineral matter, surrounded by a soft lime, and show porphyry mineralized with iron pyrites. A small vein of carbonate ore, running nearly 50% lead, has been opened; the Bonanza tunnel was driven 977′ along the Giant Chief vein, and across it to reach the ore, 150′ deeper than where first opened.

Equipment: includes compressor, 180-h. p. electric plant, taking current from the Utah Power & Light Co., hoist and all necessary buildings.

Production: several cars of ore reported to have been shipped during the past 2 years, running from 6 to 12 oz. silver, and 20 to 38% lead. Lessees are working the lower tunnels.

Property is well adapted for tunnel work, has large blocks of virgin ground and is considered promising. Company is an intermittent producer.

NIAGARA MINING CO. UTAH

Is controlled by United States Smelting, Refining & Mining Co., which see.

NORTH BINGHAM CONSOLIDATED MINING CO. UTAH

Office: Provo, Utah. Mine near Bingham Canyon, Salt Lake county, Utah. Jesse Knight, pres.; Wm. W. Matthews, v. p.; W. Lester Mangum, sec.-treas., and J. Wm. Knight, directors.

Inc. June, 1907, in Utah. **Cap.**, $100,000; shares 10c par; assessable; Is controlled, through stock ownership, by the Knight Investment Co.

Property: 6 claims, in Barney Canyon, has a very wide ore zone, said to show leached ore carrying traces of copper and up to $2.80 gold per ton.

Development: includes a tunnel of about 1,000′, and a 2-compartment shaft. Property is considered a good development proposition. Idle.

OHIO COPPER MINING CO. UTAH

Property sold at foreclosure sale, August, 1916, to representatives of bond-holders' committee and company reorganized as Ohio Copper M. Co. of Utah, which see. Also see Vol. XII.

OHIO COPPER MINING CO. OF UTAH UTAH

Office: 43 Exchange Place, New York. **Operating office and concentrator:** Lark, Utah.

Officers: H. E. Rogers, pres.; Chas. A. Kittle, v. p.; E. S. Hooley, v. p.; above with J. H. Flagler, M. N. Buckner, A. R. Rogers, A. R. Peacock, Hugh Aiken and S. B. Sherman, directors. G. M. Colvocoresses, gen. mgr. Jos. A. Heitzman, sec.; S. K. Kellock, treas.-asst. gen. mgr.

Inc. Nov., 1916, in Maine, as a reorganization of the Ohio Copper Mining Co., formerly the Ohio Copper Co. **Cap.**, $2,500,000; $1 par; 2,225,625 shares issued. Listed on Salt Lake Exchange and on Boston Curb. New York Trust Co., transfer agent. Price range 70c. to $1.05 in 1918; 35c. to 50c. in 1919.

Balance sheet as of December 31, 1918, shows: total assets, $2,676,732, which includes: property, $2,096,793; stocks and bonds of Bingham Central Ry., $327,820; current, $118,108; prepaid insurance, interest, etc., $21,087; general profit and loss-deficit, $112,925. Liabilities show: capital stock, $2,225,625; 3-year convertible 7% notes dated September 20, 1918, $250,000; current, $156,389; sundry reserves, $44,718.

Profit and loss statement shows: total value metals produced, $817,210; cost of production, $941,745; operating loss, $124,535; rents, interest received, etc., $2,999; miscellaneous expenses, $18,764; profit and loss deficit, 1918, $140,300. Deficit, December 31, 1918, $112,924. Fire loss, due to burning of the mill, is given as $104,233.

Revenue in 1919 was $188,599 from concentrates sold, and expenses were $230,386.

For detailed history of old company and the plan of reorganization, see Vol. XIII of the Mines Handbook.

Property: 14 claims, patented, 120 acres, bounded on the N. and W. by holdings of the Utah Copper Co., on the E. by the Montana Bingham Cons. M. Co., on the S. by United States Mining Co., and on S. W. by the Boston Consolidated. The Mascotte tunnel, owned by the Bingham Central railway, a subsidiary company, charges toll on all ore hauled to the mills.

Geology: property carries a belt of quartzite 500′ wide carrying 2 parallel veins known as the What Cheer and All's Well. These veins are more than 500′ apart, and separated by mineralized quartzite which constitutes the main orebody of the property, the ore averaging 1.015% copper. The quartzite, which adjoins the laccolithic mass of monzonite-porphyry of the neighboring Utah Copper and Boston Consolidated properties, is much shattered and broken, with ore disseminations and impregnations along shatter and cleavage planes, ore in the brecciated material being chiefly chalcocite and chalcopyrite, associated with pyrite, readily amenable to concentration, and lying above the level of the Mascotte tunnel.

Estimates of ore developed vary greatly, the former management claiming that ore had been developed under about 5 acres, the "porphyry" orebody being estimated as 400′ wide, 1,000′ long and 600′ deep. One estimate gave 3,746,165 tons of ore developed with 9,738,690 tons of probable ore and the average tenor probably about that of the ore milled, or 1.01% copper. Proven ore reserves July 31, 1919, were 6,000,000 tons of 0.8% copper, with another large block of ore not yet fully developed that averages 1% copper.

The 14,000′ single track Mascotte tunnel, connecting with the shaft at depth of 1,100′, cares for the large volume of water coming from the workings. Ore is blocked out in 100′ squares, with extensive development on the 3rd, 5th and 7th levels, and the caving system is used in extraction. Ore is sent from the upper workings, through chutes, to a 4,000-ton ore-bin, 20′ wide and 200′ long, extending over both tracks; loaded in about 4 minutes from the bins into trains of 18 to 20 five-ton double-bottom steel cars, and hauled by electric locomotives, to the concentrator at Lark.

The mill: at Lark, 3,200′ from the mouth of the Mascotte tunnel. On August 10, 1918, fire destroyed the mill. It was rebuilt and operations were again started, October 1, and by February 23, 1919, the 5-unit flotation mill was completed. On March 10, 1919, all operations were stopped on account of the lack of demand for copper.

Production: in 1918 was 3,362,119 lb. copper, compared with 5,279,259 lb. in 1917. In 1918, there was also produced 5,290 oz. silver and 731 oz. gold.

Output in 1919 was 1,012,920 lbs. copper, 1,149 oz. silver and 96 oz. gold.

A special stockholders' meeting was called for September 10, 1919, to authorize an increase in the capitalization to 3,500,000 shares of $1 par, 1,000,000 of which will be kept in treasury to provide for converting $1,000,000 7% ten-year bonds to be sold to further finance operations and retire $250,000 of three-year notes.

Reported, November, 1919, that a syndicate had underwritten $550,000 of the authorized bond issue.

With this financing successfully completed and if copper stays above the 20 cents per pound mark, it is expected that Ohio Copper will quickly be put on the permanently profitable basis outlined by President Rogers and made possible by modern facilities.

PHOENIX MINING CO. **UTAH**

See Utah Apex Mining Co.

PINE CANYON & BINGHAM TUNNEL CO. **UTAH**

Office: 121 N. W. Temple St., Salt Lake City, Utah.

Officers: J. B. Moreton, pres.; Richard Savage, v. p.; Homer Benton, 2nd v. p.; Louis Levine, sec.-treas.

Inc. July 28, 1916, in Utah. **Cap.,** $1,500,000; $1 par; 800,000 issued and in secretary's hands.

Property: 42 claims, 150 acres patented, covering apex of mountain, W. of Bingham, shows two N. E.-S. W. fissures, a bedded contact deposit and the

Star vein, in quartzite carrying limestone beds and cut by Bingham monzonite porphyry.

Company owns 2,000′ tunnel running from Pine Canyon toward Bingham. Portal of the tunnel will be 1½ miles from the International smelter at 5,600′ elevation. The Great Western tunnel at an elevation of 7,300′ is between the Great Divide group and the Star group, half way up the mountain side between the Nancy Hanks and the portal of the new Pine Canyon tunnel. Company does not reply to requests for information.

SILVER SHIELD MINING & MILLING CO. **UTAH**

Office: McCornick Bldg., Salt Lake City. **Mine office:** Bingham Canyon, Utah.

Officers: Henry Cohn, pres.; H. S. Joseph, v. p.-gen. mgr.; Allen T. S. Sanford, R. E. Miller, N. G. Hall, D. L. Wertheimer, J. A. Barclay, directors.

Inc. in Utah. **Cap.,** $300,000; shares $1; assessable; assessment No. 49 2c. a share, was levied in February, 1919; last assessment, 2c., delinquent, September 20, 1919; 298,700 shares issued. Paid $4,500 in dividends prior to 1903. Listed in Salt Lake City. Financial statement covering period January 1, 1916, to July 1, 1918, showed total receipts of $48,166, including $8,028 from ore sales, $14,800 from treasury stock sales, and $12,000 from assessments. Disbursements amounted to $48,166. Cash balance October 1, 1919, was $4,441, compared with debt of $7,162 year previous.

Property: about 320 acres, at Bingham Canyon. **Ore:** carries mainly silver-lead, with some gold.

Development: by shaft and 8,000′ tunnel to depth of 538′. Workings connected with tunnel of the U. S. Mng. Co. In February, 1919, a carload of high-grade ore was in the bins ready for shipment, but property is still in development stage. Reported that lessees opened a body of good ore early in 1920.

Equipment: hoist, 5-drill compressor, 50-h. p. motor, etc.

STARLESS MINE **UTAH**

Office: care Col. Enos A. Wall, owner, Salt Lake City, Utah. **Mine office:** Bingham Canyon, Utah.

Property: 8 claims patented, 160 acres, lying N. E. of the holdings of the Utah Copper Co., is developed by an incline shaft and numerous tunnels, longest 2,000′, with crosscuts and upraises, aggregating 10,000′.

Development: said to block out 800,000 tons of 1 to 2% copper ore.

Equipment: includes a hoist.

The 125-ton mill, idle, though it was enlarged and remodeled 1910, at a cost of $50,000, is equipped throughout with machinery of Col. Wall's own design, comprising Wall corrugated rolls, Wall steel rolls for middlings, 3 sets of jigs, 2 tables for concentrates, 2 Wilfley tables, and washers, of trough form, with valves and sprayers, concentrates being discharged through the bottom and sands from the top.

STIBNITE MINING CO. **UTAH**

Address: H. C. Baker, 2421 Washington Ave., Ogden, Utah.

Officers: H. C. Baker, pres.; A. M. Miller, v. p.; G. M. Flowers, sec.-treas., with Leroy Buchmiller and H. J. Craven, directors.

Inc. April, 1917, in Utah. **Cap.,** $100,000; 10c par; 800,000 issued.

Property: 686 acres, patented, 4 miles N. of Bingham, in Wasatch Range, Box Elder county, Utah.

Development: by 2,452′ adit, total openings 4,315′ to depth of 800′, showing various types of ore deposits in limestone, quartzite and shale, the ore containing lead and antimony. Reserves are estimated at 126,000 tons. Antimony ore mined in 1916 was 67 tons, assaying 66% metal.

Equipment: compressor, 6,200′ tram, 125-ton concentrating plant. Flotation was to have been added in 1918. No recent information, probably inactive.

TOM MOORE GROUP **UTAH**

Office: 159 South State St., Salt Lake City, Utah. **Mine office:** Bingham Canyon, Salt Lake county, Utah. A. M. Surbaugh and Thos. Moore Surbaugh, owners.

Property: 39 claims, 22 patented, 715 acres, with direct rail connection, in the N. E. part of the Bingham camp.

Development: by 16 shallow shafts and short tunnels, principal work being by the Highline tunnel, with another tunnel driving at lower depth. The mine carries gold and silver-bearing lead and copper ores, with small quantities of native copper, in quartz. Owners do not care to have output or other details made public, and returned letters unopened. Probably idle.

UNITED BINGHAM COPPER CO. **UTAH**

Officers: L. A. Marks, pres.; G. R. Bothwell v. p.; F. R. Snow, sec.-treas., 252 Canyon Road, Salt Lake City, with P. E. McConaughy, and W. P. Davis, directors.

Inc. 1919, in Utah. **Cap.**, $100,000; 10c par; issued 900,000 shares.

Company is the successor of Bingham Amalgamated Copper Co., described in Vol. XIII. The new company was organized in order to make the stock assessable. Old stock was exchanged for new on payment of 1c. a share.

Property: 22 claims, 300 acres, patented, known as the Illinois and Copper Glance groups, carrying 7 mineralized veins. The principal orebodies exposed in the Bingham Amalgamated are on the same vein as the Congor orebodies and of about the same character of ore. Vein is 15 to 40′ thick, developed for several hundred feet in depth, but the water and high cost of wagon haul stopped further development. In a tunnel on the west side of the property a 20′ vein shows streaks of good ore all through it. The Montana Bingham tunnel cuts this vein about 100′ deeper, 3,948′ from the portal, and opened it for 100′. Samples taken from this vein said to run from 3.2-6.5% copper, 7 oz. silver, $1.20 gold and 25% iron. Development work resumed the latter part of 1915 after an idleness of several years.

The Illinois has a 640′ shaft, with a 6 to 9′ vein carrying a 2′ pay-streak of about 5% copper ore; with occasional assays up to 40%, the average of 50 assays being 2.8% copper, 2 oz. silver and $2 gold per ton. The Copper Glance group has a 1,400′ tunnel, in McGuire gulch. Mine has a total of 2,450′ of workings.

In summer of 1917, company mined ore from a raise at the East end of the 300′ level. A trial shipment of 90 tons in June, yielded $25 per ton, the ore carrying 4.73% copper, 2 oz. silver, $1 gold, and 26.4% iron and 35.6% insoluble. The shaft, flooded in July was reopened later. Recent work has been on a small scale on the 400′ level, east side; some ore was shipped in 1918. Company plans more active exploration work in 1920.

UTAH-APEX MINING CO. **UTAH**

Office: 10 Post Office Square, Boston, Mass. **Mine office:** Bingham Canyon, Utah.

Officers: R. F. Haffenreffer, Jr., pres.; J. J. Murphy, v. p. and treas., with N. P. Duvally, sec.; G. F. McGahey and M. W. Sangy, directors. V. S. Rood, mgr.

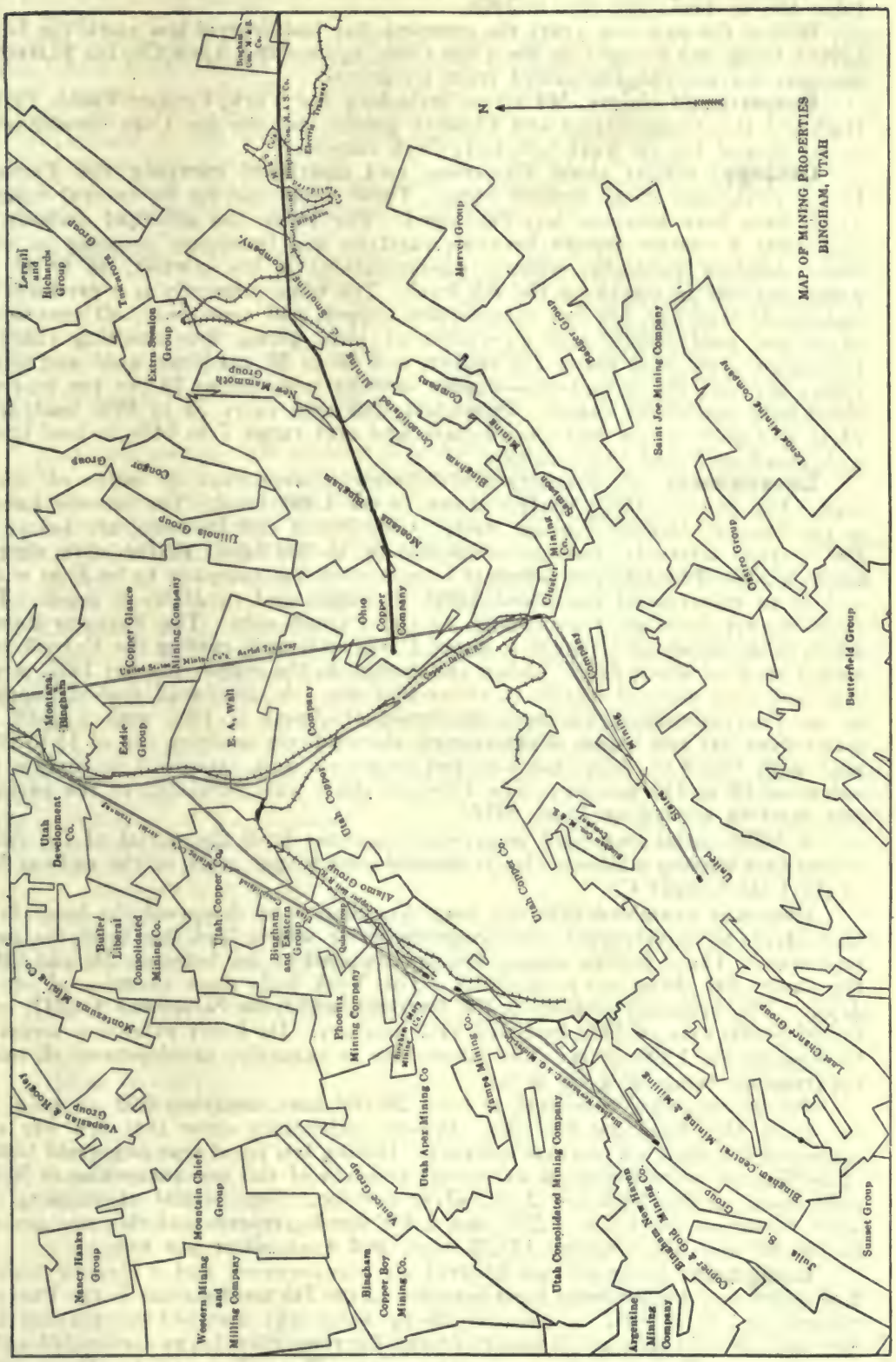
Inc. May, 1902, in Maine, as a merger of the Copperfield Mining Co. and York Mining Co. **Cap.**, $3,000,000; increased 1906, from $2,500,000; $5 par; issued 528,200 shares. State Street Trust Co., Boston, transfer agent. Listed on Boston Stock Exchange and on New York Curb. Price range $1¾ to $4⅛ in 1918; $1⅛ to $3⅞ in 1919.

Bonds: $500,000; authorized at 6%, convertible, were retired July 1, 1916. Company absorbed the Highland Boy, Petro, Minnie and Phoenix mining companies. Annual meeting, second Thursday in November.

Balance sheet for year ended August 31, 1918, shows assets totaling $3,770,031, including $2,480,789 for cost of properties; $302,781 cash; $507,798 for development and equipment.

For fiscal year ending August 31, 1918, gross receipts from ore sales, royalties, etc., were $1,761,044. Mining, development and milling cost, $1,189,306; miscellaneous expenses including general insurance, taxes, depreciation, etc., $121,580; litigation expenses and settlement of claims, $68,139, leaving a net profit of $255,858. Dividends absorbed $132,050.

Gross receipts for 1919 were $923,888, as against expenses of $1,097,995.


MAP OF MINING PROPERTIES
BINGHAM, UTAH
N
Lerwill and Richards Group
Tuscarora Group
Extra Session Group
New Mammoth Group
Smelting Company
Marvel Group
Badger Group
Saint Joe Mining Company
Lenox Mining Company
Congor Group
Illinois Group
Montana Bingham
Bingham Consolidated Mining Company
Samson Mining Company
Cluster Mining Co.
Ohio Copper Company
Copper Glance Mining Company
United States Mining Co's. Aerial Tramway
Copper Belt R.R.
Montana Bingham
Eddie Group
E. A. Wall
Utah Copper Company
Utah Development Co.
Butler Liberal Consolidated Mining Co.
Utah Copper Co.
Alamo Group
Bingham and Eastern Group
Phoenix Mining Company
Montezuma Mining Co.
Vespasian & Hoogley Group
Yampa Mining Co.
Utah Apex Mining Co
Utah Consolidated Mining Company
Bingham New Haven Copper & Gold Mining Co.
Argentine Mining Company
Bingham Central Mining & Milling
Last Chance Group
Julia S. Group
Sunset Group
Butterfield Group
Oastro Group
Mountain Chief Group
Nancy Hanks Group
Western Mining and Milling Company
Bingham Copper Boy Mining Co.
Venice Group

Dividends: initial quarterly dividend, 12½c, paid Oct. 1, 1915, 75c in 1916; 50c. in 1917; and 50c. in 1918.

Within the past few years the company has had several law suits, the latest (1919) being one brought by the Utah Cons. against the Apex Co. for $1,000,000 damages for ore illegally mined from its ground.

Property: 34 claims, 244 acres, including the York, Copper Field, Petro, Highland Boy Consolidated and Phoenix groups, adjoins the Utah Consolidated on the S. and W., on York hill, Carr Fork canyon.

Geology: claims show limestone and quartzite, carrying the Parnell, Petro, York, and Andy bedded veins. These veins are cut by several fissures which have been more or less developed. The Dana, the principal orebody, is apparently a contact deposit between quartzite and limestone, showing an ore-shoot standing vertically, without disseminations in the contact, up to 15′ in width and 500′ in length on the 4th level. The mine primarily is a producer of high-grade lead ore, but has considerable copper, and some zinc; all ores carry silver and gold values with an excess of iron, giving low smelting charges. First-class ores carry about 2% copper, and $6 to $8 combined gold and silver values per ton, the second-class copper ores carrying about $3 per ton in combined gold and silver values. First-class lead ores carry 35 to 50% lead, with silver and gold values, and second-class lead ores range 7 to 14% in lead tenor, with small gold and silver values.

Development: by 3 shafts and 6 tunnels, with over 20 miles of openings. The main working shaft is down to the 1,800′ level. The tunnels, known as the Parnell, Minnie, Smilax, Andy, Andy No. 2 and Parvenu, are spaced at 200′ vertical intervals, and are connected by incline blind shafts, with electric hoists, on the Parnell vein, which is estimated by the company to be 5′ in width and to be mineralized for about 1,000′ in length and to 2,000′ in depth. The Andy tunnel develops 3 ore-shoots, on the Parnell vein. The Parvenu tunnel, which is the principal working, is about 1 mile in length, cutting the Parnell vein with a back of about 2,200′. Since the decline in the copper market 1907, attention had been devoted mainly to silver-lead ore. A silver-lead orebody opened in the Parvenu tunnel, having a maximum thickness of 100′, with a width of better than 100′ and length undetermined, shows direct smelting ore of 15 to 20% lead, with 3 to 5 oz. silver per ton, and excess of iron, estimated to contain net values of $8 to $10 per ton. The Parvenu shaft was completed to the surface, and hoisting started in April, 1917.

A 3,000′ aerial tram, not in present use, runs from the portal of the Andy tunnel to a loading station. Ore is shipped over a spur track of the railway line of the Utah Copper Co.

Mine was examined 1916, by Pope Yeatman, who discussed the lead-silver, lead-silver-zinc and copper ore occurrences, of which lead has been the most important. There is little chance for development of ore between 200 and 1,000′ but above 200′ there are possibilities. The York beds show promise of ore at depth. The principal orebody is the Parvenu, which on November 1, 1917, contained 50,000 tons of 14% lead and 14% zinc ore. Its lower extension seems to be close to the 1,500′ level. The future lies in extensive development, all other departments being in good order.

Ore reserves are estimated at over 200,000 tons, assaying 0.03 oz. gold, 3.5 oz. silver, 11% lead and 8% zinc. Present indications show that new ore will maintain, if it does not increase reserves. During last fiscal year important bodies of milling ore were found on 100′ level; reserves of this ore amounting to 50,000 tons, assaying 8% lead and 2 oz. silver per ton. New bodies of shipping ore were found on the 1,150′, 1,225′, and 1,300′ levels; reserves of this ore amount to 160,000 tons ore assaying 12½% lead, and 4 oz. silver per ton.

Equipment: includes two 15-drill air compressors and 2 electric hoists, 1 of which is a double-drum hoist installed at the 7th level station in the Parvenu tunnel. In April, 1917, a new Nordberg hoist was installed on the surface The old Phoenix mill at the mouth of the Parvenu tunnel was dismantled and a new 200-ton mill built 1909, on the same site. The mill is said to effect a concentration of 4 into 1, with a saving of about 77% of assay values. In 1914,

company increased the capacity of the concentrator to about 350 tons daily, and in 1915 a flotation equipment was added. In 1918, a large electric compressor was added.

The mill treated 53,518 tons of lead ore in the year ended August 31, 1916, from which 16,947 tons of concentrates were recovered; and 2,010 tons of copper ore. Average cost of milling was 72.2c. per ton in 1915, as compared with 79.8c. in 1914. In 1917 the mill treated 17,637 tons of ore, assaying 0.034 oz. gold, 3.76 oz. silver, and 11.37% lead. In 1918, 49,742 tons were milled.

Company has contracts with U. S. Mng. & Sm. Co. and American Sm. & Ref. Co. for daily shipments of 300-400 tons lead zinc ore and lead ore and concentrates respectively. Employs over 500 men.

Production, years ended August 31:

Year—	Gold Oz.	Silver, Oz.	Lead, Lbs.	Copper, Lbs.
1919	2,257	195,715	14,753,984	386,833
1918	6,171	641,551	42,811,805	1,427,576
1917	3,551	396,989	24,414,451	.....
1916	4,924	620,022	37,304,675	2,355,475
1915	4,000	560,000	32,000,000	2,400,000

Zinc produced in 1919 amounted to 7,671,742 lb.

Mine idle from May until late in September, 1919, when shipments were resumed. November outputs averaged about 500 tons daily.

It is said that a large tonnage of milling ore is available.

UTAH CONSOLIDATED MINING CO. UTAH

Office: 42 Broadway, New York. **Operating office:** 608 Dooly Block, Salt Lake City, Utah. Mine office: Bingham Canyon, Utah.

Officers: R. H. Channing, Jr., pres.; Adolph Lewisohn, v. p.; with Sidney Chase, J. S. Dunstan, H. N. Anthony, J. W. Allen, Maxwell Woodhull, directors; A. H. Melin, sec.-treas.; Frederick Cowans, gen. mgr.; A. S. Winther, supt.; T. S. Van Wagoner, purch. agt.

Inc. 1903, in New Jersey. **Cap.,** $1,500,000; shares $5 par.

Is a reorganization of Utah Consolidated Gold Mines, Ltd., a British corporation that in turn succeeded the Sevier Gold Mines, Ltd., October, 1896. Property of the Utah Consolidated Mining Co. is 2,490 shares of the 2,500 shares of the capital stock of the *Highland Boy Gold & Copper Mining Co.,* of New Jersey, the latter corporation holding direct title to the Utah properties. The company also owns 8,250 shares of the Anaconda Copper Mng. Co., stock derived from sale of Internat'l S. & R. Co.

Shares are listed on the Boston and Salt Lake Stock Exchanges. Price range, $7 to $10 in 1918; $7½ to $12¾, July, 1919. Transfer agent, International Trust Co., Boston. Annual meeting, first Tuesday in April.

Comparative Profit and Loss Account shows:

	1918	1917
Sale of metals	$2,827,571	$3,513,079
Other receipts	107,065	101,698
Total receipts	$2,934,636	$3,614,777
Mining expense	1,450,743	1,562,636
Smelting expense	907,492	1,054,943
Refining, Marketing, etc	170,863	117,970
Administration and legal expense	51,619	67,033
Litigation expense	101,155	.....
Total expense	$2,681,872	$2,802,582
Net profit	252,764	812,195

Total receipts in 1919 were $2,060,404, of which $181,966 was profit. Current assets exceed liabilities by $1,931,687.

Dividends:

1903	$3.20	1909	$2.00	1915	$2.00
1904	3.00	1910	.50	1916	1.50
1905	3.50	1911	.50	1917	3.75
1906	5.00	1912	1.50	1918	1.50
1907	7.00	1913	1.50	1919	0.25
1908	2.00	1914	2.00		

Property: 46 claims, patented, 393 acres, known as the Highland Boy group, in Carr Fork canyon, 2½ miles from Bingham canyon. The Highland Boy mine was a considerable producer of silver-lead ore, 1870-90.

In 1915 the Bingham Copper Boy group adjoining the Utah Cons. on the north was purchased for $18,747. Property promising but undeveloped. In 1918, the Yampa mine, 51 acres, adjoining on the north, was purchased from the Tintic Mining & Dev. Co. for $100,000.

Geology: the Highland Boy group, the original property, has 6 ore deposits which are replacements of limestone beds 150 to 300′ thick, with quartzite above and below. These beds dip from 25 to 45° N. and the rocks are cut by a series of porphyry dikes that are nearly vertical and run N. E. The ore deposits form well-defined shoots with E.-W. strike and N.-E. pitch. They are large, varying up to 100′ in width and 100 to 200′ in length, and are separated by barren limestone; the largest orebody so far developed is said to be 320′ in extreme horizontal width and 340′ in length. An ore-shoot carrying galena was found in the lower workings in an extension of the Yampa limestone. The predominant ore of the mine carries chalcopyrite, with some bornite and chalcocite, associated with pyrite in a limestone gangue.

Development: the Highland Boy mine is opened by a main shaft 1,600′ deep, and 7 tunnels, of 1,000 to 2,600′ in length. No. 7 tunnel, 700′ below the crest of the mountain, is 2,600′ in length and is the main haulage way, all tunnels being connected, and ore milled, through chutes, to this tunnel. There are 2 blind shafts, deepest 500′, starting from the 700′ level, with large electric hoists, raising ore to that point for extraction by the electric haulage plant in No. 7 tunnel. The ore breaks easily and is extracted by the top-slice caving system, mainly on contract.

New openings totalled 29,206′ in 1917; 21,067′ in 1918; 17,407′ in 1919.

The most important exploration was done in opening up the 1,400, 1,500, and 1,600′ levels from a vertical winze sunk from the 1,300′ level. On the 1,200 and 1,300′ levels 850′ of new drifting was in 2% copper ore of an average width of 3½′. Crosscutting to north at E. end of both levels disclosed another orebody, 4′ in width, assaying 2.5% copper on the 1,200′ and 4% on the 1,300′ level. On the west end of the mine crosscutting on the 1,300′ level disclosed 6′ of 2.5% copper ore. The lead ores on the 1,400′ and 1,500′ levels, reached by the winze from the 1,300′, are reported to be holding up well.

In 1918, an option was taken on adjoining property of the Utah Lead & Copper Co. Exploration work is being done in this ground from the 1,300 and 1,500′ levels.

Suit was filed against the Utah-Apex Mining Co. for damages, 1919, Utah Cons. claiming it had the apex of the vein from which Utah-Apex had been mining ore. By an agreement with the Utah Metal and Tunnel Co. apex litigation with that company is ended, but in November, 1919, Utah-Apex commenced suit against Utah Cons. for alleged wrongful extraction of ore.

Ore reserves:

	Copper Ore Tons	Copper %	Silver Oz.	Gold Oz.	Lead Ore Tons	Lead %	Silver Oz.	Gold Oz.	Copper %
1919...	848,000	1.94	0.66	.040	38,400	15.70	5.36	.060	0.90
1918...	277,939	2.33	0.78	.048	29,591	15.93	5.23	.058	0.8
1917...	141,000	1.76	0.65	.05	31,000	14.90	4.96	.06	0.61
1916...	180,000	1.77	0.69	.048	23,400	16.03	5.62	.038	0.81

A flotation mill will be built to treat 500,000 tons of low grade copper ore.

A 12,700′ aerial tram leads from the portal of No. 7 tunnel to ore bins on the Rio Grande Western railway. There is a subsidiary aerial tram, crossing Carr Fork canyon, used for handling lumber and mining supplies.

While the great orebodies of the mine are worked out the property is far from exhausted, and development work is encouraging.

Production:

	Copper Ore Tons	Copper %	Silver Oz.	Gold Oz.	Lead Ore Tons	Lead %	Silver Oz.	Gold Oz.	Copper %
1919...	124,199	2.22	1.27	.070	45,377	17.50	5.34	.041	.82
1918...	221,651	2.03	0.82	.054	31,725	15.18	4.71	.04	.64
1917...	226,536	1.797	.764	.050	58,247	13.91	4.57	.039	.61
1916...	360,034	1.734	.796	.052	74,542	14.17	4.25	.041	.74

	Lbs. Copper	Lbs. Lead	Oz. Silver	Oz. Gold
1919	5,710,346	13,072,177	373,180	10,548
1918	8,476,197	7,812,653	306,152	13,307
1917	7,968,165	13,014,841	408,560	13,530
1916	12,211,118	18,175,709	558,845	21,727
1915	8,836,091	17,777,604	370,985	19,387
1914	7,584,391	14,588,276	284,196	15,528
1913	7,710,668	19,208,063	378,960	14,172
1912	6,506,814	8,734,398	230,004	14,042
1911	9,162,023	3,311,939	160,366	16,730
1910	7,489,471	.....	154,321	14,802
1909	10,043,900	.....	.....	.....
1908	10,648,243	.....	.....	.....
1907	13,987,557	.....	390,296	34,554
1906	18,533,974	.....	457,812	42,001
1905	17,264,474	.....	374,685	28,290
1904	13,553,483	.....	.....	.....

UTAH COPPER CO. **UTAH**

Office: Deseret Bank Bldg., Salt Lake City, Utah. **Mine office:** Bingham Canyon, Salt Lake county, Utah. Works office: Garfield, Utah.

General office: 25 Broad St., New York City.

Officers: Chas. M. MacNeill, pres.; Daniel C. Jackling, 1st v. p. and managing director; Chas. Hayden, 2nd v. p.; K. R. Babbitt, sec. and gen. counsel; other directors, Spencer Penrose, E. A. Guggenheim, H. F. Guggenheim, W. C. Potter, Stephen Birch, W. P. Hamilton, R. C. Gemmell (asst. managing director and gen. mgr.), W. Hinkle Smith, Wm. B. Thompson, J. K. MacGowan (purchasing agent), and R. A. Penrose, Jr.

Operating officials: L. S. Cates, asst. gen. mgr.; John M. Hayes, treas. and asst. sec.; J. D. Shilling, supt. of mines; D. D. Moffat, consulting engr. of mills; F. G. Janney, gen. supt. of mills; H. C. Smith, supt. Magna plant; T. A. Janney, supt. Arthur plant; H. C. Goodrich, chief engineer of mines and railway; C. F. Jennings, asst. purch. agt.

Inc. June 4, 1903, and reorganized April 30, 1904, in New Jersey. **Cap.**, $25,000,000; shares $10 par; originally, $4,500,000; capital successively increased October, 1905, to $6,000,000; February, 1907, to $6,600,000; January, 1908, to $7,500,000; January, 1910, to $25,000,000; issued, $16,244,900. The new stock issue, 1910, amounted to $8,282,240, of which $3,100,000 in stock was given for the property of the Boston Consolidated Mining Co.; $4,445,120 or 445,512 shares,

UTAH COPPER COMPANY

Our Statistical Department will furnish complete information on application.

HAYDEN, STONE & CO.

Members New York, Boston and Philadelphia Stock Exchanges.

25 Broad Street, NEW YORK **87 Milk Street, BOSTON**

were given for 1,000,152 shares of Nevada Consolidated Copper Co.; $734,370, or 73,437 shares, were sold for cash, at a premium of 400%, for $50 per share, and 275 shares were issued for the conversion of $5,500 of bonds at par. Shares are listed on the New York, Boston and Paris Stock Exchanges. D. A. Crockett, 120 Broadway, New York, and American Trust Co., Boston, transfer agents; Guaranty Trust Co., New York, and Old Colony Trust Co., Boston, registrars. Annual meeting, fourth Friday in April.

Comparative General Balance Sheet: Utah Copper Co. and Bingham & Garfield Ry. Company.

Assets.

Year	Property and Equipment	Def. Chgs. to Operations	Investments	Copper in Transit	Other Current Assets	Total
1914.....	$24,777,736	$5,385,204	$5,061,008	$3,755,997	$1,285,954	$40,265,899
1915.....	25,359,919	6,444,346	5,087,899	8,675,199	6,777,122	52,344,485
1916.....	26,900,172	7,619,430	5,438,174	15,838,979	17,970,858	73,767,613
1917.....	32,021,458	8,300,040	5,904,002	13,166,995	25,855,942	85,248,437
1918.....	36,159,976	8,943,524	5,922,119	8,709,791	30,308,254	90,043,664

Liabilities.

Year	Capital Stock	Current	Reserve for Depreciation	Surplus from sale of Sec't's	Earned Surplus	Total
1914.....	$16,244,900	$1,056,794	$1,125,349	$8,290,620	$13,522,736	$40,265,899
1915.....	16,244,900	2,228,252	1,796,970	8,290,620	23,783,743	52,344,485
1916.....	16,244,900	3,529,395	2,499,515	8,290,620	43,203,183	73,767,613
1917.....	16,244,900	8,780,729	3,385,759	8,290,620	48,546,429	85,248,437
1918.....	16,244,900	10,115,975	4,542,125	8,290,620	50,850,044	90,043,664

(a) Bonds outstanding in 1914, Bingham & Garfield Ry. Co., $25,500.

Comparative Income Account.

Year	Operating Revenue	Operating Expenses	Net Optg. Profit	Total Income	Total Deducts	Balance Dec. 31
1914.....	$16,222,456	$10,230,293	$5,992,163	$8,730,422	$5,403,667	$13,035,408
1915.....	27,155,944	12,132,109	15,023,835	17,920,443	7,457,778	23,498,074
1916.....	50,280,074	16,532,334	33,747,740	39,738,675	20,083,675	43,153,137
1917.....	48,797,423	24,886,646	23,910,777	29,985,125	24,844,734	48,293,528
1918.....	44,525,129	30,717,827	13,807,302	18,945,780	16,744,900	50,494,408
1919.....	19,554,541	13,518,508	6,036,033	.....	.....	.....

In 1919, after payment of dividends, operations of first quarter resulted in a deficit of $1,955,410; operations of second quarter, in a profit of $215,369, and those of third quarter, in a deficit of $17,223; with a surplus of $262,721 in the last quarter.

Earnings and Dividends on Stock, Per Share.

Year	Earned	Paid	Year	Earned	Paid	Year	Earned	Paid
1908.....	.....	$1.00	1912.....	$5.35	$3.00	1916....	$25.46	$12.00
1909.....	$2.93	2.00	1913.....	5.37	3.00	1917....	17.66	14.50
1910.....	3.46	3.00	1914.....	5.34	3.00	1918....	11.35	10.00
1911.....	3.96	3.00	1915.....	11.03	4.25	1919....	.....	6.00
* March 31.						1920....	.....	1.50*

Total dividends paid to January, 1918, amounted to.....	$78,465,778
Total dividends paid in January, 1918, amounted to.....	16,244,900
Distribution to December 31, 1918.....	$94,710,678
Distribution during 1919, to December 31.....	9,746,400
	$103,457,078

Holdings.

The company controls the Nevada Consolidated Copper Co., owning slightly more than 50% of the outstanding stock, having exchanged its own stock on the basis of 1 share of Utah for 2¼ shares of Nevada. The company owns, through stock ownership, the Bingham & Garfield Railway Co., described later. During 1910 the Utah Co. absorbed the Boston Consolidated Mining Co. and the Shawmut Consolidated Copper Co.

History: in 1862 General P. E. Connor was stationed at Fort Douglas, Salt Lake City, in command of the Third California Infantry, a regiment of volunteers largely recruited from experienced California prospectors and miners.

General Connor believed that the prosperity of Utah would be enhanced by immigration from the outside. He therefore encouraged exploration for minerals in the State and freely gave furloughs to his miner soldiers, in order that they might do the necessary prospecting. As a result, mineral was discovered in Bingham canyon early in the fall of 1863, and it is probable that it was not long after this date until the first prospecting was done in what is now called the "Bingham copper porphyry." This prospecting consisted of a tunnel, afterwards called "Soldier Tunnel," driven into the copper bearing porphyry for a distance of 200′ on the westerly side of main Bingham canyon, and on property now owned by the Utah Copper Co.

The mining property now embraced in the holdings of the Utah Copper Co. had been known to be copper-bearing for many years, but was supposed to be too low-grade to pay and was not taken up for active development until the organization of the original Utah Copper Co. in 1903. Previous to that time, any work done was in hunting for the rich copper fissures and fault planes. In the spring of 1903, the Utah Copper Co. acquired control of the property, and began the construction at Copperton of a 300-ton experimental concentrating mill.

Property: the Utah Copper Co., excepting the Chile Copper Co.'s mine at Chuquicamata, has the largest developed orebody in the world, its proven tonnage exceeding that of the Rio Tinto, its nearest copper competitor, and even exceeding the proven tonnage of the greatest of the enormous iron mines of the Mesaba range, or the developed tonnage of gold ore of all the combined mines of the Witwatersrand. Not only has the Utah Copper Co. the second largest body of developed ore of any mine, but it also is the greatest ore producer, measured by tonnage, of any mine of any metal.

The entire mineralized area of the property is covered by a thickness of about 115′ of low-grade and oxidized material that cannot be profitably treated by standard methods of concentration. At the inception of development, information as to the comparative thickness of capping and ore was very meagre, but as the work progressed it was readily seen that a system of mining, much cheaper than by caving, could be applied, and it was determined to adopt the use of steam shovels and remove the oxidized over-burden entirely, leaving the sulphide ore uncovered, so that it could also be handled by steam shovels at a very low cost. This character of work was commenced in August, 1906, and has since been prosecuted vigorously so that by the end of the year 1918, there had been removed from the property 48,042,824 cubic yards of capping and 79,381,400 dry tons of ore.

The maximum quantity of capping and ore ever handled in one day was 84,229 tons, and the maximum ever handled in any one month was 2,526,858 tons. The ore production from the property of the Utah Copper Co. has increased from 300 tons a day in July, 1904, to an average of over 30,000 tons daily, during the last half of 1916. In August, 1917, the average was 37,500 tons daily, while on one day in September the quantity was 47,000 tons of ore.

Geology: orebodies consist of an altered silicious porphyry, containing small grains of copper minerals, very uniformly disseminated throughout the mass, both in fracture seams and in the body of the rocks, and averaging about 1.37% copper, 0.10 oz. silver and 0.012 oz. gold. The primary copper mineral is chalcopyrite, but as a result of the oxidization of this mineral and the secondary deposition of others, practically all of the sulphide minerals of copper are now present, the predominating one being chalcocite. There are three zones in this deposit, as follows: the oxidized zone, about one-third of which contains carbonates of copper in sufficient quantity to render the material payable by leaching with a dilute solution of sulphuric acid; second, the zone of secondary enrichment, in which is found all of the concentrating sulphide ore of commercial value; and third, the zone of primary material, which is too low-grade to be profitable by any method of handling and treatment at present known.

Total area of lode mining claims in Bingham is 830.7 acres, lying on both sides of Bingham canyon above the town, and including the mine: within the boundaries of this tract development has shown that at least 226 acres contain mineralized porphyry of commercial value. The entire porphyry area has not yet been developed, and the maximum thickness of the orebody in the 226 acres

has not been fully demonstrated, but calculations show that previous to January 1st, 1919, there had been developed in the property, 453,421,400 tons of ore, averaging 1.375% copper, of which quantity 270,000,000 tons were classed as fully developed, and 183,421,400 tons as partly developed. There was mined from the entire property prior to January 1, 1919, a total of 79,381,400 tons of ore, averaging 1.397% copper; total reserves remaining, 374,040,000 tons, averaging 1.370% copper.

Development: in making the calculations to determine the tonnage of ore and its average assay, there were used 102,878 assays, representing 33,930′ of diamond drill and churn drill holes, 291,129′ of drifts, raises and winzes, and 98,835 linear feet of steam shovel cuts, or a total of 423,894′ of development work. The orebody, as at present developed, has a maximum length of a little over one mile, and a maximum width of more than one-half mile. Further development of the property will undoubtedly add materially to its ore reserves.

The total area of land other than lode claims owned by the company, December 31, 1918, is 10,853.77 acres, consisting of 1,201.87 acres near the mouth of Bingham Canyon, part of which was formerly used in connection with the operation of the Copperton plant, 675.69 acres in Utah and Davis counties, and 8,976.21 acres at the Magna and Arthur plants. The lands to be used solely for impounding tailing from the concentrating plants aggregate about 6,000 acres.

The porphyry deposit on the westerly side of the canyon is worked by steam shovels. There are 19 steam-shovel levels from Sub "A" to "V" inclusive; intermediate levels "B," "C," "D" and "E" have been cut out. The main level is called "A" and the one below it, Sub "A." Each of these levels above "A" is connected with the bottom or main level, with standard gauge railroad tracks constructed on 4% grades, so that the steam-shovels load the ore directly into railroad cars which are hauled by 50-ton saddle tank and 76-ton side tank engines to the main yard and assembled into trains to be transported to the mills. From Sub "A" to "V" level, the difference in elevation is 1,446′, and from Sub "A" level to the top of the mountain it is 1,600′. The high face of the ore extending from "A" to "F" level, across which the intermediate levels have been cut out, has a vertical height of about 240′. From "F" to "V" level the difference in elevation between the levels varies from about 68′ to 100′, depending upon certain topographical conditions which control the elevations of the stripping lines extending from the steam shovel levels to the waste dumps.

No work has yet been done on the easterly side of the canyon except development by drifts, raises, cross-cuts and churn drill holes, with a small amount of underground stoping.

Equipment at the mine at the end of 1918 included 130 4-yard narrow gauge dump cars; 107 6-yard standard gauge wooden dump cars; 110 12-yard all steel Oliver dump cars; 50 30-yard all steel Clark dump cars; 6 narrow gauge 4-wheel flat cars; 4 narrow gauge 8-wheel flat cars; 7 standard gauge flat cars: 21 standard gauge steam shovels; 48 standard gauge switching locomotives; 8 narrow gauge switching locomotives; 1 engine tender; 1 passenger coach; 1 combination crane and shovel; 1 wrecking crane; 2 Jordan Spreaders; 1 tool car; 4 Star and 7 Keystone drills, and 7 air compressors, having a combined capacity of 12,000 cubic feet of free air per minute.

The stripping is removed from the ore and carried to waste dumps in adjacent gulches, and the ore loaded into railroad cars to be transported to the mills. The rock is broken by blasting before removal by the steam shovels, holes being bored by churn drills operated by steam, and piston drills operated by air. The holes are sprung and prepared ahead of the steam shovel operations, and are loaded and shot at such times as are required by the individual shovels on the different levels. An average of 1 pound of powder has been required to break down about 5 tons of rock ready for the steam shovel to load There are 52.87 miles of standard-gauge track in and around the mines, 2.61 miles of narrow-gauge and 1.57 of three-rail track, a total of 57.05 miles, all owned by the Bingham & Garfield Railway Co.

The shovels and locomotives at the mine are operated by steam, but extensive use is made of electric power received from the Utah Power & Light Co.

Buildings at the mine include machine and carpenter shops, car repair shops. compressor buildings, storehouses, office buildings, club house, boarding houses and other minor structures.

Mills: company had three mills, one at Bingham canyon, now dismantled, and two at Garfield, 20 miles from the mine. The 900-ton Copperton mill at Bingham canyon, the first concentrator put up by the company, is fully described in Volume VIII, Copper Handbook. It was closed permanently August 1, 1910, and all machinery that was suitable was sent to the Arthur mill for use there.

The finely disseminated copper glance necessitates fine crushing with the formation of slime and a tailing loss of about 0.30% copper. Concentration is about 23 into 1.

Magna Plant.

Coarse Crushing Department.—The Magna mill was the first large plant of the porphyry copper concentrators to be built and is located near Garfield, 4 miles E. of the Garfield smelter, and about 1 mile E. of the Arthur mill of the Utah Copper Co. It is connected with mine and smelter by the Bingham & Garfield, and the Denver and Rio Grande railways.

The main building is 500'x600', and contains two 10,000-ton units of 6 sections each, each unit being 300'x500' in size and the whole mill occupying a site of about 20 acres. Milling was begun in June, 1907, with two sections and the consecutive sections were put into service as finished, the twelfth, or final section of the mill, being started in November, 1908. The ore bins of the Magna mill are of 25,000 tons aggregate capacity, the coarse ore bins having a capacity of 12,000 tons and the fine bins 13,000 tons reserve capacity.

In 1918 the Magna mill treated an average of 18,150 tons daily. It is divided longitudinally into three departments for coarse crushing, fine crushing and concentrating work. Additions to this plant have increased its capacity to 20,000 tons daily.

The coarse crushing department consists of two units, having a capacity of 15,000 tons each per 24 hours. A coarse crushing unit is equipped with two No. 7½ gyratory crushers; 4 sets of 72"x20" Garfield roughing rolls; 4 sets of 54"x20" Garfield roughing rolls; 24 conveyors; 60 steel apron ore feeders; 7 electric motors of different size; 16 Mitchell vibrating screens and one 15-ton. 3-way motor crane. In this department the ore is crushed dry to approximately ½" diameter size.

Fine Crushing and Concentrating Departments.—During the past year the fine crushing department has been remodeled and now contains thirty-six 6' Garfield Chilian mills; thirty-six 7x20' tube mills; 24 sets of 37½"x15" Garfield rolls; 12 steel apron ore feeders; twelve 24" dry elevators; twenty-four 36" wet elevators; seventy-two 3'x4' impact screens; twelve 450-h. p. motors, and many of smaller size; one 15-ton 3-way motor crane; one 5-ton, 3-way motor crane, and one 50-ton, 3-way motor crane, the latter operating over and being able to handle one of the assembled tube mills complete.

In this department the ore is crushed dry to approximately 10-mesh by the rolls, and is further reduced to about 20-mesh by the Chilian mills, and then to any necessary desired fineness through medium of the tube mills.

The concentrating department for the entire plant is located on three floors, and has been remodeled during the past year. It now contains No. 5 Wilfley finishing tables; 4'x12' Garfield roughing tables; 6' vanners of the top-suspended type; 5-compartment Richards-Janney classifiers; 8' drag classifiers, and 6' drag classifiers. There is now under construction one 225' Dorr thickener, besides the two 75' Dorr thickeners already in commission.

Miscellaneous buildings at the Magna plant consist of machine shop, boiler shop, blacksmith shop, carpenter shop, tin shop and electrical shop, all thoroughly equipped for making any necessary repairs. Pumping stations, a large warehouse, transformer houses, ice house, complete rigger shed, main office, time office, dormitory and mess-houses also exist.

The fine crushing department has a 12,500-ton capacity ore bin, equipped with twenty-six 60" steel apron feeders. In this department the ore is crushed

dry to approximately 10 mesh by 23 sets of 37½x15″ rolls, three 8x6 Marcy ball mills. Screening and circulation is done with help of seventy-eight 3x4 impact screens and twenty-six elevators. It is then crushed wet to approximately 30-mesh by twenty-six Chilean mills and twenty-six 7x10 tube mills; twenty-six elevators; twenty-six drag classifiers; fifty-two 4-compartment and fifty-four 5-compartment Richard Janney classifiers.

The concentrate department has Garfield roughing tables, No. 5 Wilfley finishing tables, and 6′ vanners.

The electric power used at both Arthur and Magna plants is taken from the Utah Power & Light Company. It is stepped down into substations from 44,000 to 440 volt. The 13,000-h. p. steam-electric plant, 1,500′ northeast of the Magna mill, was equipped with 20 Heine 440-h. p. boilers, working under 175 lbs. steam pressure, equipped with American automatic stokers. Generating room contains two 26x50x48″ Allis-Chalmers cross-compound Corliss condensing engines direct connected to 1,500 k. w., A. C. generators; also three 32x70x48″ Nordberg cross-compound Corliss condensing engines direct connected to 2,250 k. w., A. C. generators. There are two concrete smoke stacks 180 ft. high by 12 ft. inside diameter. This plant has not been in operation since February, 1914.

The Leaching Plant.

This plant, located near the Magna mill, completed during 1917, treats the oxidized and partially oxidized capping overlying the sulphide ore, which carries approximately 15 pounds of copper per ton, of which about 12 pounds are soluble in sulphuric acid.

Ore from the mine at Bingham is discharged in crusher building where it is reduced to 15% on ½″ mesh screen by two No. 6 Gates gyratory crushers, style "K," and two 72″x20″ Garfield rolls. A noticeable feature in the crushing plant is the absence of any elevators; all intermediate crushing products being handled on incline conveyors.

The crushed ore is charged from loading bridge into twelve 100′x50′x18′ deep mastic lined concrete leaching vats equipped with suitable filters in bottoms.

The vats of ore are leached in rotation with a sulphuric acid solution containing a maximum of 1½% free acid.

The leaching solution is handled and circulated by means of 6″ centrifugal antimonial lead pumps and air lifts. The leaching solution, containing from .2% to .3% free sulphuric acid, and the copper, in the form of sulphate, is run to mastic lined concrete and wooden precipitation launders filled with scrap iron, where the copper is precipitated. The cement copper precipitate is then sluiced from the precipitation launders, drained, dried and loaded into cars previous to shipment to the smelter. The tailing is discharged from the vats by an unloading bridge equipped with a 10-ton grab bucket into 30-yard dump cars and hauled away by locomotives to the waste dumps.

Arthur Mill.

The Arthur mill was built by the Boston Consolidated Mining Company at a cost of upwards of $1,500,000. It was remodeled to a capacity of 7,800 tons of ore daily in 1916, by replacing the Nissen stamps with rolls and Chilean mills to correspond to the practice at the Magna mill. Later additions have increased this capacity to 16,000 tons daily.

The ore is brought to the head of the primary crushing department by railroad cars of 69 tons capacity, which are spotted on a car dumper by a mule haulage system; this equipment having a capacity of 30 cars per hour.

The railroad delivers the railroad cars in the electric mule haulage yard which is constructed on a 1.50% down grade. The car riders uncouple the cars and drop them down the grade beyond the mule pit, where they are spotted on the dumper by the mule haulage system. The loaded car, as it is spotted on the dumper, kicks off the empty car which runs down a grade back of the dumper and up a kick back track, where it reverses its direction and continues on down into the empty yard located opposite the car dumper and mule haulage

tracks. Four men are required to ride these cars from the mule haulage tracks across the dumper and back again.

The dumper discharges over a grizzly which separates in plus and minus 6″ product, the over-size going to a No. 27 gyratory crusher, the largest type made. The undersize and crusher product are conveyed to the secondary coarse crushing department by four 60″ pan feeders and two 60″ conveyors. The above department contains a 60-ton crane, with 10-ton auxiliary hoist.

The secondary coarse crushing plant consists of three No. 8 gyratory crushers, six sets of 72″x20″ Garfield roughing rolls, two elevators, twelve conveyors for circulation and transporting the ore to the fine crushing department, and 25-ton crane. The capacity is 16,000 tons of approximately ⅝″ size. Adjacent to this department is a 9,000-ton coarse ore bin, with overhead tracks, which is used when the primary crushing plant is down for repairs. This bin has six conveyors and one hundred and two steel apron feeders for transferring the material to the secondary coarse crushing department.

Miscellaneous buildings at the Arthur plant consist of substations, machine shop, boiler shop, oil house, compressor building, warehouse, carpenter shop, foundry, pattern storage building, general offices, telephone and emergency hospital building, dormitory, mess house, lumber shed, heating plant, assay office, time office, scale house, and houses for employees.

Initial Water Supply.—The main pumping plant, called Plant No. 2, is situated immediately east of the Magna mill and at the end of the Utah & Salt Lake canal, which brings the water from Utah Lake about forty miles from the plant. The canal has been enlarged sufficiently to deliver 100 second feet of water to Plant No. 2.

The equipment in this plant consists of one 22,000 gal. capacity, single stage, centrifugal pump driven by a 250-h. p. induction motor; one 10,000-gal. capacity, single stage, centrifugal pump, driven by a 150-h. p. induction motor; one 5,000-gal. capacity, single stage, centrifugal pump driven by a 100-h. p. induction motor, all three of which pump direct into the Magna 5,500,000-gal. concrete lined reservoir above the Magna mill, through 700 ft. of 30″ wooden stave pipe line against a 30 ft. head; three 5,000-gal. capacity, single stage, centrifugal pumps, each driven by a 250-h. p. induction motor; one 10,000-gal. capacity single stage, centrifugal pump driven by a 450-h. p. induction motor, all pumping direct to the Arthur mill 2,000,000-gal. reservoir through 6,300 ft. of 30″ and 42″ wooden stave pipe line against a head of 135 ft. The total capacity of this plant to the Magna mill is 37,000 gals. per minute, and to the Arthur mill, 25,000 gals. per minute.

The reserve pumping plant No. 1 is used in whole or part when the main pumping plant No. 2 is out of primary water. This reserve pumping plant is situated 1,500 ft. N. E. of the Magna mill, and includes 6 Byron Jackson centrifugal pumps, each of 10,000 gals. capacity. These pumps, having a combined capacity of 60,000 gals. per minute, deliver the water through two 42″ wooden stave pipe lines, each 1,800 ft. in length, against a 235 ft. head, into the 5,500,000-gal. reservoir.

In order to insure a sufficient supply of mill water at all times, and as a protection against unforseen accidents on the Utah & Salt Lake canal which would cut off the supply of primary water from that source, practically a duplicate water supply is being constructed, and in connection with this work there was purchased 1,325 acres of land lying about nine miles east of the plants. The topography of this land is such that it forms a natural reservoir for the drainage from higher lands, but nevertheless, its elevation is sufficient so that the storage water can flow by gravity to the lower pumping plant at Magna through a canal constructed for that purpose. There is also under consideration the construction of a ditch from the Surplus canal to this natural reservoir, which will require a pumping plant of low head, and after this work is completed it is believed that the water supply for the Utah Copper Co. for milling purposes will be such as to make practically impossible any combination of circumstances that would

necessitate the closing down of the mills or even any reduction in their capacity because of water shortage.

Bingham & Garfield Railway.

Inc. July, 1908, in Utah. Cap., $6,515,000; $100 par. Controlled by the Utah Copper Co., through ownership of the entire share capital.

The mileage at the end of the year 1918 is shown in the table below:

Main line and branches between and in the vicinity of Garfield and Bingham	37.136	miles
Yard and siding tracks, including all the terminals	52.769	"
Additional tracks leased to Utah Copper Co	43,458	"
Total length of tracks	133.363	"

The average grade for the Main line is about 2%; the maximum grade is 2.5%, with curves compensated .04 of a foot per degree of curvature. There are 4 tunnels with an aggregate length of 4,821′, all driven 18′ wide and 22′ high; the longest being 2,085.11′. There are 3 steel viaducts with an aggregate length of 2,000′ containing about 3,000 tons of steel; the longest, across Carr Fork, being 690′ long and 190′ high.

The road equipment owned and operated by this company at the end of the year 1918 consisted of the following: 7-Mallet engines, each weighing 228.5 tons on drivers; 1 consolidated engine, weighing 87 tons on drivers; 12 switch engines, 647 Hopper bottom steel ore cars, 50 drop bottom side dump steel general service gondola cars, 149 steel concentrate cars, making a total of 846 cars each of 60 ton nominal capacity with 10% excess allowance for overload; 3 steel flat cars of 50 tons capacity; 8 wooden flat cars of 25 tons capacity; 4 steel frame powder cars, of 50 tons capacity; 1 tool box car; 1 kitchen box car; 16 outfit cars; 7 caboose cars; 9 steel tank cars of 7,000 gallons capacity each; 1 Jordan spreader; one 120-ton wrecking crane; 1 scale testing car; 1 locomotive crane; 4 passenger coaches; 1 business car.

The cost of the complete line was upwards of $6,000,000. The first train load of ore, about 2,600 tons, was taken down the main line on September 14, 1911, and regular passenger and freight service was started the following morning. In 1918 the line handled an average of 34,081 tons of freight and 1,692 passengers daily.

Production from Concentrates:

Year	Tons Treated	Cost Per Ton Mine Cts.	Cost Per Ton Mill Cts.	Total (a) Dollar	% Cu.	% Rec'd	% Cu. in Conc.	Lbs. Cu. Rec'd p. t. Ore	Net Prod'n Lbs. Cu.	Cost—Cts. per Lb. (b)	Sell. Price Cts.
1910...	4,340,245	40.97	46.63	1.1738	1.54	66.55	27.28	20.51	85,644,511	8.069	12.818
1911...	4,680,801	44.79	41.68	1.1725	1.51	69.53	25.62	21.03	98,436,224	7.865	12.434
1912...	5,315,321	42.33	41.58	1.1239	1.36	66.32	20.75	18.09	91,366.337	9.024	15.839
1913...	7,519,392	32.88	36.76	0.9761	1.25	63.95	17.31	15.95	113,942,834	9.498	15.337
1914...	6,470,166	32.32	35.36	0.9550	1.42	66.04	18.19	18.82	115,690,445	8.131	13.256
1915...	8,494,300	24.41	34.02	0.8624	1.43	64.13	19.17	18.39	148,397,006	7.56	17.679
1916...	10,994,000	27.81	37.82	0.9355	1.43	62.34	18.71	17.90	186,915,000	8.116	23.926
1917...	12,542,000	44.46	69.30	1.4170	1.34	61.10	16.61	16.33	194,612,365	11.940	25.805
1918...	12,160,700	53.70	92.77	1.7630	1.23	65.11	16.08	15.97	184,460,168	15.361	24.662
1919(1Q)	1,526,500	.....	.....	.....	1.27	74.70	.....	.....	28,971,089	13.72(c)	.....
(2Q)	1,242,500	.....	.....	.....	1.35	81.80	.....	.....	28,046,978	11.59(c)	.....
(3Q)	1,397,400	.....	.....	.....	1.16	76.20	.....	.....	25,269.679	14.88	.....
(4Q)	1,372,300	.....	.....	.....	1.25	81.56	.....	.....	27,965,470	16.47	.....

(a) Includes transportation, all fixed, general and maintenance charges. (b) After making allowances for smelter deductions, and crediting value of gold and silver recovered, but not including miscellaneous income. (c) Excluding Federal taxes, and without credit for gold, silver or miscellaneous income. In 1916, transportation cost 27.92c. per ton, and in 1918, 29.83c.

The average price received in 1919 was 17.9c. per lb., and costs 11.7c. Production in 1918 also included 467,596 oz. silver at 97.42c. and 49,266 oz.

gold, compared with 483,281 oz. silver at 82.165c. and 48,614 oz. gold in 1917. Precious metals in 1919 were 28,907 oz. gold and 263,721 oz. silver.

Monthly Output:

Month	1919	1918	1917	1916	1915
January.....	10,500,000	12,613,380	13,913,811	11,999,910	8,009,646
February.....	10,335,000	11,994,960	13,459,829	11,849,972	8,202,467
March.....	8,366,000	16,179,831	15,512,676	12,714,651	10,203,882
April.....	9,420,000	16,690,883	17,231,512	14,557,282	12,015,148
May.....	9,125,000	17,294,291	19,262,856	15,950,215	14,053,765
June.....	9,528,000	17,779,609	19,909,097	18,000,000	14,730,912
July.....	8,405,863	16,021,766	18,127,154	20,302,228	14,641,009
August.....	8,640,000	19,920,947	18,796,012	20,315,440	15,966,543
Sept.....	8,220,092	17,369,230	17,839,378	20,462,256	14,159,289
October.....	9,525,700	18,643,472	18,022,665	20,325,520	16,004,607
Nov.....	9,482,451	16,443,042	16,468,323	16,421,192	13,722,723
Dec.....	9,005,591	13,217,178	16,311,805	13,976,533	14,497,485

Increase of ore reserves for 1918 was 2,288,000 tons in excess of tonnage mined. Much additional ore can and will be developed.

Total amount of capping removed was 4,064,091 cu. yards. The total area upon which stripping operations has been conducted was 258.67 acres and the actual area stripped was 132.16 acres.

The average cost of mining concentrating ore, including the proper apportionment of all fixed and general charges for the year 1918 was 53.70c. per ton, of which 10.16c. represents charges for stripping and 6.69c. for development. The actual direct cost was 42.85c. per ton as compared with 36.88c. per ton for the previous year.

Utah Copper is still the brightest star in the Hayden-Stone-Jackling galaxy, and its aggressive and brilliantly competent management promises to keep the company in its present enviable position.

UTAH METAL & TUNNEL CO. UTAH

Mine office: Bingham, Utah.

Officers: B. B. Lawrence, pres.-gen. mgr.; Jas. E. Rothwell, v. p.; W. E. L. Dillaway, treas., with Walter B. Farmer, Wm. H. Coolidge, Henry G. Lapham, and L. E. Stoddard, directors. W. H. Hendrickson, mgr.

Inc. May, 1914, in Maine. **Cap.**, $800,000; $1 par; increased from $500,000 to $725,000, to purchase Bingham-New Haven C. & G. Mng. Co.; again increased in April, 1919, to $800,000; 750,000 shares issued; 100,000 set aside for conversion of $750,000 7% bonds; in August, 1919, 50,000 shares of this block were sold at $50 a share to a syndicate composed of L. E. Stoddard, W. H. Coolidge, H. G. Lapham, and F. H. Prince. Company converted $375,000 of its bonds into stock, exchanged $225,000 for a like amount of 6% bonds which matured April 1, 1919, and at present has about $150,000 bonds in its treasury. The re-financing will enable the company to pay off a floating debt of about $80,000, and leave the company approximately $120,000 for mining operations.

Commonwealth Trust Co., Boston, and Registrar & Transfer Co., New York, transfer agents. International Trust Co., Boston, and Empire Trust Co., New York, registrars. Company acquired Bingham-New Haven C. & G. Mng. Co., by exchange of share for share. Listed on Boston Stock Exchange; traded on New York Curb. Stock sold at $1 to $10.50 in 1915. Price range $1¼ to $3 in 1918; $1 to $5⅛ in 1919. Annual meeting, first Monday in May.

Company is a reorganization of the Utah Metal Mining Co., itself a consolidation of the Bingham Central, Bingham Standard, and Bingham Metal Mining Co.

A dividend of 50c. per share was paid in August, 1916; 80c. in 1917. In 1918, 1¼c. was paid April 1.

Comparative Balance Sheet, years ending December 31:

Assets.	1918	1917
Property account	$1,777,107	$1,784,349
Prepaid accounts	1,489	2,890
Cash	1,009	43,048
Supplies	60,029	92,097
Accounts receivable	14,743	98,289
Total	$1,854,374	$2,020,673

Liabilities.	1918	1917
Capital stock	$700,000	$691,588
Bonds	233,500	220,500
Accounts payable	45,923	51,093
Notes payable	35,436	.....
Surplus	839,518	1,057,492
Total	$1,854,374	$2,020,673

Gross revenue in 1919 was $94,521, of which $59,909 was from company operations. Expenses were $96,458.

Property: is extensive, covering 3,539 acres, including 139 acres timber land in Bingham district, adoining holdings of Utah Cons. and Utah Copper Co. (Boston Con.), and extending across the range to Middle Canyon, on the Tooele side. The company drove a transportation and drainage tunnel, the Big Tunnel, 11,500′ through and 2,300′ below the crest of the range, from near Tooele to Bingham Canyon (Carr Fork). This gives direct short transportation to Tooele and Garfield and develops a large flow—2,000,000 gals. per day—of water, part of which is sold to the Garfield mill of the Utah Copper Co., the company having an income of $30,000 a year from this.

The Bingham or Carr Fork holdings include the Bingham Central & Bingham Standard groups, an area in which the various mineral bearing limestone beds of the camp are cut by the Saginaw-Burning Moscow and Nast veins and crossed by the Old Jordan fault. The claims on the Tooele side show similar limestones, cut by fissures, but the development work there has not thus far shown commercial orebodies, as it has on the Bingham side.

In November, 1914, the company started crosscut exploration from the big drainage tunnel at 8,200′ from the Tooele portal. In March, 1915, 1,300′ from the Bingham portal, the latter work encountered mineralized ground, and on upraising 70′, an orebody 25′ thick was cut. Drifting disclosed a second orebody E. of and above the first, and later a third orebody, already opened and mined by the Bingham New Haven Co., was cut. At present there are five productive orebodies on the combined properties. One copper ore shoot 300′ below the B. N. H. tunnel has been proven for over 200′.

The transportation tunnel is 8x9′ in the clear, double-tracked, with ½% grade. It develops the mineral bearing limestone and veins at depths of 375 to 900′ below any other workings.

Development: on the Utah Metal includes besides the 11,490′ transportation and drainage tunnel, and the workings therefrom, extensive tunnel development on the Bingham Central and Standard group, embracing the 4,000′ No. 2, 700′ Saginaw, 2,000′ Whitlay, 2,000′ Jeff Davis, 400′ Deem, 950′ Mtn. Maid, the Amelia and lesser tunnels, all showing ore at various points. On the Tooele side, the Middle Canyon group has one 5,000′ tunnel, another 1,700′ and a third 500′ long.

New work in 1918 amounted to about 10,000′. The ground already opened, and the orebodies found, indicate the existence of similar other deposits. A large amount of mill ore has been developed.

Equipment: includes a 300-ton mill using the Callow system of flotation.

Production:

	Tons Ore,	Lbs. Lead,	Lbs. Copper,	Oz. Gold,	Oz. Silver,	Value Gross
1919.....	.....	1,176,063	74,115	29	32,696	$94,521
1918.....	.....	1,187,114	207,059	940	61,502	$190,516
1917.....	.....	5,348,610	659,127	4,612	242,003	884,688
1916.....	71,402	6,301,670	1,761,520	17,934	388,757	1,499,268
1915.....	.....	9,860,089	2,873,815	16,914	475,894	1,386,845

The 1919 output included 70,750 lb. of zinc.

In October, 1917, a five years' contract was arranged with the International Smelting Co. for Utah Metal ore, the price to be the average for the week preceding receipt of the ore.

The Bingham-New Haven property includes 26 claims, 500 acres adjoining the Utah Consolidated on the S. E., includes the Zelnora mine near the head of Carr Fork. Claims show 3 fault fissures in porphyry and a contact deposit 3′ to 8′ in width, between quartz-porphyry and limestone. The copper ore averages 3.5% copper, $6 in gold and silver and about 12% excess iron. The lead ore averages 20% lead, $7 in gold and silver and 1.5% copper, ores being chalcopyrite, galena and sphalerite. The main ore supply is from 3 beds of limestone, which strike E. W. and dip N. Company now mining 2 deposits of copper, 2 of lead and one of complex ore.

Development: by tunnels with a blind shaft starting 900′ from the portal of the lowest tunnel, there being a vertical distance of 1,200′ between the highest and lowest workings. The 1,030′ lower tunnel cuts a wide fissure vein, giving assays of about 3% copper, 2.3 oz. silver, and $2.50 gold per ton. Terminal at the upper tunnel was moved to the lower tunnel and mine is operated through the latter. The shaft is now down 320′ below the 500′, or Highland Boy level, and crosscuts have been driven 200′ and 320′ below the tunnel level to cut a recently found orebody which averages 6′ in width where cut. Estimated 2-3 years' ore reserves in sight. Mine has several miles of workings with an aerial tram, connecting with loading bins on the Copper Belt railroad.

Equipment: includes electric power, air compressor and 175-ton mill, equipped with jigs, Wilfley and Diester tables, vanners and ball mill for fine grinding.

Summary: the year 1918 was not profitable for the **Utah Metal** company. Regular mining operations ceased during the period of negotiations regarding apex rights, but expensive development work was necessary to open up and prove apex claims. The adjoining Utah Cons. was the other claimant. It was decided in December, 1918, to reach a settlement without having recourse to litigation. This settlement gave the Utah Metal & Tunnel Co. unrestricted right to follow all beddings found on the westerly part of the Bingham-New Haven ground downward extralaterally, in and under the Utah Cons. ground, without regard to apexes, and also full mining rights in a segment of ground lying between the boundary line separating the properties and the southerly stopes of the Utah Cons. workings, a space about 2,000′ long and 1,100′ wide. Also as part of the agreement the Utah M. & T. Co. transferred to the Utah Cons. certain causes of action and claims for damages it had against the Utah Apex Mining Co., another neighboring property.

VICTORIA CONSOLIDATED MINING CO. **UTAH**

Owned by Bingham Mines Co., which see.

WESTERN MINING & MILLING CO. **UTAH**

Idle. Is a subsidiary of the Homestake T. & C. Co., which see.

Officers: J. H. Hurd, sec., 219 Douglas Ave., Salt Lake City. Controlled by John B. Taylor, 521 Atlas Block, Salt Lake City, Utah. E. D. Haskins, v. p.

Inc. 1897, and reorganized 1905 in Utah. **Cap.,** $300,000; shares $1 par; assessable, with 2 assessments levied; issued $200,000. Is a close corporation, having only 9 shareholders.

Property: 20 claims, 19 patented, 215 acres, in the Pine Canyon section

of the Bingham district, on the western slope of the Oquirrh Mountains. The claims are developed by numerous tunnels, and show the same limestone beds, cut by mineralized fissures, which have made the bonanza orebodies of the Utah Cons. and other properties on the east side of the range.

YOSEMITE MINES CO. UTAH

Controlled by Bingham Mines Co., which see.

PARK CITY DISTRICT.

AMERICAN FLAG MINING CO. UTAH

Office: 815 Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Park City, Summit county, Utah.

Officers: Geo. H. Rathman, pres., treas. and gen mgr.; Wm. M. Curtis, v. p. and mgr.; John Cain, sec.; F. V. Bodfish, supt.

Inc. 1902, in West Virginia. **Cap.,** $500,000, increased to $1,000,000 on re-incorporation in Nevada, 1910; shares $1 par; assessable; fully issued.

American Flag property is leased to the Park City Mines Co., which see.

In 1918, reported in hands of receiver, with claims against it of approximately $200,000.

ANCHOR MINING CO. UTAH

Idle several years. **Office:** Calumet, Mich.

Officers: John D. Cuddihy, pres.; F. W. Taylor, sec.-treas., and Henry L. Baer, directors.

Inc. June, 1908, in Michigan. **Cap.,** $150,000; shares $25 par; issued, 1,800. Annual meeting, second Tuesday in June.

Lands: 9 claims, patented, 131 acres; in the Snake Creek district, one-half mine south of Daly-Judge mine, near Park City. Company is the successor of the Wolverine Mining Co.

BIG FOUR EXPLORATION CO. UTAH

Property reported sold early in 1918 for $35,000. No details. Company was described in Vol. XIII.

BOSTON ACME MINES CORPORATION UTAH

Edward Wischmeyer, Jr., pres.; Harry Niles, v. p.; M. K. Tavenner, sec., all of Baltimore.

Said to have a three-quarter interest in the Boston-Utah Mng. Co. In 1918 an attempt was made to acquire control of the Morgan-Crescent Mng. Co., which company claims the Boston Acme Mines Corp. did not live up to the contract and has forfeited all rights on Morgan-Crescent.

BOSTON-UTAH MINING CO. UTAH

Geo. T. Stenhouse, mng. director. Control held by St. Petersburg, Fla., capitalists.

Property: in the Morgan mining district, the supposed northerly extension of the Park City ore zone, shows native copper in fissure on a contact between flat dipping limestone beds and a granite hanging wall. See Boston Acme Mines Corp.

BROADWATER MILLS CO. UTAH

Company dissolved, mill dismantled. Described in Vol. XIII.

CALIFORNIA COMSTOCK CONS. MNG. CO. UTAH

Property sold to Silver King Cons. Mng. Co., which see. Described in Vol. XIII.

CONKLING MINING CO. UTAH

Mine office: Park City, Summit county, Utah.

Officers: Col. Nicholas Treweek, pres.; Wm. C. Hall, v. p.; Geo. A. Lund, sec.; J. Leonard Burch, treas.; preceding, and Margaret Treweek, directors.

Inc. Sept. 17, 1908, in Utah. **Cap.,** $500,000; shares $1 par; assessable. Is a close corporation, with 25% of stock owned by Silver King Coalition Mines Company.

Property: 2 claims, 2 miles from a railroad, shows gold, copper and lead ores, developed by a 1,000′ tunnel on the lands of the Silver King. Com-

pany brought suit against the Silver King Coalition Mines Co. for illegal extraction of $575,000 in ore from Elephant stope, and in January, 1919, the Circuit Court of Appeals at St. Louis decided in favor of plaintiff, awarding damages of $542,000, with accrued interest, approximately $600,000. In December, 1919, the Silver King Coalition announced that all litigation in the district had been settled.

DALY JUDGE EXTENSION MINING CO. **UTAH**

Park City, Utah.

Officers: Mrs. Clarissa Whitehill, pres.; E. Waddanfs, v. p.; S. L. Raddon, sec.-treas.; with S. Lewis, and Henry Spriggs, directors.

Inc. in Utah. **Cap.,** $600,000; shares 10c par.

Property: 8 claims, 140 acres, partly patented, at Park City developed by 700′ tunnel and 2 shafts, said to show copper-lead-silver ore in fissure veins.

DALY-JUDGE MINING CO. **UTAH**

Reorganized in 1916 as the Judge Mining & Smelting Co., which see.

DALY MINING CO. **UTAH**

Office: 1003 Boston Bldg., Salt Lake City, Utah.

Officers: Col. E. A. Wall, pres.; Geo. W. Parks, sec.

Inc. in Utah. **Cap.,** $4,000,000; issued $3,000,000; $20 par; assessable. Listed on Salt Lake Exchange.

Dividends: paid $2,925,000 to 1897. Dividends resumed in 1917, when $60,000 was paid; in 1918, $75,000; in 1919, $97,000 to October 1. On January 2, 1920, 10c was paid. The grand total is $3,142,000.

Property: in Uintah district, Summit county, 8 claims and an interest in 14 claims of the Ontario Silver Co. claims; also an interest in 17 claims of the Daly West Co., and 195½ acres owned jointly with the Ontario Silver Mng. Co., total acreage 316, of which all are patented.

Ore: silver-lead-gold and copper in fissure veins in quartzite. The property is an old one, and at last accounts had 2,300′ of shafts and much unexplored ground between the surface and 1,700′ levels. Work has been carried on intermittently during the past few years. Ore assays from 45 to 80 oz. silver, 8 to 15% lead, and $0.75 to $1.50 gold per ton; shipments are about 500 tons monthly of ore of this character.

DALY WEST MINING CO. **UTAH**

Office: 1101 Deseret Bank Bldg., Salt Lake City, Utah. **Mine office:** Park City, Summit county, Utah.

Officers: G. W. Lambourne, pres.; Geo. G. Brooks, v. p.; with H. M. Stonemetz, M. C. Fox, and O. N. Friendly, directors. S. G. Taylor, treas.; A. H. Peabody, sec. O. N. Friendly, gen. supt.; G. R. McKay, mine supt.

Inc. Feb. 14, 1902, in Colorado. **Cap.,** $3,600,000; increased to $5,000,000 in 1918; shares $20 par. Owns a 20% stock interest in the Little Bell Mining Co., an adjoining property. National City Bank, Salt Lake City, and First National Bank, Boston, registrars. American Trust Co., Boston, transfer agent. Stock listed on Boston and on Salt Lake Exchanges.

In 1918, ore sales returned $184,593; other income totaled $2,753, which, with balance on hand, January 1, 1918, equalled $217,565. Expenditures were $193,938, leaving balance on hand, January, 1919, $23,626.

Dividends: 30c quarterly reduced to 15c. in 1913; total to end of 1916 was $6,606,000. Nothing was paid in 1914, 1915, 1916, 1917, or 1918.

Company is a large silver-lead producer, copper being a by-product.

Property: the Daly West and Quincy mines with 50 claims, patented, 250 acres in the Park City district. The ores are a complex of argentiferous lead, zinc and iron sulphides, occurring in fissures, and as replacement deposits in limestone. Ores are declining in value with depth. Production formerly equally divided between smelting and concentrating ore, is now mainly the latter. The property has 3 principal veins, of 4 to 6′ minimum and up to 40′ maximum width. Upper workings are practically worked out, lower workings show concentrating ore. Owing to fire, no work was done, 1914-1915, but operations were resumed in 1916.

Development: the main shaft is 2,300′ deep, and the mine has about

15 miles of workings, an average of nearly 1 mile of new ground being opened yearly. Connection was made, October, 1909, with the 3-mile Ontario drainage tunnel, on the 2,100′ level for the use of which company pays $750 monthly rental.

Equipment: includes hoists and air-compressor. The 350-ton concentrator was destroyed by fire December, 1913. A new 600-ton mill was built and went into commission January, 1915. Plant includes a flotation unit with capacity of 30 tons of dry slime per day.

Production: recent shipments have been as follows: 20,344 tons in 1913; 24,341 tons in 1914; 13,620 tons in 1915; 9,980 tons in 1916.

Property, though an old one, has much new territory yet to be prospected and the known ore shoots give indications of going to greater depths.

The present management took control March 1, 1918; for several years previous to this time the mine had not been operated to best advantage, and only such development work done as was necessary for immediate ore extraction. The new management decided on a more aggressive line of development work and also to mill the ore at the Judge Mng. & Smg. Co.'s plant; this necessitated the driving of a 1,000′ crosscut.

JUDGE MINING & SMELTING CO. UTAH

Office: 1101-3 Deseret Bank Bldg., Salt Lake City, Utah. **Mine P. O.:** Park City, Summit county, Utah.

Officers: G. M. Lambourne, pres. and gen. mgr.; M. C. Fox, v. p.; S. G. Taylor, treas.; A. H. Peabody, sec. O. N. Friendly, gen. supt.

Inc. 1901, in New Jersey, as the Daly Judge Mining Co. Reorganized, 1916, under present name. **Cap.,** $300,000; shares $1 par; increased March, 1916, to $500,000; 480,000 shares issued. Stock listed on Salt Lake Exchange.

Dividends: in 1916, $435,000; in 1917, $480,000; in 1918, $240,000; in March, 1919, $60,000. Total dividends to 1919, $2,310,000. Rate in 1918 was 12½c per share, quarterly. Balance of $148,385 in treasury, January 1, 1920. Total receipts from ore sales in 1918, $701,401, not including receipts from the zinc plant, $360,241, or sundry receipts, $28,700. Profit in 1919 was $208,385.

Property: company has valuable holdings, about 1,100 acres patented ground, covering 11,000′ of a fissure vein system, in Park City district, adjacent to the Daly West mine. Is a large producer of silver-lead ores with much zinc and a small amount of copper.

Development: to 2,500′ level by main drainage tunnel. New work in 1918 amounted to 5,761′ of which 10.98% is on the Daly vein, 64.65% on the Back vein, 24.37% on the Middle vein. The depth ranged from 300 to 1,400′. In 1917, the development definitely established the existence of an ore zone not previously known containing one of the largest deposits of shipping ore ever found in the mine.

The Snake Creek tunnel, driven 14,500′ to the property line, was completed early in 1916; it will unwater the mines at greater depth and provide transportation. It is to be extended later for further exploration of the property.

Equipment: includes 400-h. p. electric hoist, compressor and 500-ton wet concentrating plant with flotation unit for treatment of slimes, making a zinc and lead product, also an electrolytic plant producing 99.95% zinc.

Production:	1916	1917	1918
Crude ore sold, tons	4,164	7,247	9,633
Residues, tons	....	....	2,843
Ore concentrated	61,787	58,186	40,622
Ore mined, tons	65,951	65,427	50,255

	Silver oz.	Gold oz.	Lead lb.	Zinc lb.	Copper lb.	Sold for
To 1916	5,622,420	11,800	116,601,381	86,937,150	2,984,875	$6,482,834
1916	477,852	535	8,114,627	5,153,049	341,198	839,455
1917	585,680	532	7,919,720	.....	428,000	953,729
1918	508,434	490	7,931,566	.....	371,036	1,061,642
1919	410,307	402	6,989,908	1,262,760	276,926	711,847

The company's progress in zinc production is of interest. As ore contracts expired in April, 1916, zinc concentrate was stored. By February 1, 1917, a 15-ton electrolytic plant of good design, was erected and started. In 1916 the mill made 6,129 tons of concentrate, assaying 44.58% zinc, 4.38% lead, 6.54% iron, and 21.47 oz. silver. In 1917, and 1918, zinc production was considerably curtailed, in 1918, only about one-third capacity was attained.

The discovery of high-grade mill ore in the footwall of the Daly vein was the most notable result of 1919 development; work for the year totaled 2,976′ and 43,107 tons of ore were mined.

KEARNS-KEITH MINING CO. **UTAH**

Out of business, property conveyed to the Silver King Coalition Mines Co. of Park City, which see.

KEYSTONE MINING CO. **UTAH**

Offices: 163 S. Main St., Salt Lake City, Utah, and 32 Broadway, New York.

Officers: H. G. McMillan, pres.; Ernest Bamberger, v. p. and treas., with John Dern, E. O. J. Hanke, C. W. Saacke, Alfred Frank, John McGinnis, directors. L. B. McCornick, sec.; Herbert Cohen, sec.-treas.; J. L. Tilton, asst. sec.

Inc. Sept. 12, 1902, in Wyoming. **Cap.,** $700,000; shares $1 par; outstanding $500,000; assessable; last assessment 2c, December, 1915. Capital to be increased to $1,000,000, at last accounts. Transfer office: J. L. Tilton, 32 Broadway, New York. Empire Trust Co., New York, registrar. Listed on Salt Lake Exchange and on New York Curb as a prospect.

Property: 16 patented claims, 66 acres, in Unitah mining district, 3 miles S. W. of Park City, said to show silver-lead ore.

Development: 225′ vertical shaft and 700′ tunnel, work of former years, Sinking the winze from tunnel level during 1916.

The property was rehabilitated in 1916, compressor and motor installed and exploration started. A suit against the Kearns-Keith Mng. Co. and the Silver King Coalition Mines Co., asking $1,500,000 damages for alleged unlawful extraction of ore was pending, June, 1916, but in December, 1919, the Silver King Coalition announced that all disputes in the district had been settled.

LITTLE BELL CONSOLIDATED MINING CO. **UTAH**

Office: Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Park City, Summit county, Utah. Solon Spiro, pres. and gen. mgr.; S. M. Bamberger, sec.; Joe Kemp, supt.

Inc. 1902, in Wyoming. **Cap.,** $1,500,000; shares $5 par; non-assessable; fully issued. Began payment of 5c. quarterly dividends, November, 1909, and up to and including September 2, 1910, had paid 4 quarterly dividends of $15,000 each. Shares listed on Salt Lake Stock Exchange; 20% of stock owned by Daly West Mng. Co.

Property: 30 claims, patented, in Park City district. **Development:** extensive, showing deposits of lead-silver ore.

Equipment: includes steam power, with hoist and air compressor. Electric power is taken from the Knight plant at Provo. The old 100-ton mill at the Fortuna Mining Co., at Bingham Canyon, was bought 1910, and re-erected at Park City. Worked intermittently. No recent information.

MARTIN GOLD AND SILVER MINING CO. **UTAH**

Address: C. F. Johnson, 201 Ness Bldg., Salt Lake City, Utah.

Property: 9 claims, unpatented, located on west side of Thaynes canyon, near Park City.

NAILDRIVER MINING CO. **UTAH**

Is a subsidiary of the Ontario Silver Mng. Co., 163 So. Main St., Salt Lake City, Utah.

Officers: W. Mont. Ferry, pres.; Herbert Cohen, sec.-treas.

Inc. Oct. 2, 1902. **Cap.,** $600,000; shares $2 par; assessable; 287,450 shares issued. Stock listed on the Salt Lake Exchange.

Property: 13 claims in Park City mining district, Summit county, shows silver-lead-gold-copper ore, developed to depth of 600′ by shaft and drifts.

In 1918, output reported to be 500 to 600 tons of ore. In 1919, a shipment of 60 tons in May, was followed in June by one of 165 tons, and small shipments have since been made. Mine has been worked mostly by lessees, but reverted to company, August, 1919, and is now a steady shipper.

NEW QUINCY MINING CO. **UTAH**

Office: 202 Atlas Blk., Salt Lake City. **Mine office:** Park City, Summit county, Utah.

Officers: W. S. McCornick, pres.; W. R. Hutchinson, v. p.; A. L. Thomas, sec.; Herman Bamberger, treas., with F. J. Hagenbarth, D. C. Rogers, M. B. Johnson, directors. W. B. Cole, supt.

Inc. June, 1915. Is a reorganization of the Thompson Quincy Mining Co. **Cap.,** $125,000; shares 10c par; assessable; with assessments not to exceed 3c during the first year. Exchange of stock made on a share-for-share basis, calling for distribution of 1,055,958 shares. Stock is listed on Salt Lake Exchange. The New Quincy Co. assumed the obligations of the Thompson Quincy.

Annual report for 1918 shows receipts totaling $21,730, of which $534 was from ore sales, $21,093 from assessment, $61 from sale of shares, and $42 balance from 1917. Disbursements amounted to $20,216, $6,341 being spent at the mine; $1,848, payment of interest, and $10,300, bills payable. Cash remaining was $1,514. Indebtedness at end of 1918 was $35,326, plus $5,093 interest.

Property: 140 patented acres in Park City district, with rights of way and easements from the Daly West, Daly and Ontario companies. The claims supposedly carry the extension of the Quincy orebody of the Daly West mine. Developed by a 625′ two-compartment vertical shaft, a crosscut tunnel through the Little Bell mine, cutting a contact vein, said to carry ore assaying up to 20% lead, 160 oz. silver and $2 gold per ton, and through the Ontario drain tunnel No. 2, which was extended to the Quincy mine by the Ontario company. In 1918, no work was done between April 1 and October 1, due to inability to use the Daly West shaft, which was closed for repairs. Since resuming operations the company has been doing development work on the 1,200′ level. In the Bonanza Flat area there is still 2,000′ of unexplored ground.

NEW YORK BONANZA MINING CO. **UTAH**

Park City, Summit county, Utah.

Reported, September, 1919, sold to the Naildriver Mining Co.

Old company described in Copper Handbook, Vol. XI.

ONTARIO SILVER MINING CO. **UTAH**

Offices: 163 So. Main St., Salt Lake City; Room 1208, 32 Broadway, New York, and Park City, Utah.

Officers: J. E. Bamberger, pres.; Ernest Bamberger, v. p.-treas.-gen. mgr., with N. A. Dunyon, Wm. C. Osborne, P. L. Benjamin, L. E. Bamberger and Walter Linforth, directors. Herbert Cohen, sec.; J. L. Tilton, New York, asst. sec. Newton A. Dunyon, supt.

Inc. Dec. 15, 1876, in California. **Cap.,** $15,000,000; $100 par; all issued. Stock is listed on New York Exchange. Central Union Trust Co., New York, registrar. Annual meeting, third Monday in January. Was at one time the largest silver producer in Utah, with a total production of about $35,000,000 gross and a dividend record of $15,112,500.

The annual report, December 31, 1918, showed total receipts of $605,859, including $573,070 from ore sales and royalties; disbursements, $427,485; cash on hand, $113,429, bonds and other liquid assets, $391,244.

Dividends: $14,932,500 to end of 1902, then a break without disbursements until July, 1918, then 2 dividends, Nos. 228 and 229, 50 cents a quarter to January, 1919. Total is $15,112,500.

Property: the Ontario mine, 800 acres, patented, at the head of Little Cottonwood canyon; also owns a 57% interest in the Weber Coal Co., 811 acres coal land; 75,000 shares of New Quincy Mining Co. stock, and ⅓ interest in Naildriver Mining Company.

The Ontario is an old and famous silver-lead mine in which the ore occurs in a great pipe and chamber deposit in limestone. Ore shows an increase in

zinc content at depth. In December, 1915, the manager decided to re-open the Ontario mine below the 1,500′, or drain tunnel No. 2 level. The old workings were unwatered to the 1,700′ level and work was done on the 500, 1,000, 1,500 and 1,700′ levels in 1916, on company account.

Development: about 60 miles of old workings, includes two tunnels and a shaft 2,000′ deep. From the 900′ level to surface, mine is worked by lessees.

Shaft caved badly in November and the lower levels were flooded, but by May, 1917, re-timbering and unwatering had been accomplished.

Ore extraction is mainly from workings between 1,500 and 2,000′ levels, where low-grade ore is mined. Silver-chloride ore 12-18″ wide and running over 200 oz. was recently cut above 500′ or Union tunnel level. Management is hunting oreshoots beyond Ontario fault.

Equipment: includes 3½-mile power line, 2 electric pumps, hoist, compressor, and 100-ton mill.

Stock believed to have a speculative value in addition to its liquidation value of about $4 per share. Although the high-grade ore is mined out, there is much low-grade ore left in the property, which will yield a fair profit with silver at $1.

PARK CITY KING MINING CO. **UTAH**

Officers: Thos. Marioneaux, pres., Kearns Bldg., Salt Lake City; Frank Barnes, sec.-treas.; Sam'l Dowse, supt., with D. M. Griffith, directors.

Inc. May, 1917, in Utah. **Cap.**, $100,000; shares 10c par; 625,000 shares in treasury.

Property: 60 acres, adjoining the Silver King on the W. at Park City, said to carry 3 fissure veins, showing copper and silver values. In 1918 was being developed by tunnel; no recent report.

PARK CITY MINES CO. **UTAH**

Address: Park City, Utah.

Officers: J. H. Leavell, pres.; H. R. MacMillan, v. p.; John Pingree, sec.-treas.

Inc. in Utah. **Cap.**, $1,000,000; shares $1 par; 521.526 shares issued, 36,000 in treasury, June, 1916. Listed on Salt Lake City Exchange.

Company has bond and lease on American Flag mine at Park City, for $250.000 and owns 34,000 bonds and 65,000 shares of American Flag stock.

Development: 1,150′ shaft, with levels and drifts. Ore reserves estimated at 10,000 tons. Production to June, 1916, $400,000, the ore averaging $31 and $20 net. No recent report; probably inactive.

PARK UTAH MINING CO. **UTAH**

Office: Deseret Nat'l Bank Bldg., Salt Lake City, Utah.

Officers: G. W. Lambourne, pres.; W. M. Bransford, v. p.; Geo. W. Blood, gen. mgr., with M. C. Fox, J. S. Bransford, Frank Pingree, and Otto Ludeking, directors. A. H. Peabody, sec.; S. G. Taylor, treas. Paul Hunt, supt.

Inc. 1917, to develop several hundred acres of patented ground in the Park City district, Utah. **Cap.**, $1.250,000: $1 par; outstanding, 854,000 shares. $84,000 in treasury September 11, 1919.

Development: crosscutting N. and S. from the Ontario drain tunnel at about 10,000′ in from the portal. Management is trying to solve the problems of the Frog Valley and McHenry faults. Developing in 1919-'20.

SILVER KING COALITION MINES CO. **UTAH**

Offices: Kearns Bldg., Salt Lake City, and Park City, Utah.

Officers: Moylan C. Fox, pres.; W. Mont. Ferry, v. p.; F. J. Westcott, sec.; W. S. McCornick, treas., with Henry Newell, Jas. Ivers, Jr., Thos. Kearns, David Keith, and W. J. Halloran, directors. M. J. Dailey, mgr.; Forest Mather, supt.

Inc. May 20, 1907, in Nevada. **Cap.**, $6,250,000; $5 par; all issued. Annual meeting, third Monday in May. Transfer agent: F. J. Westcott, Salt Lake City. Registrar: Utah Savings and Trust Co., Salt Lake City. Stock listed on Salt Lake City and Boston Stock Exchanges.

Balance sheet of December 31, 1918, showed: assets, $7,509,301, which in-

cluded property account, $5,859,666; ore in transit, $48,117; cash, $207,514; Liberty bonds, $100,100. Liabilities included accounts payable, $79,553, reserves for depletion, $1,081,933; surplus, $51,764; net profit for 1918, $46,050. Earnings, in 1918, totaled $797,181, of which $787,927 was from ore sales.

The mine produced $25,000,000 from 1892 to 1912.

Dividends: $15,198.560, which includes $10,675,000 paid by original Silver King Mining Co. The last dividend, No. 24, was paid January 1, 1918.

Property: 327 patented claims, about 2,250 acres, covering 19,000′ along the strike of the ore zone at Park City, 35 miles S. E. of Salt Lake City, consists of the holdings of the following mining companies: Silver King, Union, Park City, Fairview, Alliance, Woodside, Mass., Jupiter, Kearns-Keith, Crescent, Apex, Boss, Baltimore, St. Louis-Magnolia, Pinyon Ridge, Odin, Belmont and Uintah Treasure Hill Coalition.

Ore: silver-lead-zinc sulphide ore occurs in fissures and large replacements in limestone and quartzite. For geology see U. S. G. S. Prof. Paper No. 77.

Development: by 2 shafts to depth of 1,300′ and over 100 miles of workings. One of the main workings is the 3-compartment Silver Hill winze sunk from the Alliance tunnel level, at a point 8,500′ from the portal; the collar of the winze is 1,600′ from surface. In 1917 extensive development was done N. W. of the shaft, towards Thayne canyon, and large orebodies found in the Park City limestone.

The Conkling Mining Co. brought suit for $575,000 against the company for alleged illegal extraction of ore. Judgment was rendered in favor of the Coalition Co.; the Conkling Co. appealed the case to the Circuit Court of Appeals, which reversed the former decision. The Coalition Co. then filed a petition for a rehearing in the Circuit Court of Appeals. On October 20, 1919, the U. S. Supreme Court issued a write of certiorari to the Silver King Co. In December, 1919, company announced that these suits were settled.

The mine is electrically equipped, and company owns a 600-ton mill. A flotation section, which started operating December 5, 1915, is said to give an increased saving of from 10% to 15% silver and 10% lead. Company employs 400 men.

Production: 29,285 tons of ore and concentrate in 1916; in 1917 shipments ran about 600 tons ore, or 1,000,000 lb. lead per week. In 1918, 51,627 tons ore were produced and 19,061 tons ore and concentrates shipped; ratio of concentration, 4.28 into 1. The first-class ore, 8,184 tons, assayed 32.7% lead, 28.4 oz. silver, 0.08 oz. gold, and 0.63% copper. Metal produced totaled 10,105,775 lb. lead; 440,064 oz. silver; 1,375 oz. gold; 109,732 lb. copper.

SILVER KING CONS. MINING CO. **UTAH**

Offices: Newhouse Bldg., Salt Lake City and Park City, Utah.

Officers: Solon Spiro, pres.; R. P. Morris, v. p.; D. L. Wertheimer, treas., with H. A. Lee, Sherman Fargo, Wm. Pischell, and Herman Harms, directors. G. W. Browning, sec.; N. N. Blye, supt.; Harry A. Lee, cons. engr. and asst. mgr.

Inc. 1902, in Wyoming, as the Silver King Cons. Mng. Co.; re-incorporated Feb. 24, 1908, in Utah. **Cap.**, $700,000; increased Sept. 12, 1912, from $500,000; increased January 31, 1918, to $1,000,000; $1 par; issued January 1, 1919, 827,237½ shares. Empire Trust Co., New York, transfer office. Metropolitan Trust Co., New York, and Columbia Trust Co., Salt Lake City, registrars. Stock listed on New York Curb and Salt Lake Exchange.

Annual report for year ended January 1, 1919, shows: balance, January 1, 1918, $239,086; ore sales, $275,968; capital stock sales, $266,265; miscellaneous, $28,007; total, $809,327. Disbursements were $752,619, leaving a balance, January 1, 1919, of $46,708.

Dividends: year ended Jan. 31, 1914, $308.791, derived from judgment paid by co-tenant; 1915, $251,033; 1916, $255,032; 1917, $383,287; 1918, $70,000.

In December, 1917, company purchased, for $300,000, the entire property, 135 acres, of the California Comstock Cons. Mng. Co.; it is located in Thaynes Canyon and comprises the "western territory" of the Silver King Cons. At time

of purchase, this property was developed by a 450′ 3-compartment shaft and equipped with a 150-ton mill.

Property: 1,211 acres near Park City, adjoins Silver King Coalition on the west, and covering a mile of the westerly extension of the ore-bearing veins of Park City. Ore: carries lead, silver, gold, and copper in replacement deposits in limestone and quartzite. For geology of the district, see U. S. G. S. Prof. Paper No. 77.

Development: by a deep drainage and transportation adit known as the Spiro tunnel, which will be completed in the summer of 1920, and opens up all the orebodies at a great depth. The old work includes two shafts, lowest level is at 1,800′ depth. In 1918 it was found that the orebodies in the mine stopes were not as continuous as expected. Toward the north and west boundaries the ore was stoped to the boundary lines from the 1,550′ to the 1,700′ level. The stopes adjacent to the main vein that showed large faces of good ore were cut off by faults. A large amount of prospect work was done on the 1,100′, 1,550′, 1,625′, and 1,700′ levels; ore was found in all places opened, but not in commercial quantities at existing costs for labor and material. Work was suspended then to await completion of the Spiro tunnel. This tunnel, 8′x8′ in section, will have an ultimate length of 14,000′; it is on company ground and will serve for drainage, transportation, and development. Its main purpose is to explore the Thaynes Canyon area. By January, 1920, the breast was at 11,700′. The distance driven in 1918 cost $30.487 per foot, compared with $21.618 per foot for 5,000′ driven in 1917. The cost of the tunnel was estimated at $400,000.

The California Comstock shaft has recently been unwatered to the 450′ level; in 1918, the 250′ level was worked, but the grade of ore mined there showed little or no profit under the existing conditions. The 150-ton mill was remodeled and put in operation. A 10,200′ tramway was built in 1916 to convey ore to the mill and railroad, and a flotation mill, initial capacity 70 tons daily, was installed.

Production, years ending January 31 until January 31, 1917, when fiscal year was made to agree with calendar year:

	Ore, tons	Lead, lb.	Silver, oz.	Gold, oz.	Copper, lb.	Net value
1918	4,901	2,433,365	206,357	200	107,456	$275,971
1917*	10,260	5,016,627	451,627	403	248,771	642,467
1917	10,082	5,273,216	439,007	423	228,819	500,499
1916	13,719	7,843,139	652,076	605	411,086	519,478
1915	9,987	5,593,786	503,784	514	257,912	346,990
1914	609	316,434	22,319	40	6,343	19,847
1913	612	461,830	27,813	55	9,656	27,143

* February 1 to January 1, 1918.

In March, 1919, the company announced a short-time loan of $200,000 in notes of $100, $500, and $1,000 denominations, for purpose of financing its project until a betterment of metal prices would exist.

The property has become a steady producer during the past two years, and the company, apparently, is on a sound footing.

THREE KINGS CONS. MINING CO. UTAH

Formerly the Three Kings Silver Mining Co.

Office: 616 Newhouse Bldg., Salt Lake City. **Mine office:** Jas. McGlenn, supt., Park City, Utah.

Officers: J. R. Elliott, pres.; W. J. Burton, v. p.; R. J. Mackintosh, sec.-treas.-mgr., with W. A. Stewart and R. B. Parry, directors. David Erickson, supt.

Inc. May 13, 1914, in Utah. **Cap.,** $250,000; 25c par; 147,500 shares issued; assessable.

Property: the Nelson and Mineola groups, 156 acres, at Park City, showing usual geologic conditions of that camp, with fissures carrying silver-lead ore.

Development: by shaft to 700′ depth. Most recent development said to have opened a vein from 1′ to 3′ in width and assaying more than $40 per ton.

Equipment: includes electric hoist and compressor driven by 75-h. p. motor. Reported on by Edward R. Zalinski. Management is confident of finding commercial ore.

THREE KINGS SILVER MINING CO. **UTAH**

Name changed to Three Kings Cons. Mining Co., which see.

VERDUN MINING CO. **UTAH**

Address: Box I, Park City, Utah.

Officers: W. J. Buck, pres.; J. L. Kearns, sec.; R. T. Kimball, treas., with C. F. Wherrit, and Geo. Evans, directors.

Inc. 1917, in Utah. **Cap.,** $50,000; 5c par; issued 400,000 shares.

Property: 5 claims and lease and bond on three others in Park City district, said to show silver, copper, gold ore in a contact deposit, assaying 2% copper, and 2½ to 12 oz. silver per ton.

Development: 250′ tunnel. Property is a prospect.

TINTIC MINING DISTRICT

Ore was first found in the Tintic district, 60 miles S. of Salt Lake City, in 1869, and production started the following year. Since that time the district has been a steady producer; its output to the end of 1916 was approximately $170,000,000, in silver, gold, lead, and copper.

The U. S. Geological Survey published a report on the Tintic district in 1898, but copies are no longer available for distribution. A more recent report has been published giving the results of later studies. Professional Paper 107, entitled "Geology and Ore Deposits of the Tintic Mining District, Utah," by Waldemar Lindgren and G. F. Laughlin, with a historical review by V. C. Heikes.

See "East Tintic District," by L. H. Goodwin, Eng. & Mng. Journal, January 10, 1920.

ADDIE MINING CO. **UTAH**

Address: 333 Judge Bldg., Salt Lake City, Utah.

Officers: G. C. Lambert, pres.; H. B. Cole, sec.

Inc. in Utah. **Cap.,** $30,000; 10c par; assessable.

Property: 5 silver-lead claims in Tintic district, Juab county.

Development: includes a tunnel and two shafts, reopened 1920.

AMERICAN MINES SYNDICATE **UTAH**

Office: Houghton, Mich. **Mine office:** Eureka, Juab county, Utah.

Officers: Walter Fitch, pres.; J. H. Rice, v. p.; Wm. P. Seager, treas.; preceding officers, Cecil Fitch and Exilda Fitch, directors.

Inc. 1907, in Arizona. **Cap.,** $100,000; shares $100 par; paid in, $80 per share; issued, $86,350. Is a holding company, controlling the Chief Consolidated Mining Co. through ownership of 361,000 shares.

AMERICAN STAR MINING CO. **UTAH**

Office: 403 Dooly Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

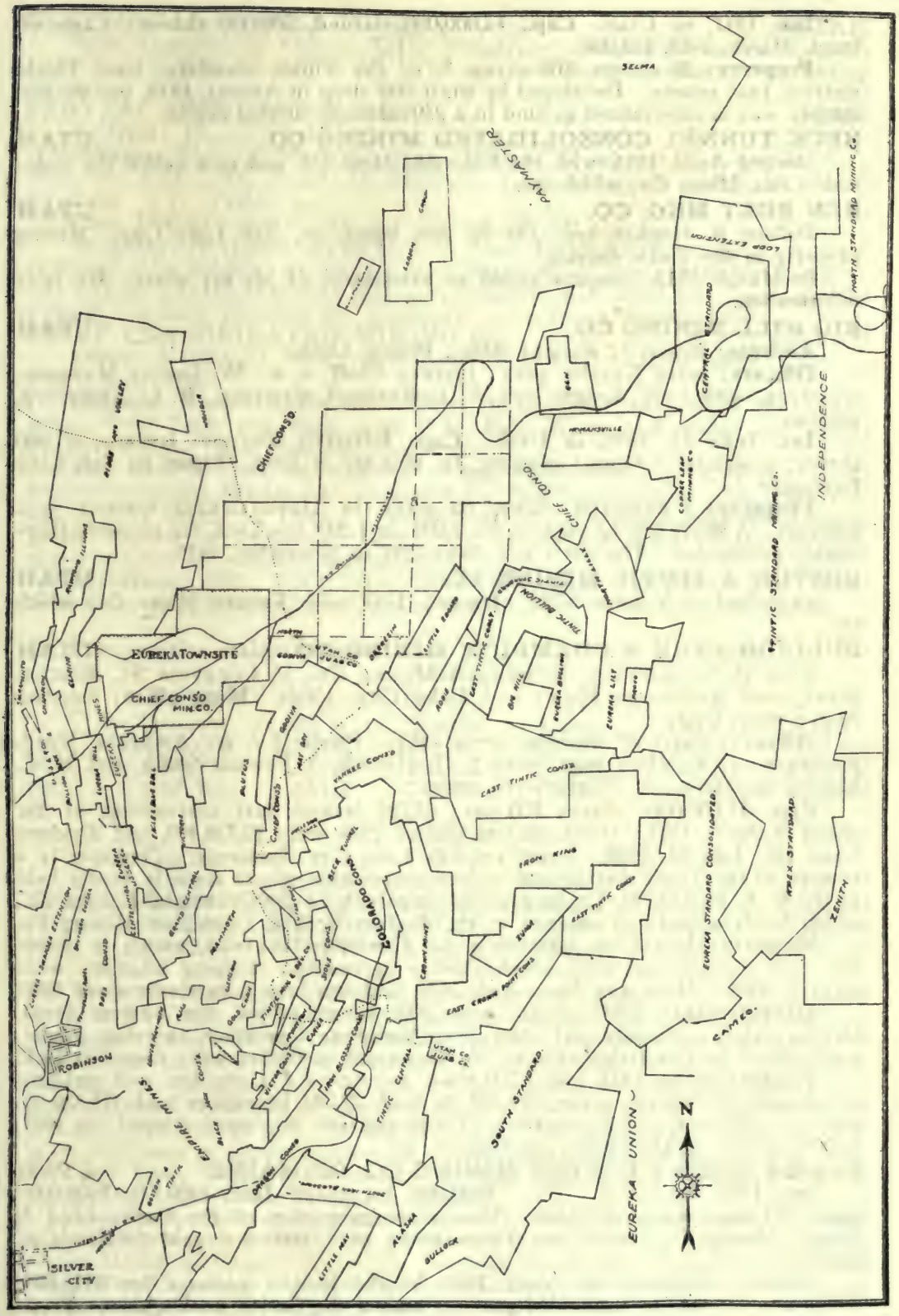
Officers: Imer Pett, pres. and gen. mgr.; Geo. E. Davis, v. p.; Fred R. Sands, sec.-treas., with Jas. P. Graves and Thos. P. Billings, directors.

Inc. 1909, in Utah. **Cap.,** $1,000,000; shares $1 par; issued 704,500 shares.

Property: 2 claims, 15 acres, between the Victoria and Chief Consolidated mines, and touching the Plutus on the east and Eagle & Blue Bell on the west. Mine has about 1,000′ of workings, made from the 900′ level, 1,000′ from the 1,350′ level and about 600′ from the 1,875′ level of the Eagle & Blue Bell mine, and is developing through the Eagle & Blue Bell, in 1919. Workings show an ore channel of about 60′ width. Property considered promising.

APEX STANDARD MINING CO. **UTAH**

Officers: Lewis Merriman, pres.-mgr., Eureka, Utah; Frank Kimball, v. p.; S. S. Pond, sec.-treas., with F. W. Brock and Hugh Hefferman, directors.



MINING PROPERTIES OF TINTIC DISTRICT, UTAH

Inc. 1917, in Utah. **Cap.**, $1,000,000; issued, 500,000 shares. Cash on hand, March, 1919, $15,000.

Property: 20 claims, 400 acres, S. of the Tintic Standard, East Tintic district, Juab county. Developed by shaft 900′ deep in August, 1919, and by December was in mineralized ground in a 250′ crosscut at that depth.

BECK TUNNEL CONSOLIDATED MINING CO. **UTAH**

Merged April, 1916, with the Colorado Mng. Co. and now called the Colorado Cons. Mines Co., which see.

BEN BOLT MNG. CO. **UTAH**

Delbert B. Hughes, sec., 339 W. 2nd South St., Salt Lake City. Mining property in the Tintic district.

In March, 1918, company called an assessment of ¼c per share. No later information.

BIG HILL MINING CO. **UTAH**

Address: Room 12 Knight Bldg., Provo, Utah.

Officers: Jesse Knight, pres.; Harvey Cluff, v. p.; W. Lester Mangum, sec.-treas., with J. W. Knight, and W. L. Burnhall, directors. R. L. Anderberg, asst. sec.

Inc. June 15, 1899, in Utah. **Cap.**, $100,000; 10c par; issued, 565,000 shares; assessable. Annual meeting, 1st Monday in June. Listed on Salt Lake Exchange.

Property: 3 patented claims, 60 acres, in Tintic mining district, is a prospect. A shaft will be sunk to the 1,000′ or 1,200′ level and the property thoroughly prospected. The shaft was down 200′ in November, 1919.

BOSTON & TINTIC MINING CO. **UTAH**

Described in Volume XIII. Merged, 1917, with Empire Mines Co., which see.

BULLION BECK & CHAMPION MINING CO. **UTAH**

Care U. S. Smelting, Refining & Mining Co., 55 Congress St., Boston, Mass., and Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: Geo. W. Heintz, pres.; Wm. Pischel, v. p.; Ambrose Nord, sec.-treas.; C. E. Allen, mgr., with J. H. Horlick, J. Fewson Smith, and M. C. Morris, directors. A. P. Mayberry, supt.

Cap., $1,000,000; shares $10 par; 63,787 issued; last assessment of 20c called in April, 1914. Dividends: to end of 1909, were $2,738,400, last dividend being 10c, July 11, 1908. Listed on Salt Lake City Exchange. Company is a veteran of the Tintic district and a close corporation whose stock is mostly held by the U. S. S. R. & M. Co. through its ownership of the Centennial Eureka Co., which holds a majority interest in the Bullion Beck & Champion Mining Co.

Property: 31 claims, adjoining the Centennial-Eureka, which is under the same control, and with which sideline agreements stopping litigation were secured, 1908. Mine was discovered, 1876, and has been a producer since 1880.

Development: 1,300′ shaft, with 200′ winze below the bottom level. Ore is mainly carbonate and chloride in limestone formation, carrying copper, gold, silver, lead and zinc values. No important orebodies were found in 1918.

Production: in 1915 was 2,700 tons, averaging $11 per ton and yielding 41 oz. gold, 29,306 oz. silver, 775,728 lb. lead, 27,042 lb. copper and 375,670 lb. zinc; in 1916, only small quantities of lead and zinc ore were shipped; in 1917, 5,700 tons ore; in 1918, 2,072 tons ore.

CARISA GOLD & COPPER MINING CO. OF MAINE **UTAH**

Inc. 1907, in Maine. Cap., $500,000, increased Jan., 1909, to $600,000; shares $1 par; issued, $545,000. Was a reorganization of the Carisa Gold & Copper Mining Co., which levied assessment of $30,000 and paid dividends of $60,000.

Property purchased in April, 1917, by the Knight interests for $115,000, which amount was to be divided pro rata among the Carisa stockholders. Property is now part of the holdings of the Empire Mines Co. and described thereunder.

CENTENNIAL-EUREKA MINING CO. **UTAH**

Fully described in Volume XIII. Properties absorbed December 31, 1917, by U. S. S. R. & M. Co., which see. The first 7 levels of the mine are worked by lessees.

CENTRAL STANDARD MINES **UTAH**

Address: Provo, Utah.

Officers: Thos. F. Pierpont, pres.; Willard Scowcroft, v. p.-treas.; J. C. Deal, sec., with J. W. Knight, A. Hedquist, L. N. Ellsworth, and J. W. Smith, directors. J. W. Taylor, supt.

Cap., $100,000; shares, 10c par; issued, 700,000 shares.

Property: 16 claims, 5 patented, in East Tintic mining district, entirely surrounded by holdings of Chief Cons. Reported in June, 1919, that company was sinking a shaft in ground that is in litigation, both the Chief Cons. and the Central Standard claiming it. Equipment includes an electric hoist.

CHIEF CONSOLIDATED MINING CO. **UTAH**

Office: Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: Walter Fitch, pres.; Thos. Carmichael, sec.; Wm. P. Seager, treas.; Cecil Fitch, gen. mgr., with J. H. Rice, W. S. McCornick, and Exilda Fitch, directors. J. F. Johnson, asst. mgr.

Inc. Feb. 9, 1909, in Arizona. **Cap.,** $1,000,000; shares $1 par; non-assessable; issued, 884,232. McCornick & Co., bankers, Salt Lake City, registrar; Boston Safe Deposit & Trust Co., transfer agent. Has about 1,900 shareholders. Stock is listed on the Boston Curb. Annual meeting, third Tuesday in February, at office of company, Tucson, Ariz.

Dividends: 1913, 20%; 1914, 10%; 1915, 10%; 1916, 20%; 1917, 35%; 1918, 45%; 1919, 19%, and on February 2, 1920, 10%. The total is $1,606,248.

Comparative Balance Sheet:

Assets.

	Mining Property	Mine Inv'ts	Current Assets	Liberty Bonds	Cash	Total
1919....	$1,721,670	$126,832	$290,961	$551,876	$325,676	$3,017,014
1918....	1,360,777	95,919	200,067	505,504	200,727	2,362,994
1917....	1,395,198	81,166	747,570	159,000	337,492	2,099,865

Liabilities.

	Capital Stock	Surplus	Current Liabilities	Deprec. & Tax Res.	Profit & Loss	Total
1919....	$884,232	$1,236,591	$129,518	$365,241	$401,431	$3,017,014
1918....	884,232	512,709	70,325	171,846	723,883	2,362,994
1917....	884,223	478,673	115,914	247,075	431,936	2,099,865

Property: patented claims, 1,315 acres and unpatented claims, 3,250 acres, in the Tintic and North Tintic mining districts. Company owns the mineral rights under the city of Eureka, the Little Edgard Mining Co. and the Deprizim group; controls the Homansville Mng. Co. and Baltimore Consolidated Mining Co. These last four groups comprise about 600 acres. Company also controls the Plutus Mining Co. owning 14 adjoining claims. The company owns a continuous strip extending along the mineralized zone for 3½ miles east from its mine, covering 2/3 of the mineralized district. In November, 1919, the Tintic Standard had started suit against the Chief Cons. to determine ownership of the White Wing No. 5 claim.

The Eureka lands carry about 4,000′ of the strike of the Victoria ore channel, which has an extreme width of about 400′, the Victoria ore channel being on the Mammoth-Grand Central ore zone, and parallel to the Centennial-Eureka zone. The Victoria ore channel has a practically N.-S. strike, the ore occurring in pipes and shoots in nearly vertical lime beds.

Development: by an 1,800′ and a 600′ vertical shaft with 127,000 feet of workings, development being on all levels from the 600′ to the 1,800′ level. A

new concrete-lined shaft, No. 2, was 1,000′ deep in January, 1920; it is planned to sink this shaft to the 2,000′ level. In 1918, new work totaled 15,672′, of which 4,048′ was on Plutus ground. Ore was produced from all levels from the 600′ to the 1,800′ level. New work in 1919 amounted to 25,937′.

The most important feature of the work during the first quarter, 1919, was the discovery of ore in the 1,052 drift, which has been running for a long time. exploring the ground easterly from the mine. This discovery was on the Alabama claim of the Plutus Mining Co.; the management regards it as establishing a new ore channel, and as giving assurance of a second mine.

Equipment: the plant has three 150-h. p. boilers, with mechanical stokers, a hoist and 2 air compressors. The double-cylinder hoist has 6′ balanced drums, 1⅛″ steel cable, and operates 2 triple-deck cages in balance, carrying 1-ton cars, to depth of one-half mile. Buildings include a power plant, housing the boilers, hoists and air compressors; a machine shop, carpenter shop, and a smithy, all of steel frame. Late in 1919 there were 450 men employed.

Production:

	Ore, tons	Copper, lb.	Lead, lb.	Zinc, lb.	Gold, oz.	Silver, oz.	Value Net
1919.....	63,726	15,574	5,979,588	.....	3,753	2,757,533	$2,343,927
1918.....	66,019	4,137	7,906,831	14,597	4,100	2,354,798	1,869,819
1917.....	59,950	....	10,780,540	600,236	9,175	1,534,907	1,554,714
1916.....	83,606	1,795	18,439,153	879,410	8,331	1,739,004	1,315,441
1915.....	36,412	5,648	8,232,606	622,465	4,634	403,854	309,136
1914.....	40,667	237,901	5,974,008	71,665	6,337	665,947	324,299
1913.....	51,866	117,328	2,597,091	.....	4,806	1,030,132	381,287
1912.....	33,072	.....	1,141,222	.....	7,838	969,907	509,426
1911.....	8,063	.....	825,551	.....	389	306,362	117,583
1910.....	8,841	.....	800,802	.....	584	531,483	217,059

Gross average value ore in 1919 was $55.57 per ton and $36.78 net; in 1918, $45.07 and $28.49; in 1917, $40.12, and $25.93, respectively.

For 1919 the average gold content was 0.0589 oz., silver, 43.272 oz., lead (on lead ore) 11.92%, copper, 1.186%. Average New York price received for metals was 112.6c. for silver, 5.92c. for lead, 18.31c. for copper.

Chief Consolidated is a valuable property, the largest silver producer in Utah, and is under excellent management.

COLORADO CONSOLIDATED MINES CO. **UTAH**

Office: Provo, Utah.

Officers: Jesse Knight, pres.-mgr.; J. William Knight, v. p.; W. Lester Mangum, sec.-treas., with R. E. Allen, J. S. Smith, K. S. Jordan and A. M. Knight, directors. Controlled by Knight Investment Co.

Is a consolidation of the Beck Tunnel Cons. Mng. Co. and Colorado Mng. Co.

Inc. April, 1916. **Cap.**, 2,500,000 shares; 10c par; stock in old companies exchanged share for share. Listed on Salt Lake Exchange.

Dividends of $675,000 have been paid by the Beck Tunnel and $2,600,000 by the Colorado Cons.

Property: 28 claims, near the Sioux mines, in the Tintic district, Utah county, contains large deposits of low-grade ore carrying silver-gold, lead and copper values.

Development: main shaft is 2,000′ deep and will be sunk to water level. In 1919, the 1,900′ level was being explored; no ore has been found to date on this level.

COLORADO MINING CO. **UTAH**

Merged April, 1916, with the Beck Tunnel Cons. Mng. Co. and now called the Colorado Cons. Mines Co., which see.

COPPER LEAF MINING CO. **UTAH**

Mine in the Tintic district.

Officers: J. C. Diehl, of Provo, Utah; J. E. Mayer, of Salt Lake City; J. W. Taylor, mgr., of Eureka; T. F. Pierpont and Alex. Hedquist, of Provo.

Inc. 1916, in Utah. **Cap.,** 600,000 shares; $1 par. Cash on hand, Jan., 1919, reported as $19,000.

Property: several claims in the Tintic mining district.

Development: vertical shaft which reached the 1,250′ level in Oct., 1919. Exploratory work is being done on the 1,000′ and 1,200′ levels.

CROESUS MNG. CO. **UTAH**

Succeeded by Eureka Croesus Mining Co.

CROWN POINT MINING CO. **UTAH**

Officers: Jos. Worthlin, pres.; J. F. Greer, sec.-treas.; John Roundy, gen. mgr., Provo, Utah, with E. B. Kimball and Jos. Berry, directors.

Inc. 1907, in Utah. **Cap.,** $100,000; 10c par; assessable. Last assessment, 1c per share due August 15, 1919. Listed on Salt Lake Exchange.

Property: 8 claims, 5 patented, in Tintic district. **Ore:** silver-lead. Development by 1,000′ shaft and 4,100′ of tunneling. Workings totaled 6,875′, Sept., 1919. **Equipment:** includes a hoist and compressor. Funds for development raised by assessments.

D. & B. MINES CO. **UTAH**

Officers: C. H. Blanchard, pres., 766 First Ave., Salt Lake City; Wm. H. Dickson, v. p.; A. C. Ellis, sec.; with Pat Donnelly, and Chas. P. Brooks, directors, all of Salt Lake City. L. H. Farnsworth, treas.

Inc. in Nevada. **Cap.,** $200,000; shares, 10c par; outstanding, 1,130,000 shares; listed on Boston Curb.

Property: 63 claims, in the North Tintic mining district, said to have gold, silver, lead and copper ore. The claims are in 2 groups, the D. & B. group of 30 claims has a 200′ shaft and several hundred feet of workings. The K. & K. group has a 90′ and also a 200′ shaft. Property is a prospect. The stock has been profusely advertised by Orem & Co., Boston, Mass.

DESERET MOUNTAIN MINES CO. **UTAH**

Office: 409 Atlas Bldg., Salt Lake City.

Officers: W. Mont Ferry, pres.; D. H. Livingston, v. p.; Wm. D. Livingston, sec.; S. J. Truman, treas., with J. W. Mellen, J. H. Turner and I. D. Wines, directors. D. E. McPherson, supt.

Cap., 1,000,000 shares; 500,000 reserved for treasury.

Property: 12 claims, 250 acres in the West Tintic mining district, Juab county, said to show a contact vein, between limestone and porphyry, 12′ wide, carrying copper ore that assays better than 3%.

Development: by 300′ new incline shaft and an old shaft 218′ deep, drifts, stopes and raises. Plans continuing shaft to 500′ level. The 300′ level crosscut cut the vein in 1917, but owing to war conditions, mine was shut down until early in 1919, when shaft was unwatered to the 300′ level, and development work resumed.

DRAGON CONSOLIDATED MINING CO. **UTAH**

Office: care Knight Investment Co., Provo, Utah. Mine near Tintic, Juab county, Utah.

Officers: Jesse Knight, pres.; J. Will Knight, v. p.; W. Lester Mangum, sec.-treas.; R. E. Allen and L. E. Ritter, directors; E. R. Higginson, supt.

Inc. 1911, in Utah. **Cap.,** $2,000,000; $1 par; issued 1,750,000; 250,000 in treasury. Stock listed in Salt Lake City.

Initial dividend of 1c a share declared February 20, 1917, and continued quarterly during 1917 and 1918. Is heaviest shipper in the Tintic district, as ore is low-grade pyrite used as a flux by smelters.

Property: 28 claims, patented, 122 acres, comprising the Dragon and Governor groups in Tintic district. The Governor group has 2,000′ or more of the big Iron Blossom fissure in limestone, from which the great production of that and the Sioux mines has come. The Dragon group shipped 100 tons per day of iron ore to the U. S. smeltery, for a long time. The Governor ground has a rich orebody of copper-silver ore developed by drifts from the Iron Blossom on the 300′, 600′, 800′ and 1,000′ levels, showing a 20′ vein with 0.5 to 10% copper and 20 to 50 oz. silver. Part of the property is worked through the Black Jack shaft.

In the tunnel connecting the workings with the Iron Blossom property, large bodies of low-grade ore were encountered in 1915.

Equipment: includes electric pump on 1,000′ level which secures water supply of the Knight-Christensen mill, and a hoist.

Production: 1,743 tons in 1914, yielding 44,006 oz. silver, 135,814 lb. copper, 57,552 lb. lead and 432.37 oz. gold; 7,804 tons in 1915, yielding 102,143 oz silver, 490,750 lb. copper, 14,766 lb. lead and 2,559 oz. gold. Later figures not available.

Shipping 260 tons daily, 1919.

EAST CROWN POINT MINING CO. UTAH

Address: Provo, Utah.

Officers: R. A. Badger, pres.; H. C. Jex, sec.

Inc. 1907, in Utah. **Cap.**, $100,000; shares 10c par; assessable; last assessment, ½c a share, delinquent October 4, 1919. Listed on Salt Lake Exchange.

Property: 9 silver-lead claims in Tintic district, Juab county, Utah. Idle for some time, but planning to resume work.

EAST STANDARD MINING CO. UTAH

Officers: Fred C. Allen, pres.; Isaac Isaacson, v. p.; M. C. Morris, sec.-treas., with J. Frank Quist, and Gus Wickman, directors.

Inc. 1919, in Utah. **Cap.**, $100,000; 10c par; 600,000 issued.

Property: 9 claims, adjoining the Tintic Standard on N. E., in East Tintic district, Juab county, formerly known as the White Track. Management states that a shaft will be sunk to 1,000′ depth.

EAST TINTIC COALITION MINING CO. UTAH

Address: Provo, Utah.

Officers: John M. Bestelmeyer, pres.; H. G. Blumenthal, v. p.; A. Bestelmeyer, sec.-treas., with D. R. Beebe, and H. C. Hicks, directors.

Cap., $75,000; shares 5c par. Listed on Salt Lake Exchange. In July, 1919, company stated that it had $26,312 in cash and no debts.

Property: 3 patented claims, located just W. of the Eureka Bullion, said to have gold-silver-lead ore.

Development: 225′ tunnel, and two incline shafts, one 142′, and one 127′ deep. In July, 1919, started work on a new shaft. Is a prospect.

Equipment: newly installed, includes a head-frame, electric hoist, compressor and drills.

EAST TINTIC DEVELOPMENT CO. UTAH

Property bought, 1916, by Eureka Lilly Mining Co., which see.

EMPIRE MINES CO. UTAH

Address: Jesse Knight, Provo, Utah.

Inc. 1907, in Utah. **Cap.**, 3,000,000 shares; 5c par. Listed on Salt Lake Exchange.

Is a merger of the Black Jack, Boston & Tintic, Central Mammoth, Lower Mammoth, Garnet, Old Colony and Eureka, Manhattan and Opex Consolidated mining companies, all controlled by the Knight Investment Co.

In April, 1917, the property of the Carisa Gold & Copper Mng. Co. of Maine at Mammoth, Utah, was bought for $115,000.

Property: over 700 acres in the Tintic district, Utah, east of Silver City and south of Eureka.

Practically all the work done since the consolidation has been carried on through the Lower Mammoth shaft, the main work late in 1919, being on the 1,800′ level, where a 3′ vein of good copper ore was cut in Black Jack group.

EUREKA BULLION MINING CO. UTAH

Address: J. M. Bestelmeyer, mgr., Provo, Utah.

Officers: H. C. Hicks, pres.; J. M. Bestelmeyer, v. p.; August Bestelmeyer, sec.-treas, with N. C. Hicks, and H. G. Blumenthal, directors.

Inc. 1916, in Utah. **Cap.**, $50,000; shares 5c par; assessable. Listed on Salt Lake Exchange.

In January, 1920, company formed the Tintic Silver Mining Co., with a capital of $150,000.

Property: 7 patented claims and 2 unpatented claims, formerly owned by

the Grutli Mining Co., were bought at sheriff's sale, 1916, for $8,960. Claims are in the East Tintic district, W. of the Tintic Standard property, and are said to show a 50′ vein on surface with a limestone porphyry contact.

Development: by 800′ shaft reported to show quartz in a cave 150′ long, 50′-75′ high and 75′ wide at 500′, with manganese. A drift on the 800′ level is said to have opened a 4′ vein of ore in June, 1919, with assays 9 to 20% lead, 23 to 70 oz. silver, and about $2 gold per ton. A winze is being sunk below this level to cut two intersecting fissures.

Equipment: includes compressor, 60-h. p. steam boiler, hoist, etc.

EUREKA CROESUS MINING CO. OF NEW YORK **UTAH**

Controls or owns the Eureka Utah Mining Co. of Salt Lake City. E. L. Torres, pres.

Cap., $1,500,000; shares $1 par.

Property: the Huebner mine, at Eureka, Juab county, Utah, has shipped some high-grade lead-silver ore. Reported in 1919, that a 250-ton mill would be erected.

EUREKA HILL MINING CO. **UTAH**

Office: Deseret National Bank Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: Moylan C. Fox, pres.; Waldemar Van Cott, v. p.; Jas. E. Berkey, sec., with Ed. W. Packard, directors. Jackson C. McChrystal, managing engr.; Chas. Weisbaker, supt.

Inc. Nov. 12, 1875, in Utah. **Cap.,** $1,000,000; shares $100 par. Is a close corporation, credited with having paid $2,000,000 in dividends. Paid $1 dividend, 1916. Annual meeting, third Tuesday in February.

Property: 5 claims, 27 acres, patented, also a 25-acre millsite and 150 acres miscellaneous lands, in the Tintic district, adjoins the Bullion-Beck and Centennial Eureka. The Eureka Hill mine has a 1,500′ main working shaft and about 30 miles of workings. Orebodies are lenticular deposits, carrying cuprite, malachite and enargite, with average values of about 1.4% copper, 6% lead, 25 oz. silver, and $3 gold per ton. Mine worked for 45 years, but shut down, 1911, and only old workings mined by lessees since then. Produced many millions of silver-lead ore from above 1,000′ level. Deep development in future will be from adjacent mines.

Knight-Dern interests, 1916, leased tailing dumps of Eureka Hill, reported to contain 200,000 tons of ore, averaging $4.50 per ton. Lessees were shipping ore in 1919.

EUREKA KING MINING CO. **UTAH**

Directors: Ray Van Cott, Judge Bldg., Salt Lake City; Geo. M. Chiulos, A. E. Moreton; Geo. B. Bywater, and F. J. Sylvester.

Property: in Tintic mining district. In June, 1919, consolidated with the Paymaster Mines Co. The company will spend $50,000 in development work on the 1,200′ level.

EUREKA LILLY MINING CO. **UTAH**

(Succeeds East Tintic Development Co.)

Office: Judge Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Utah.

Officers: N. F. Snyder, pres.; Thos. Barrett, v. p.; with Elmer Holderway and Jos. Galigher, directors. Gideon Snyder, sec.-treas. Grant Snyder, mgr., New York, supt.

Inc. 1907, in Utah. **Cap.,** $1,300,000; shares $1 par; assessable; No. 9 assessment, 1c per share, was called in June, 1919; last assessment, 1c a share, delinquent September 15, 1919; outstanding, 1,300,000 shares. Listed on Salt Lake Exchange. Company is a consolidation of the Lilly and Provo mining companies.

Property: Eureka Lilly mine, 8 claims, 6 patented, in the East Tintic mining district, adjoining the Tintic Standard mine on the west and including the Ralph mine of the East Tintic Dev. Co., bought in 1916, from which considerable high-grade silver-lead ore was mined years ago.

Development: by 1,660′ incline shaft, which passes through broken limestone to depth of 1,200′, where it enters the underlying quartzite, the ground

is cut by N. 10° E. and E.-W. fissures, and ore occurs at intersections. On the 1,400′ level these fissures have so far shown no large bodies of commercial ore. On the 1,660′ level a fissure shows 5″ to 8″ of copper-silver-gold ore along a drift on the vein. Driving on 1,660′ level and sinking shaft in February, 1920.

Produced over $150,000 worth of ore, running 42% lead and 31 oz. silver per ton, from above the 200′ level.

EUREKA METALLURGICAL CO. **UTAH**

Addres: Eureka, Utah.

Officers: M. M. McChrystal, pres.; R. V. Smith, v. p. and gen. mgr.; Thos. McCormick, treas.; Judge E. Pike, sec.; above, with J. Westerdahl, directors. C. M. Oakes, asst. mgr.

Inc. 1917, in Utah. **Cap.,** $500,000; shares $1 par.

The company was organized to conduct a general metallurgical business, on the strength of patents of R. V. Smith for treating carbonate lead-zinc ores by flotation. Operates a small mill at Eureka.

EUREKA MINES CO. **UTAH**

Address: John H. McChrystal, gen. mgr, Eureka, Utah.

Officers: Wm. R. Wallace, pres. and gen. mgr.; Jackson C. McChrystal, v. p.; J. E. Berkley, sec.; H. J. Wallace, treas., with John H. McChrystal, directors.

Inc. 1916, in Utah. **Cap.,** $100,000; shares 10c par. Listed on Salt Lake Exchange.

Property: in the Tintic district, is bounded by the Chief Consolidated, Gemini, Centennial, Eureka and Eagle and Blue Bell mines.

Ore: silver-lead of milling grade, averaging about 6 oz. silver and 4% lead with occasional zones of enrichment.

Development: mine has been opened up through the deep workings of the Gemini on the 900′ to 1,500′ levels. Shipments are reported to carry 90 oz. silver and 9% lead and to average $70 to $80 a ton. At last report, lessees had found good ore on the 1,000′ level and company work was being done on the 1,100′ level.

EUREKA STANDARD MINING CO. **UTAH**

Address: F. G. Richmond, mgr., Salt Lake City.

Property: 14 claims, about 280 acres, in the East Tintic district, formerly known as the Montana group. Shows several large outcrops.

Development: by 500′ 3-compartment shaft. Work on property was resumed in 1919, and a 1,500′ shaft started.

FARRAGUT MINING & MILLING CO. **UTAH**

Address: care Ashby S. Thatcher, Boston Blk., Salt Lake City.

Property: the Admiral Farragut group of claims in the North Tintic district, near Eureka, developed by a 265′ shaft, which was to be sunk to 500′. No recent returns; probably idle.

GEMINI MINING CO. **UTAH**

Office: 723-4 Kearns Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: E. W. Packard, pres.; Jackson H. McChrystal, v. p. and gen. mgr.; J. E. Berkley, sec.; E. O. Howard, treas., with W. Van Cott, directors. John H. McChrystal, supt.

Cap., 5,000 shares, $100 par. **Dividends:** to 1918, totaled $482 per share. In 1916, $16 per share was paid and in 1917 $20 per share.

Property: the Gemini is a silver-lead mine with accessory copper ore, in shoots. There are 3 fissure veins, in an ore-channel about 450′ wide, cut transversely by a number of cross-fissures, making a rather complex system of orebodies, the main fissure, of 15 to 20′ width, having a S. E. dip, with ore-shoots raking to the north. Ore in the upper workings averages about 12% lead and 40 oz. silver, while the bottom level, at 1,600′, shows a 20′ vein carrying argentiferous 3% copper ore.

Development: by 1,700′ shaft and a 300′ winze, equipped with electric hoist. The adjoining Ridge & Valley mine is operated through the Gemini shaft.

The Gemini has been a regular producer since 1886. Management, like many in Utah, extremely reticent about giving any information.

GODIVA MINING CO. **UTAH**

Office: 735 Kearns Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: E. W. Packard, pres.; J. C. McChrystal, v. p. and gen. mgr.; J. E. Berkley, sec.; E. O. Howard, treas.

Cap., $1,000,000; $1 par. In 1919, 144,000 treasury shares offered to public at 30c. Financial statement for 1918 showed receipts from ore sales, $49,260; expenditures included $20,502 paid lessees and $14,029 for development. Cash on hand, January 1, 1919, $4,112.

Property: 64 acres of patented claims in Tintic district. Only leasing done for some years, company not operating on account of settlement of estates.

Development: by 1,200′ shaft, with a winze 150′ below that level. New work in 1918 amounted to 1,057′. Good lead-silver ore is said to have been opened on the 1,300′ and 1,350′ levels.

Equipment: 250-h. p. hoist, compressor, 100-ton concentrator, ore bins, buildings, etc.

From 1908 to April 1, 1917, production was 13,701 tons of crude ore and 2,861 tons of concentrate, worth $805,687. In 1916 zinc and silver-lead ores yielded $93,000, mostly from 700′ level. In 1918, ore mined totaled 1,800 tons, average value, $37.13 per ton.

GOLD CHAIN MINING CO. **UTAH**

Provo, Utah. **Mine office:** Mammoth, Juab county, Utah.

Officers: C. E. Loose, pres. and gen. mgr.; J. T. Farrar, v. p.; P. G. Peterson, sec.-treas., with G. Simmons and John R. Turloes, directors. W. D. Loose, supt.

Inc. Dec., 1910, in Utah. **Cap.**, $250,000; shares 25c par. Listed on Salt Lake Exchange.

Dividends: to date, $130,000. Company absorbed the Ajax Mining Co., said to have paid upwards of $1,000,000 in dividends.

Property: the Gold Chain group and Ajax mine in the Tintic district. Development on the 1,500′ level opened an orebody averaging 15 to 20 oz. silver, 40 to 50% lead and $2 to $3 gold per ton.

Development: new work in 1919, was being done from the 1,800′ level of the Empire Mines Co. Lessees are working on the level above.

Equipment: hoist, 17-drill compressor, and electric motors.

GRAND CENTRAL MINING CO. **UTAH**

Office: Provo, Utah. **Mine office:** Mammoth, Juab county, Utah.

Officers: Jos. T. Farrar, pres.; H. L. Holbrook, v. p.; Preston G. Peterson, sec.-treas.; Col. Edwin C. Loose, gen. mgr.; W. D. Loose, supt.

Inc. Feb., 1902, in Colorado. **Cap.**, $600,000; increased 1909 from $250,000; shares $1 par, non-assessable; issued 600,000. Stock listed on Salt Lake Exchange.

Dividends: in 1914, 15c per share; in 1915, 2½c; in 1916, 8c; in 1917, 16c; in 1918, 12c. Total dividends to 1919, $1,802,000. In April, 1919, 4c was paid.

Property: the Grand Central is the deepest mine of the Tintic district. It adjoins the Centennial Eureka and is opened to the 2,600′ level, carrying a vein with an orebody 200′ wide in places and of low average grade, though it is the largest orebody in the Tintic camp. A second ore shoot, 700′ west of the old one, and with parallel strike, was opened on the 2,000′ and 2,100′ levels. This oreshoot averages 15 to 20% copper on the 2,380′ level and has been opened up on the 1,600′ level for a distance of 1,200′, showing a width of 50 to 100′. At this point the ore is bunchy, requiring careful sorting. Mine producing from the 400′ to the 2,300′ levels, inclusive.

Equipment: includes hoist, tramway and electric power. Mill to be constructed after the Knight Christensen plant has proved successful.

Production: 117 cars or about 5,500 tons ore in first quarter of 1919.

Property and management good.

GRUTLI MINING CO. **UTAH**

Described in Volume XIII. Reorganized, November, 1917, and now known as the Eureka Bullion Mng. Co., which see.

HUMBUG MINING CO. **UTAH**

Merged with Uncle Sam Consolidated Mining Co.

IBEX GOLD MINING CO. **UTAH**

Joy, Juab county, Utah. A Knight Investment Co. property, under lease and bond to Detroit Copper Co. and described thereunder p. 1350.

INDEPENDENCE MINING CO. **UTAH**

Address: A. G. Mattson, pres., Eureka, Utah; Harold Schriver, sec.

The last assessment, ½c a share, was delinquent October 18, 1919.

Property: a group of claims near the Copper Leaf, in the Tintic district. Company bought the old mill and other equipment of the Bullion Beck & Champion Mining Co. at Eureka. A shaft is being sunk and electrically-driven machinery erected. Company has spent $28,000, and owes $10,000.

IRON BLOSSOM CONSOLIDATED MINING CO. **UTAH**

Officers: W. Lester Mangum, sec.-treas., 11 Knight Blk., Provo, Utah. Jesse Knight, pres.; J. Wm. Knight, v. p.-gen. mgr.; preceding, with R. E. Allen and A. M. Knight, directors. H. V. Birch, asst. mgr. Chas Zabriskie, supt.

Inc. Nov. 7, 1899, in Utah. **Cap.,** 1,000,000 shares; 10c par; assessable; all outstanding. Listed on Boston Curb and Salt Lake City Exchange.

Dividends: $400,000 in 1913; $330,000 in 1914; $350,000 in 1916; $250,000 in 1917; $75,000 in 1918; $50,000 in 1919; $25,000 on January 26, 1920. Total to date is $3,285,000.

Property: 15 claims, patented, 147.75 acres in the Tintic mining district, Juab county, Utah. The Iron Blossom mine is in limestone cut by a large fissure vein on which the orebodies are aligned.

Development: property is opened to a depth of 2,200′ with about 12 miles of workings.

The future of the mine, apparently, depends on the development of the unexplored ground for only a limited supply of ore is available in the old mine and most of the ore now being shipped is mined by leasers. Diamond-drilling for 1,300′ on the 1,900′ level failed to disclose anything of value.

Production: in 1918, amounted to 684,275 lb. copper, 624,547 lb. lead, 386,093 oz. silver, and 1,406 oz. gold. This ore is treated by the Tintic Milling Co.

IRON KING MINING CO. **UTAH**

Mine near Eureka, Juab county, Utah.

Officers: Col. C. Edw. Loose, pres.; Reed Smoot, v. p.; P. G. Peterson, sec., all of Provo, Utah.

Cap., $2,000,000; shares $1 par, increased from $1,000,000 in July, 1917. Listed on Salt Lake Exchange.

Property: 400 acres in Tintic district. Assessments of 1c a share have paid for development work. Mine developed by shaft, 1,400′ deep, July, 1919, and a 3,500′ tunnel, planned to be driven 6,000′. The shaft will be sunk to the 2,000′ level. The mine is said to show 100,000 tons of iron ore blocked out and ready for stoping. Mine closed down March, 1912, owing to inability to market the iron ore at a profitable figure, but was re-opened in April, 1917.

Equipment: a compressor and an electrically-driven double-drum hoist were installed in June, 1919.

JOE BOWERS MINING CO. **UTAH**

Office: 515 Dooly Blk., Salt Lake City, Utah. John Dern, pres.; A. Reeves, sec.

Inc. in Utah. **Cap.,** 700,000 shares; $1 par; assessable; 522,442 shares outstanding. Listed in Salt Lake City.

Property: 40 acres in the Tintic district shows silver-lead ore. Is a prospect.

KING WILLIAM MINING CO. **UTAH**

Office: 546 E. First South St., Salt Lake City, Utah. **Mine address:** Eureka, Juab county, Utah.

Officers: at last accounts: Chas. H. Blanchard, pres. and gen. mgr.; F. G. Morse, v. p.; W. A. Wright, sec.; N. G. Hall, treas.

Inc. 1907, in Nevada. **Cap.,** $1,250,000; $1.25 par.

Property: 2 claims, patented, 16 acres, surrounded by the holdings of the Eagle & Blue Bell, Centennial-Eureka and Grand Central.

Development: is through the Eagle & Blue Bell workings, on the 500′ and 1,000′ levels, corresponding with the 1,400′ and 1,900′ levels of the King William. There are several shallow shafts.

In October, 1916, the mine was sold by the sheriff to a company that has 1,000,000 shares, on which an assessment of ½c each was levied. There is no information from the mine for 1917-19.

KNIGHT INVESTMENT CO. **UTAH**

Officers: Knight Blk., Provo, and 817 Newhouse Bldg., Salt Lake City, Utah.

Officers: Jesse Knight, pres.; Amanda M. Knight, v. p.; W. Lester Mangum, sec.-treas., with R. E. Allen, J. Wm. Knight, Knight Starr Jordan and R. Knight, directors.

Controls 13 properties, ranging from prospects to successful dividend paying mines, in the Tintic district, Juab county, Utah, including the Colorado Cons Mines Co., and the Empire Mines Co., Bonneville Mining, Dragon Cons., Iron Blossom Cons., Lucky Boy Cons., Spring Canyon Coal, Tintic Milling, Utah Ore Sampling, Rico Wellington Mining Co., at Rico, Colo.

Company also operates the Knight Woolen Mills, the Tintic Milling Co., and Eureka Hill R. R. Co.

LEHI-TINTIC MINING CO. **UTAH**

Address: C. S. Card, sec., 417 Boston Bldg., Salt Lake City, Utah.

Officers: George Nicholes, pres.; W. H. Trask, Jr., v. p.; Geo. B. Doyle, treas., with Geo. D. Anson, and J. A. Barclay, directors.

Cap., 1,000,000 shares; assessable; assessment No. 34 2c a share, levied in June, 1919. Last assessment, 1c a share, delinquent, November 21, 1919. No. 33 was adjudged as illegal, and payments made were credited to No. 34.

Property: 12 claims in the Tintic district, about 4 miles from Eureka, shows silver-lead-gold ore in fissure vein.

Development: by 2,100′ tunnel. Equipped with compressor and steam power. Reported early in November, 1917, that the tunnel had cut the Empire vein, assaying 28% lead, 6 oz. silver, and $2 gold per ton. In 1919, company was planning to sink a 500′ working shaft, and in December a 1,000′ tunnel was being driven to cut 3 mineralized fissures opened in the upper workings.

LILLY MINE **UTAH**

Office: 414 Judge Bldg., Salt Lake City.

Officers: Grant Snyder, pres.-mgr.; Thos. Bonoth, v. p.; Gideon Snyder, sec.-treas., with H. Blumenthal, G. N. Holdaway, directors.

Property: 12 claims, 10 acres at Eureka, in the Tintic mining district, Utah, adjoining the Tintic Standard mine.

Mine credited with past production of $100,000 worth of ore from upper workings.

LION HILL CONSOLIDATED MINES CO. **UTAH**

Described in Volume XIII. Property acquired in December, 1919, by the Ophir Metals Co., which see.

LITTLE MAY MINING CO. **UTAH**

Address: Silver City, Utah.

Property: in Silver City section of Tintic district. Developing in July, 1919. Details not available.

LOWER MAMMOTH MINING CO. **UTAH**

Merged, 1917, with Empire Mines Co., which see. Stockholders receive 15 shares of Empire for every 100 of Lower Mammoth held.

MAMMOTH MINING CO. **UTAH**

Office: 402-3 McIntyre Bldg., Salt Lake City, Utah. **Mine office:** Mammoth, Juab county, Utah.

Officers: Samuel McIntyre, pres. and gen. mgr.; Samuel McIntyre, Jr.,

v. p. and supt.; Col. R. M. Wilkinson, sec., with Earl McIntyre, and R. E. Marks, directors.

Inc. 1881, in Utah. **Cap.,** $10,000,000; shares $25 par. Reincorporated Dec. 5, 1906, in Nevada. **Cap.,** $1,000,000; shares $2.50 par. Controls the Cleveland Mining Co., through ownership of 70% of capital stock. Annual meeting, first Tuesday in February.

Dividends: 5c per share in 1913, 5c in 1915, 25c in 1916, and $1 in 1917; total to date, $2,820,000.

As a result of 9 years' litigation, a judgment in favor of the Grand Central Mining Co. was rendered, 1910, against the Mammoth Mining Co., and necessitated the levying of a 10c assessment, 1910, the first in the history of the company. Assessment No. 2, 5c a share, was payable in March, 1919, to provide money for further development work.

Property: 19 claims, in Tintic distrct. Mine opened about 1870, is developed extensively and has a 2,300′ main shaft, the deepest in the Tintic camp. Irregular shoots and chimneys of gold, silver, and copper ores occur.

Equipment: includes complete plant, installed in 1910. About 50 men employed.

Production: 36,000 tons in 1914; 26,000 tons in 1915; 36,000 tons in 1916; 24,000 tons to July, 1917; about 18,000 tons in 1918. Dumps said to contain over 250,000 tons.

MAMMOTH No. 2 MINING & MILLING CO. **UTAH**

Idle. **Office:** 409 Hooper Bldg., Salt Lake City, Utah. Mine at Mammoth, Juab county, Utah.

Officers: Wm. H. McIntyre, pres.; Samuel McIntyre, v. p. and treas.; Isaac Jennings, sec.

Inc. 1900, in Utah. **Cap.,** $300,000; $1 par; assessable; fully issued.

Property: 2 claims, patented, adjoining the Mammoth Mining Co., shows lead and copper ores.

MAY DAY MINING & MILLING CO. **UTAH**

Address: 515 Dooly Block, Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: John Dern, pres.; M. P. Braffet, v. p.; A. Reeves, sec.; W. S. McCornick, treas., with J. C. Dick, directors.

Inc. 1896, in Utah. **Cap.,** $200,000; shares 25c par; assessable; all outstanding. Stock transferred at company's office. Annual meeting, first Monday in April. Listed on Salt Lake City Exchange.

Balance sheet for year ended March 31, 1919, shows $9,289 received from ore sales, $16,122 from two assessments, $1,582 from sundries, a total of $26,994. Expenses totaled $27,271. Dividends total $300,000.

Property: 6 claims, 5 patented, 60 acres, in the Tintic mining district.

Ore: zinc, silver and lead in limestone.

Development: by 1,100′ vertical shaft and 1,500′ tunnel. The mine has been practically out of ore several times; at one time the supply was so low the stock dropped to 1c per share; the larger part of its dividends has been paid since then.

Equipment: includes 50-h. p. electric hoist and compressor, capacity 250 cu. ft.

Production: for year ending March 31, 1917, 1,360 tons lead ore, valued at $40,980; 569 tons zinc ore valued at $18,378 for year ending March 31, 1919; 591 tons lead ore, valued at $9,126 and 18 tons gold ore, valued at $163.

Development work is being carried on with the hope of finding new orebodies. Part of the property is leased, and company itself leases part of the Chief Consolidated ground.

MONO DEVELOPMENT CO. **UTAH**

Address: J. H. Cook, pres., or Matt Gisborn, Salt Lake City, Utah. Mine at Dry Canyon, near Ophir, Salt Lake county, Utah. Stock assessed ¼c a share.

Property: a group of claims, 300 acres, noted in 1872-3 for its high-grade silver ore. Claims are near the following producing mines: Mono Brook-

lyn, Thad Stevens, Kearsarge and Eureka Ophir. A new wagon road was built October, 1917, from Dry Canyon to the railway; heretofore ore was hauled 9 miles to Stockton.

Developed: by 2,500′ tunnel. No recent information; probably idle.

NORTH BECK MINING CO. **UTAH**

Address: E. J. Radatz, 19 Haxton Place, Salt Lake City, Utah.

Property: in northwestern part of Tintic, adjoining Centennial-Eureka, and Gemini, developed by shaft 1,450′ deep in January, 1920, to be sunk to 1,600′. A leached zone was opened at 1,200′. Mine is fully equipped.

Management does not reply to requests for information.

NORTH SCRANTON MINING CO. **UTAH**

Address: H. B. Merrihew, Box 355, Lehi, Utah.

Officers: H. B. Merrihew, pres.-mgr.; B. C. Lott, v. p.; F. R. Heidebreich, sec.-treas., with D. H. Cox, directors.

Inc. May, 1905, in Utah. **Cap.,** $100,000; shares 10c par; assessable; 421,000 issued. Operating expenses in 1916 were $1,684.

Property: 10 unpatented claims, 200 acres, on west slope of Tintic range, in North Tintic district, Utah, 3½ miles by good road from railroad. Group shows outcrops of silver-bearing zinc-lead ore in a well-defined fissure in dolomitic limestone. **Ore:** consists of 6 to 8″ streaks, reported to carry 23% lead and 6 oz. silver per ton.

Development: by 2 tunnels and winzes with total workings of 2,300′. Tunnel No. 1 exposes 18% zinc ore at depth of 40′. Tunnel No. 2 shows ore assaying 74% lead and 54 oz. silver, at depth of 75′. While not in commercial quantity, this ore warrants further development to reach the main fissure. The fissure has been followed down for 200′.

Is a prospect.

NORTH STANDARD MINING CO. **UTAH**

Address: 230 Judge Bldg., Salt Lake City, Utah.

Officers: Dr. C. F. Wilcox, pres.; John Dorius, sec.-treas.; J. H. Manson, v. p. and mgr. Cap., $100,000; par 10c. Stock is listed on Salt Lake Exchange. Assessable; assessment No. 1, 1c a share, called October, 1919.

Property: 22 claims, north of the Tintic Standard at Eureka, Juab county. Company is sinking a 2-compartment shaft, which had reached a depth of 500′ in October, 1919.

Equipment: includes electric hoist, and a compressor.

OGDEN-TINTIC LEASING CO. **UTAH**

Has a lease on part of property of Tintic Central Mining & Milling Co., which see.

OLD SUSAN MINING CO. **UTAH**

Mail returned, 1918, from former address, 411 Felt Bldg., Salt Lake City, Utah.

Officers: W. H. Simmons, pres.; P. F. Thompson, v. p.; E. D. R. Thompson, sec.-treas.-mgr., with F. A. Druehl, directors.

Inc. 1899, in Utah. **Cap.,** 400,000 shares; 10c par; 257,572 shares outstanding. Annual meeting, first Monday in January.

Property: 3 patented claims, 25 acres in Tintic mining district, Juab county, shows gold-silver lead ore in fissure veins in porphyry and monzonite. Developed to depth of 300′ by 1,500′ tunnel. The mine, at last accounts was worked by lessees on a royalty basis.

OPEX CONSOLIDATED MINES CO. **UTAH**

Is a part of Empire Mines Co., which see.

OPHIR HILL CONSOLIDATED MINING CO. **UTAH**

Office: Miner Bldg., Butte, Mont. **Mine office:** Ophir, Tooele county, Utah.

Officers: Wm. A. Clark, pres.; W. C. Siderfin, sec.; M. H. Hartman, gen. mgr., with Chas. W. Clark, directors. A. G. Swanson, mine supt.; F. Wellenger, mill supt.; E. Bowman, engr. Company is managed as a close corporation.

Property: one-half mile north of Ophir, carries the 5′ Top-vein, the

20′ Big vein, the Middle vein 10′, the Copper vein 8′, and the Blue vein, 6′ thick and from 10′-100′ wide.

Ore: contains argentiferous galena, with pyrite, averaging 8% lead and 10 oz. silver per ton; also some copper and zinc ores. Ore occur as replacements in argillaceous limestone and shale, in 3 clearly defined shoots, known as the Wild Delirium, Miner's Delight and Western Stope.

Development: an 1,800′ incline shaft, with the usual levels and stopes, also a transportation tunnel nearly 1 mile long, through which all ore is taken. This tunnel intersected the vein on the 1,300′ level; it also drains the mine at depth.

Equipment: includes a steam plant, not operating, and a hoist; there is a gravity tramway from the mine to the 200-ton mill.

Production: averages about 200 tons daily of lead-silver ore, with a little gold and 2½% copper. Concentrates run about 10-20 oz. silver and 10-12% lead per ton. The property is an excellent one. A branch of the Salt Lake Route known as the St. John & Ophir R. R. Co. was built to the property in 1912.

In 1919, mine produced 33,895 tons of ore, yielding $705,856 gross, or $155,633 net. Ore contained 373,435 oz. silver, 6,595,743 lb. lead and 210,241 lbs. copper.

OPHIR KING GOLD MINING CO. UTAH

Mine near Ophir, Tooele county, Utah.

Inc. November, 1917, in Utah. **Cap.,** $10,000; shares 2c par; assessable.

Lands: 30 acres, patented, 9 miles from railroad, adjoining the Ophir Hill and Cliff Mining Co.'s properties carry auriferous and argentiferous copper and lead ores. Mine has 400′ tunnel, with some crosscutting and several shallow shafts. Property and equipment were sold at sheriff's sale in November, 1914, to John B. Holmes, for $1,750, to satisfy a judgment obtained by Holmes.

OPHIR METALS CO. UTAH

Address: W. B. Farmer, Ophir, Tooele county, Utah.

Inc. 1919, in Utah.

Property: that of the Lion Hill Consolidated Mines Co., 640 acres in the Ophir section of the Tintic district, carrying silver-lead ore in fissure veins in limestone.

Development: by over 5,000′ of shafts, tunnels, and drifts. A tunnel is to be driven 500′ below the old workings.

OPHIR QUEEN MINING CO. UTAH

S. Crawford, Cedar River, Mich., controls property.

OPHIR SILVER MINES CO. UTAH

Officers: Guy R. La Coste, pres., 21 Mining Exchange, Salt Lake City; O. D. Coughten, v. p.; E. W. Toole, sec.-treas., with C. M. Beck, directors.

Inc. Nov., 1919, in Utah. **Cap.,** $100,000; par 10c; 600,000 shares in treasury.

Property: 15 claims, in Ophir district, Tooele county, adjoining the Ophir Hill property, said to show a well-defined vein of silver-lead ore. Previous development, mainly tunnels, is estimated to have cost $30,000. Management plans to continue the 630′ tunnel to the shale-lime-porphyry contact.

OPHIR-UTAH MINING CO. UTAH

Idle. **Office:** Salt Lake City, Utah. Mine near Ophir, Tooele county, Utah G. G. Schliep. pres.; C. L. Olson, sec.-treas.

Inc. Feb. 13, 1909, in Utah. **Cap.,** $250,000; 25c par.

Lands: 7 claims, 9 miles from railroad, show copper and lead ores. Has several buildings and a hoist.

OPOHONGO MINING CO. UTAH

Office: Provo, Utah.

Officers: Wm. Hatfield, pres. and mgr.; J. H. Hatfield, v. p.; J. W. Hatfield, sec-treas.; F. E. Birch, mgr.

Inc. 1908, in Utah. **Cap.,** $250,000; shares 25c par; assessable. Assessment No. 4, one cent a share, levied June, 1919. Shares are listed on the Salt Lake Stock Exchange.

Dividends. three 1c and two 2c declarations in 1911-12, and one of 2c

on January 30, 1913, a total of $80,907 to 1916. Stock is listed on the Salt Lake Exchange.

Property: 3 claims, patented, in the vicinity of the Black Jack and Ajax mines.

Development: by shafts and tunnels, with over 2,000′ of workings, to depth of 1,800′. The mine is operated jointly with the Gold Chain, with which it is connected on the 300′ level, and hoisting is through the Black Jack shaft. The 450′ level shows an 18′ orebody, said to give assays up to 10% copper and $60 gold per ton. The 700′ level shows this same ore shoot. Present development is mainly in the winze below the 1,800′ level, down 75′ in favorable ground.

Equipment: owned jointly with the Gold Chain, includes an air compressor.

Production: has been intermittent since it began in 1909. The recent assessment was levied with the idea of providing money to start work.

OXFORD CONSOLIDATED MINING CO. **UTAH**

Eureka, Utah. James Crooks, pres.; Geo. W. Owen, sec.-treas.; C. H. Spriggs, mgr.

Inc. June, 1909, in Utah. **Cap.,** $25,000; shares 5c par; assessable.

Lands: 9 claims, patented, show copper and lead ores. Levied an assessment of one-half cent, early 1911, to pay indebtedness incurred through litigation. No work has been done since patent to property was issued.

PINION QUEEN MINING CO. **UTAH**

Address: Provo, Utah. **Mine office:** Dividend, Utah.

Officers: Thos. Pierpont, pres.-mgr.; J. William Knight, v. p.; J. C. Deal, sec.-treas., with Andrew Sutherland, supt., and Wm. Scowcroft, directors.

Property: 16 claims, in East Tintic district. Management plans sinking a 3-compartment shaft to 500′ level.

PLUTUS MINING CO. **UTAH**

Controlled through stock ownership by Chief Consolidated Mng. Co.

Address: Eureka, Juab county, Utah.

Inc. 1907, in Utah. **Cap.,** $100,000; shares 10c par; fully issued; assessable. Last assessment of 1 ct. per share delinquent October 21, 1919. Absorbed the Tetro Mining Co., January, 1909. Shares are listed on the Salt Lake Stock Exchange.

Property: 14 claims, patented, including the Tetro group of 3 claims, from which the Tetro Mining Co. paid $18,000 in dividends. Mine carries auriferous and argentiferous lead and copper ores, developed by a 600′ shaft, about 3,700′ of tunnels, and 1,250′ of other workings. Is being developed by Chief Cons. Mining Co.

PROVO MINING CO. **UTAH**

Address: Provo, Utah.

Officers: Jos. S. Berry, pres.; J. W. Farrer, v. p.; D. W. Conover, sec.-treas., with Geo. H. Naylor, W. J. Tregonning, and J. A. Barclay, directors.

Inc. Feb. 28, 1887, in Utah. **Cap.,** $100,000; 10c par; assessable; 837,440 issued. Listed on Salt Lake Exchange.

Property: 3 patented claims at North Tintic, adjoining the Tintic Standard. Lead-silver-zinc ore occurs in pockets. Development by 300′ shaft. As company was without funds, control passed to a new syndicate late in 1919, who paid 9c. a share for the stock.

QUEEN ISABELLA MINES CO. **UTAH**

Officers: Alex. Caldwell, pres., Eureka, Tooele county, Utah; Alex. Ray Irvine, v. p.; S. R. Thurman, sec.-treas., with Daniel Caldwell and Bert Thurman, directors.

Inc. 1916, in California. **Cap.,** $50,000.

Property: 14 claims adjoining the Sharp mine, Tintic district, and carrying the extension of the Sharp vein. The Sharp mine while under 2-year lease and bond to Mr. Alex. Caldwell produced 15 carloads of silver-lead ore, netting $15 to $20 per ton. At last accounts, 1918, the company was planning to give a lease on the property.

RAYMOND-ILLINOIS MINING CO. **UTAH**

Office: 312 McCornick Bldg., Salt Lake City, Utah. Mine is at Eureka, Juab county, Utah.

Officers: F. J. Hagenbarth, pres. and mgr.; J. M. Wheeler, v. p.; J. C. Lynch, treas., and Thos. Kearns, directors; M. B. Johnson, sec.

Inc. 1905, in Utah. **Cap.,** $450,000; shares $1 par; assessable. Assessments of one-half cent a share fell due May 7, and June 29, 1917.

Property: 15 patented claims, in the Tintic district, shows fissures and replacements in limestone. Developed by about 1 mile of tunnels and a 1,500′ vertical shaft, which as yet have shown but little ore. The bottom workings are wet. Diamond drilling was done, 1909-10, from the bottom of the shaft. Idle since 1914.

RICHMOND & ANACONDA CONSOLIDATED MINING CO. **UTAH**

See Uncle Sam Consolidated Mining Co.

RIDGE & VALLEY MINING CO. **UTAH**

Address: 723 Kearns Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: Wm. R. Wallace, pres.; Jackson C. McChrystal, v. p.-mgr.; J. E. Berkley, sec.; H. J. Wallace, treas.; J. H. McChrystal, supt., with Sarah H. McChrystal, directors.

Cap., $1,000,000; originally $150,000, increased 1915 to $500,000 and in 1916 to present amount; par, 50c.; issued 500,000 shares.

Property: 39 claims, 443 acres, adjoining the Gemini property, and operated through the Gemini shaft for many years. Ores carry lead-silver-copper-gold values.

Development: by 1,800′ shaft, and extensive workings. Recent development work on the 1,800 foot level is claimed to be satisfactory. In 1918, 4,000 tons of ore shipped sold for $14,721, giving net profits of $4,240. In January, 1919, 700 tons ore were shipped.

SCRANTON LEASING CO. **UTAH**

Address: care Wade & Funkel, Scranton mine, Eureka, Utah. Operates under lease the Scranton mine at North Tintic, Utah. Produces lead and zinc ores from new discovery on surface and from Magazine tunnel. Employs 52 men.

In 15 months, to July, 1917, the output was 6,000 tons, containing 20% lead and 32% zinc. Shipments were made in 1918; no later information available.

SCRANTON MINING & SMELTING CO. **UTAH**

Offices: McIntyre Bldg., Salt Lake City and Scranton, Tooele county, Utah.

Officers: T. G. Wolf, pres.; H. A. Knapp, treas., with B. H. Throop, all of Scranton, Pa., R. J. Deighton, sec.-mgr., and Wm. H. Bramel, Salt Lake City, directors.

Cap., $30,000; shares $1 par.

Property: in the North Tintic district, is an old producer of silver, lead and zinc ore. The company operated the mine until 1915, and the stopes were pretty thoroughly worked out.

SELMA MINES CO. **UTAH**

Office: Kearns Bldg., Salt Lake City, Utah. **Mine office:** Knightsville, Juab county.

Officers: J. C. Jenson, pres. and gen. mgr.; L. C. Peterson, v. p.; O. W. Carlson, sec.-treas., with R. A. Brown and Chas. Biers, directors.

Inc. Dec., 1909, in Utah, as successor of Selma Consolidated Mining Co. **Cap.,** $50,000; shares 5c par; assessable, except 50,000; 740,000 outstanding. Last assessment, half cent a share, was levied in March, 1919. Statement made in June, 1917, showed current assets of $13,655, and current liabilities, $5,616. Miners have taken half of their wages in shares.

Property: 34 claims, unpatented, near the Lehi Tintic mine, supposed to carry the northern extension of the mineral zone of the Colorado mine, 2 miles from a railway. The property has a lime-porphyry contact, with 3 principal fracture zones carrying silver-lead-copper ore.

Development: by 210′ three-compartment shaft, and tunnels showing leached ground with occasional bunches of good ore. The old company expended about $75,000 on development. Workings total 2,650′, including tunnels 80, 900, and 1,400′ long, opening ground to depth of 1,000′. **Equipment:** includes electric power and electric hoist.

SIOUX CONS. MNG. CO. **UTAH**

Succeeded by Sioux Mines Co., which see.

SIOUX MINES CO. **UTAH**

Is a reorganization of Sioux Cons., fully described in Vol. XIII.

Address: Provo, Utah.

Officers: Reed Smoot, pres.; R. L. Anderberg, sec., with Jesse Knight, W. Lester Mangum, and K. S. Gordon, directors.

Inc. 1917, in Utah. **Cap.,** $100,000; par 10c; outstanding, 498,470.

Property: 6 patented claims, 47 acres, in Tintic district, said to show silver-lead ore.

Development: by shaft to the 1,000′ level. In April, 1916, the company resumed work; sank the shaft from 600′ to 1,000′ level. Drifts for about 500′ E. on the 800′ and 1,000′ levels in search of the continuation of the orebody found in the Iron Blossom, failed to find commercial ore. Considerable quartz was found and management believes that ore will be found at greater depth.

SOUTH IRON BLOSSOM MINING CO. **UTAH**

Robinson, Juab county, Utah. George Jones, pres.; T. L. Schofield, sec.-treas.

Inc. 1908, in Utah. **Cap.,** $100,000; shares 10c par; assessable; outstanding $241,000. Listed in Salt Lake City.

Property: 4 claims in the Tintic mining district, showing silver-lead ore.

SOUTH STANDARD MINING CO. **UTAH**

Address: 422 Judge Bldg., Salt Lake City.

Officers: E. J. Raddatz, pres.-treas.; W. I. Snyder, v. p.

Cap., 1,300,000 shares; assessable; last assessment ¼c a share, was levied in June, 1919. Listed on Salt Lake Exchange. Company is a consolidation of United Tintic Mines and the South Standard Mining Co.

Property: 47 claims, in Juab and Utah counties, includes the Montreal, Tintic Combination, Tintic Empire, and Bullock groups.

SWANSEA CONSOLIDATED MINING CO. **UTAH**

Office: Knight Bldg., Provo, Utah.

Officers: Jesse Knight, pres.; R. E. Allen, sec.-treas.

Inc. in Utah. **Cap.,** $100,000; shares 10c par; 999,798 outstanding; assessable. Listed on Salt Lake Exchange.

Owns 145 acres in Tintic mining district, said to show silver-lead ore. Property closed. Lessees working the dumps, at last account.

SWANSEA EXTENSION MINING CO. **UTAH**

Has passed on. Described in Vol. XIII.

THOMPSON-QUINCY CONSOLIDATED MINING CO. **UTAH**

Reorganized 1915, as New Quincy Mining Company, which see.

TINTIC BULLION MINING CO. **UTAH**

Officers: John M. Bestelmeyer, pres., Provo, Utah; T. Nicholes, v. p.; H. C. Hicks, sec.; August Bestelmeyer, treas., with Samuel Bennett, directors.

Inc. 1919,in Utah. **Cap.,** $75,000; 5c par.

Property: located in East Tintic mining district, adjoining Eureka Bullion.

TINTIC CENTRAL MINING & MILLING CO. **UTAH**

Property under lease to Ogden Tintic Leasing Co.

Office: Provo, Utah. **Mine address:** T. T. Holdaway, Knightsville, Juab county, Utah. J. T. Farrer, pres.; R. L. Anderberg, sec.-treas.

Inc. June, 1907, in Utah. **Cap.,** $50,000; shares 5c par; assessable; all issued. Three assessments yearly of one-half cent a share. Last assessment, one-half cent a share, delinquent October 17, 1919. Stock listed on Salt Lake Exchange.

Property: 20 claims, covering ground adjacent to the Iron Blossom in

the Tintic district and supposedly carrying the extension of the ore-bearing fissures of that mine. These fissures are in limestone and are cut by porphyry, carrying irregular orebodies. Work is being done through the Iron Blossom mine.

Development: includes a 1,038′ shaft with extensive workings on the 870′, 920′ and 1,020′ levels. In 1917 some lead-silver ore was opened on the 900′ level.

TINTIC CHIEF MINING CO. UTAH

Office: Provo, Utah.

Officers: H. C. Hicks, pres.; J. M. Bestelmeyer, v. p.; August Bestelmeyer, with E. A. Peay, and N. C. Hicks, directors.

Inc. July, 1919, in Utah. **Cap.,** $75,000.

Property: located in Tintic mining district, Juab county.

TINTIC COALITION MINES CO. UTAH

Frank Hornberg, pres. and mgr.

Property: located in south end of the Tintic district several miles S. E. of Silver City, said to show lead-silver ore. Developed by 1,800′ tunnel. Company has done no shipping since 1912. A part of the property has been worked by lessees in recent years but company resumed operations in 1919.

TINTIC COMBINATION MINING CO. UTAH

Consolidated with Tintic Empire and Bullock companies to form United Tintic mines, now dead, the property passing to the Tintic Tunnel Co.

TINTIC CO. UTAH

Office: 734 Fifth Ave., New York. **Mine office:** Bingham Canyon, Salt Lake county, Utah.

Officers: E. B. Schley, pres.; Kenneth B. Schley, v. p.; E. Richter, sec.-treas.; C. G. Raynor, asst, sec.-treas.

Inc. 1903 in Maine. **Cap.,** $2,700,000; shares $3 par; issued $2,091,249. Original cap., $3,000,000; shares $5 par, increased, 1906, to $4,000,000, with an outstanding issue of $3,500,000 stock in 700,000 shares of $5 par, which was first reduced 1909, to $2,100,000, by cutting the par value from $5 to $3 and was immediately thereafter increased to present amount of $2,700,000.

Bonds: $500,000 authorized, at 6%, convertible into stock, of which $422,900 is outstanding, this bond issue having been made to liquidate a floating debt. The company is a securities-holding corporation only, and was the parent company of the Tintic Mining & Development Co., Yampa Smelting Co. and West Mountain Tramway Co. See Tintic M. & D. Co.

TINTIC-DAVIS MINING CO. UTAH

C. M. Morris, pres., 813 E. 1 S., Salt Lake City; Geo. H. Taylor, mgr.

Inc. in 1919.

Property: located in North Tintic mining district, adjoins Chief Cons. In October, 1919, machinery was added, and a head-frame built. Details of operations not available.

TINTIC DELAWARE MINING CO. UTAH

Address: Provo, Utah.

Officers: Joseph Hatch, pres., Heber, Utah; W. R. Wherritt, v. p.; J. A. Holdaway, Provo, sec.-treas., with W. D. Clark, J. H. Ekker, E. H. Ekker, and S. Ness, directors.

Inc. in Utah. **Cap.,** $100,000; increased June, 1919, to $200,000; 10c par. Listed on Salt Lake Exchange.

Property: 8 claims, in West Tintic, 12 miles from Dunbar, Juab county, contains lead and silver ore. Developing during recent years.

TINTIC DELMAR MINING CO. UTAH

Office: Snow Bldg., Provo, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: Lewis Merriman, pres.; Andrew Madsen, v. p.; Harvey Cluff, sec.-treas., with C. W. Reed and T. Boardman, directors.

Inc. March 27, 1909, in Utah. **Cap.,** $100,000; shares 10c par.

Property: 20 claims, partly patented, in the North Tintic district, on

which limestones occur with geologic conditions like those of Centennial Eureka mine.

Development: by 350′ tunnel, to be extended to crosscut formation, which shows stringers of quartz carrying ore said to give good assay values in silver, lead and copper where 2 large cross breaks intersect. A 114′ winze encountered fissures opened by a drift, 100′ below the tunnel, reported to show ore carrying 300 oz. silver, some gold, lead and a little copper in a shoot encased in low-grade ore.

Property reported on favorably by C. A. Porter of the Utah Copper Co. and by Prof. J. E. Tallmadge. No recent report of operations received. Is a promising mining gamble.

TINTIC DRAIN TUNNEL CO. **UTAH**

Address: Provo, Juab county, Utah.

Officers: Jesse Knight, pres.; W. L. Mangum, sec.-treas., with J. S. Smith, E. F. Birch, Henry Barney, A. M. Knight, K. S. Jordan, R. E. Allen, and J. K. Jordan, directors. Listed on Salt Lake Exchange.

Organized in September, 1917, to drive a 5½ mile adit from Goshen valley to a point near Silver City, for drainage of adjacent mines and sale of water for irrigation. In September, 1919, tunnel was in 3,400′ and advancing about 10′ daily—no timbering required at that time. Company owns 300 claims along the right-of-way.

TINTIC EMPIRE MINING CO. **UTAH**

Address: Eureka, Utah.

Officers: Theo. Nicholes, pres.; L. E. Chipman, v. p.; H. J. Fitzgerald, sec.-treas.; with H. E. Phelps, and Orson Keeler, directors

Cap., $125,000; 10c par; 625,000 issued.

Property: is in the North Tintic mining district, near Eureka, between the Lehi-Tintic and the Tintic Paymaster. A shaft was started in September, 1919, and was 100′ deep in January, 1920, and a 280′ tunnel driven; 36% lead and 7 oz. silver ore was uncovered on the surface. Equipment being installed.

TINTIC MILLING CO. **UTAH**

Address: Provo, Utah.

Officers: Jesse Knight, pres.; J. S. Smith, mgr.; W. L. Mangum, sec.-treas.; T. P. Holt, gen. supt.

Inc. in Utah. **Cap.,** 1,000,000 shares, 3c par; assessable. The purpose of the company is to provide a process and a mill for treating low-grade ores of the locality, hitherto found valueless. The mill employs the Holt-Dern and Knight-Christensen roasting furnaces and leaching. Operations began March, 1916, the mill treating 200 tons daily, mostly from the Iron Blossom and Dragon Consolidated mines. About $60,000 in silver bullion is produced monthly. Bullion assays 90% copper and carries from 600 to 2,000 oz. silver per ton.

Briefly the process is: crusher, 4 sets of rolls, 11 roasting furnaces; four 100-ton leaching tanks, and scrap iron precipitating boxes. The charge for roasting is a mixture of oxide and sulphide ores, coal dust, and salt. This process is amenable to the low-grade silver-copper-gold ores of the district.

TINTIC MINING & DEVELOPMENT CO. **UTAH**

Property sold to Utah Cons. Mining Co., and company dissolved. Described in Vol. XIII.

TINTIC PAYMASTER MINES CO. **UTAH**

Officers. W I. Snyder, pres., Eureka, Utah; J. W. Knight, v. p.; H. G. Snyder, sec.-gen. mgr., with W. Scowcroft and R. E. Allen, treas., directors.

Inc. 1919, in Utah. **Cap.,** $1,000,000; 50c par; issued, 600,000 shares.

Property: a consolidation of about 1,700 acres, including the Eureka King, located in the Tintic mining district, between the Lehi Tintic and the Selma.

Development: on the Eureka King, a 500′ shaft, which is to be sunk to the 1,000′ level, cut No. 1 vein in lime and quartzite January, 1920. It was well mineralized.

Equipment: electric power, 52-h. p. motor-driven hoist, 46′ head-frame, 52-h. p. 5-drill compressor, automatic bucket dump, and all surface accessories.

TINTIC PRIZE WINNER MINING CO. **UTAH**

Address: Springville, Utah.

Officers: H. Straw, pres.; Edw. Bingelson, v. p.; W. B. McPherson, sec.-treas., with Mel Chase, and Earl Bissell.

Inc. July, 1919, in Utah. **Cap.,** $100,000; par $10.

Property: in Tintic district, Juab county.

TINTIC QUADRANGLE MINING CO. **UTAH**

Officers: Geo. Horton, pres.; Samuel Bennett, v. p.; Geo. F. Tilson, sec.-treas., with C. S. Goddard and Geo. Horton, Jr., directors.

Inc. about Oct., 1919. **Cap.,** $100,000; par 10c.

TINTIC STANDARD MINING CO. **UTAH**

Office: 422 Judge Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: E. J. Raddatz, pres.-treas.-gen mgr.; W. I. Snyder, v. p.; L. H. Stohr, sec., with Willard Scowcroft, and Ira I. Travis, directors. John Westerdahl, supt.

Inc. Oct. 2, 1907, in Utah. **Cap.,** $1,300,000; $1 par; assessable; issued, 1,175,000. Has levied 19 assessments of ½c. each up to 1916. Stock listed on Salt Lake Exchange. Annual meeting, January 10.

Dividends: initial of 20c paid June 23, 1917, and 40c during that year. Four quarterlies of 8c. each, plus extra of 15c. paid in 1919. Eleven in all to date, equal to $1,140,658. Net profits in 1918 were $638,944.

Property: 95 claims, 1,760 acres, of which 15 claims, 300 acres, are patented, covers a long stretch on the ore zone. In November, 1919, company started suit against the Chief Cons. concerning ownership of the White Wing No. 5 claim.

Geology: mine shows limestone, quartzite, and porphyry, carrying fissure veins with N.-S. strike and dip of 55° E. in limestone. Ore comes from a north-south fault fissure at contact of shale with underlying quartzite.

Ore: a fine-grained aggregate of galena and tetrahedrite, plus a little pyrite, in barite and quartz, and is reported to assay from a trace to 50% lead, 1 to 105 oz. silver, and $1 to $15 gold per ton. The management reports the main orebody as 200′ wide.

Development: one 1,450′ three-compartment main working shaft, and about 8,000′ of drifts, etc. The second shaft, 1,700′ south of main shaft is also 1,450′ deep and connects with the other. Both shafts show shipping ore. Ore developed is on the 1,250 and 1,350′ levels.

Equipment: includes a 100-h. p. steam plant, with an 80-h. p. double-cylinder, hoist, good for 1,500′ depth. Also double-drum hoist with 300-h. p. motor and an 800 cu. ft. compressor with 150-h. p. motor.

Production: in 1919, about 50,000 tons of ore. Total from 1915-'18 inclusive, 58,495 dry tons that yielded 1,900,000 oz. silver, 7,900,000 lb. lead, 750,000 lb. copper, and 1,582 oz. gold.

TINTIC STAR MINING CO. **UTAH**

Jesse M. Harms, mgr.

Inc. 1918, in Utah. **Cap.,** $100,000; 10c par.

Property: 4 miles S. E. of the Tintic Delaware near Dunbar, Juab county, said to show copper-silver ore. Driving a tunnel in 1919.

TINTIC TUNNEL CO. **UTAH**

Letters returned unanswered July, 1917, from Newhouse Bldg., Salt Lake City. No recent information; probably idle.

Officers: L. A. Martin, mgr., with F. C. Richmond, D. R. Beebe, S. B. Smith, B. D. Lyon, H. J. Fitzgerald, R. J. Evans, D. F. Davis and C. E. Martin, directors.

Inc. 1916, in Utah. **Cap.,** $2,000,000.

The company planned to drain the E. and S. ends of the Tintic district by means of a 5-mile tunnel. It has absorbed the holdings of the United Tintic

Mines, which was a consolidation of the Tintic Combination, the Tintic Empire and Bullock Companies.

Property: 28 claims, about 600 acres, in the Tintic district, near Eureka, said to show 4 parallel veins in an ore zone, or channel, that lies east of the Mammoth-Grand Central and the Centennial-Eureka ore zones. The claims are so located as to give approximately 2 miles on this vein system.

Ore: carries copper, lead, silver and gold values. The veins vary greatly in width, but are generally of small size, the Bullock vein, in which work has been centered, showing a maximum width of about 4′. The ore in this vein runs high in iron and carries about $20 per ton in copper, lead and silver.

Development: principally on the old Bullock property, includes shafts of 280′, 215′ and 102′ and several old tunnels. **Equipment:** includes a small steam plant and hoist.

Excess of water and high cost of mining have presumably caused cessation of work.

TINTIC UNION MINING CO. **UTAH**

Officers: Willard Scowcroft, pres., Ogden, Utah; W. I. Snyder, v. p.; H. G. Snyder, sec.-treas., with Gideon Snyder, and J. W. Scowcroft, directors.

Inc. 1919, in Utah. **Cap.,** $1,000,000; 50c par.

Property: 22 claims, located in southern part of East Tintic district. Company plans exploration work.

TINTIC WINCHESTER MINING CO. **UTAH**

Address: L. N. Ellsworth, Tintic, Eureka county, Utah.

Officers: G. F. Tilson, pres.; William Haws, v. p.; L. N. Ellsworth, sec.-treas., with S. Trotter and H. B. Cole, directors.

Inc. Dec., 1919, in Utah, to engage in general mining business.

TINTIC ZENITH MINING CO. **UTAH**

Office: Eureka, Utah.

Geo. A. Udall, and A. W. Larson, of Eureka, reported as heavy stockholders. A. L. Hurley, supt.

Property: located in eastern part of Tintic mining district, Juab county. Company will sink a 2-compartment shaft, 1920.

TINTIC ZINC CO. **UTAH**

Has passed away. Described in Vol. XIII.

UNCLE SAM CONSOLIDATED MINING CO. **UTAH**

Office: 515 Dooly Block, Salt Lake City, Utah. **Mine office:** Eureka, Juab county, Utah.

Officers: Hon. John Dern, pres.; M. P. Braffet, v. p.; Frank D. Kimball, treas.; Fred. C. Dern, sec.; J. C. Dick, gen. mgr.; W. P. Carter, supt.

Inc. June 29, 1900, in Utah. **Cap.,** $750,000; shares $1 par; assessable; increased August 21, 1912, from $500,000; issued, $550,000, with 1 assessment levied. The company formerly owned a 50% stock interest, 400,000 shares, in the May Day Mining & Milling Co., which stock was distributed 1910, to shareholders, as a stock dividend. The Richmond & Anaconda Mining Co., adjoining, was absorbed 1912, by the Uncle Sam.

Shares are listed on the Salt Lake Exchange. Annual meeting, first Monday in June.

Regular dividend rate was 2 cts. per share monthly, changed June, 1910, to 2 cts. quarterly, with an extra dividend of 3 cts., December, 1910, dividends for 1910 having been 19 cts. per share; total dividends to April, 1913, were $470,000; none since. Assessment of 1c. a share was levied on April 22, 1920.

The annual statement for year ended May 31, 1918, shows: ore sales realized $5,487; balance from 1917, was $1,554; assessment No. 2, $5,494, other $558, making $13,095. Expenses totaleo $12,103, leaving $992 cash balance.

Property: 4 claims, patented, in Tintic district, including the Humbug mine, which is the principal property, producing mainly auriferous silver-lead ore of both smelting and milling grades. A good orebody was developed in the western part of the property. **Equipment:** is electrical.

Production: in 1916, 25 tons zinc ore and 265 tons lead ore.

Last report states that company expects to do development on west part of

the property, with funds derived from royalties. This work was expected to disclose the southern extension of the Yankee orebody opened in 1916.

UNITED TINTIC MINING CO. **UTAH**

Described in Vol. XIII. Company was consolidated with South Standard Mining Co., which see.

UTAH CONSOLIDATED MINES CO. OF TINTIC **UTAH**

Office: 425 Atlas Bldg., Salt Lake City. T. R. Cutler, pres.; H. J. Fitzgerald, sec.-treas.

Inc. in Utah. **Cap.,** $1,000,000; $1 par; all issued. Listed in Salt Lake City.

Property: 100 acres in Tintic mining district, shows silver-lead ore. Presumably idle.

UTAH CONSOLIDATED MINING & MILLING CO. **UTAH**

Idle. **Office:** 424 Atlas Blk., Salt Lake City, Utah. **Mine office:** Mammoth, Juab county, Utah.

Officers: S. S. Jones, pres.; H. S. Cutler, v. p.; Hart J. Fitzgerald, sec.-treas.; preceding, with Hon. Reed Smoot, A. N. Holdway and Hugh J. Cannon, directors, at last accounts.

Inc. March 10, 1907, in Utah. **Cap.,** $250,000; shares 25c par; non-assessable. Shares listed on the Salt Lake and San Francisco Exchanges.

Property: 6 claims, patented, near the Sioux Consolidated and Colorado mines, developed by a 500′ shaft, with 2 levels opened. Part of the property is worked by lessees, who secure a small production. No recent report.

UTAH MINERALS CONCENTRATION CO. **UTAH**

Mail returned, 1919, from former address, H. Atkinson, mgr., Eureka, Juab county, Utah, with A. W. Parshall, supt.

Owned 250-ton custom concentrating mill for local ores. Company in hands of receiver in 1917, and presumably defunct.

VICTORIA GOLD MINING CO. **UTAH**

Care Mrs. R. S. Robertson, sec.-treas., 1706 E. 2nd South St., Salt Lake City, Utah. Dr. A. A. Kerr, pres.; E. W. Hall, v. p.

Property: 8 claims, patented, near Gemini mine at Tintic.

Development: 500′ incline shaft and 400′ tunnel opening up a large body of manganiferous iron ore carrying lead values.

Stockholders' meeting was held in December, 1918, for the purpose of increasing company's capitalization. In 1919, E. J. Raddatz obtained an option on the property and work was reported resumed with a few men.

YANKEE CONSOLIDATED MINING CO. **UTAH**

Office: 308 Newhouse Bldg., Salt Lake City, Utah. **Mine office:** Eureka, Juab county.

Officers: A. W. Vosburg, pres.; G. L. Bemis, v. p.; A. E. Canfield, sec.-gen. mgr. Lew Merriman, supt.

Inc. July 8, 1898, in Utah. **Cap.,** $1,000,000, increased in 1908 from $500,000; shares $1 par; assessable; all issued; listed in Salt Lake City. Has paid dividends of $192,500; last dividend paid in February, 1913, 1c. per share.

Property: 134 acres on Godiva Hill, Tintic district, includes the Yankee, Mountainview and Lakeview mines, lying between the Beck Tunnel and Uncle Sam Consolidated on the south and May Day on the north.

Ore: silver-lead-zinc with some gold. Country rock is limestone and porphyry. For geology of Tintic District, see U. S. G. S., Folio No. 65.

Development: by tunnels and shafts, deepest 1,800′. Recent work has been mainly on the 1,500′ level. Lessees are working part of the property.

Company does not reply to requests for information.

Shipments amounted to about 2,000 tons of ore in 1916; 1,500 in 1917 and in 1918, about 300 tons in first half of 1919.

ZUMA MINING & MILLING CO. **UTAH**

Address: Eureka, Juab county, Utah.

Officers: P. J. Fennell, pres. and mgr.; Mrs. Mary E. Drescoll, treas.; W. F. Shriver, sec.

Inc. 1907, in Utah. **Cap.,** $500,000; shares 50c par; 700,000 shares out-

standing; assessable; last assessment, 1c. a share, payable in June, 1919. Reported August, 1919, that company had spent $70,684 since starting operations, May 1, 1916. July 3, 1919, had $1,934 in cash, and indebtedness, $10,000. Stock listed on Salt Lake Exchange.

Property: 6 claims, 4 patented, in the East Tintic district, near the Crown Point and Iron King mines, said to carry gold-silver-lead-zinc ore.

Development: by 500′ shaft and a 300′ winze from the 500′ level, also 1,000′ of tunnels. Reported, November, 1919, that 9′ of quartz with 3′ of high-grade ore had been opened on the 900′ level.

Equipment: includes hoist, engine and compressor.

VERMONT

ELY COPPERFIELD ASSOCIATES — VERMONT

Address: 30 E. 42nd St., New York. **Mine office:** West Fairlee, Vt.

Officers: H. W. Bennett, pres.; W. L. Hogg, v. p.; Tom W. Bennett, sec.-treas.; above are the directors. K. A. Schleifer, mgr.

Inc. March 1, 1917. **Cap.,** $250,000; $100,000 pfd.; $150,000 common stock; $100 par; non-assassable; all outstanding.

Statement of February, 1919, gives $80,000 gross earnings during previous 6 months, and operating expenses of $75,000.

Property: the Copperfield or Ely mine, 1,200 acres at West Fairlee, Vt., This is the deepest mine in the State, discovered in 1821, and known for many years as the Vermont copper mine. Geo. Westinghouse acquired it in 1899, and the present company bought it from the Westinghouse estate in 1917.

The ore consists of magnetic pyrite and chalcopyrite occurring in lenticular masses in hard quartz-mica schist. The orebody last worked by present management being 10′ to 20′ thick, 50′ to 100′ long, and opened for 500′ on its dip. The average assay was 4½% copper. The low grade material on the dumps said to assay 1.65% copper.

Development: by 4,500′ inclined shaft.

Management states it has over 300,000 tons dump ore which it is putting through a 200-ton flotation mill, erected 1917-1918.

Production: 350,000 lb. of copper in 1918. The mine is idle at present, awaiting better prices and demand for copper.

ORANGE COUNTY COPPER MINE — VERMONT

Strafford, Orange county, Vt. J. B. Reynolds, mgr. and principal owner, 55 N. Main St., Rutland, Vt. Lovat Fraser, engr.

Lands: 900 acres, held under deed of mining rights, are near the Elizabeth mine, 13 miles from the Boston & Maine railway. Property carries a lenticular orebody, conforming to dip of the country rocks, which include gneiss, under garnetiferous mica-schist and above hornblende-schist, with strike of west of north, and average dip of about 45°. The lens, of 40′ extreme width, but not mineralized for the full width, is traceable 4,000′ on the property. Ore carries chalcopyrite, disseminated in massive pyrrhotite, averaging 2% copper.

Development: by 110′ incline shaft, with about 70′ of laterals on the 100′ level.

Equipment: includes steam boilers, a 3-drill air compressor and several mine buildings. Geology is described, Bull. 455, U. S. Geol. Survey.

PIKE HILL MINES — VERMONT

Address: Corinth, Orange county, Vt.

Officers: John H. Allen, pres.; John J. Coakley, sec.-treas.; with C. A. Andrews, George Marshall and D. S. Conant, directors; H. G. Hunter, mgr.

Inc. Jan. 9, 1906, in Vermont. **Cap.,** $200,000; $100 par; outstanding, $160,300.

Property: 186 acres, freehold, in the Corinth district, 14 miles from the Boston & Maine railway, shows mica-schist carrying lenses of chalcopyrite disseminated in pyrrhotite, of 2% estimated average copper tenor. The mine was worked in a small way at intervals during the nineteenth century.

Equipment: hydro-electric power and 100-ton flotation plant.

Production: 131,911 lb.; fine copper in 1905; 304,377 lb. copper and 1,698 oz. silver in 1906; 425,367 lbs. copper and 2,292 oz. silver in 1907. Inactive from November, 1907, until October, 1915, when experiments with the flotation process were started. Shipments from October, 1915, to January, 1916, about 210 tons, claimed to run 10% copper and 1 oz. silver per ton. In 1918, mine produced 509,654 lb. copper and 2,056 oz. silver.

VERMONT COPPER CO. **VERMONT**

Office: 50 E. 42nd St., New York. **Mine office:** South Strafford, Orange county, Vt. A. Heckscher, pres.; G. E. Parks, sec.; N. O. Lawton, gen. supt.

Inc. 1906, in Arizona. **Cap.,** $1,000,000. Is successor of Elizabeth Copper Co., and later took over the Strafford Mining Co. and the Sharon Power Company. On account of low price of copper, operations ceased May 1, 1919, and company was put in hands of Ralph E. Pierson, Bethel, Vt., as receiver.

Property: the Elizabeth and Foster copper mines, 9 miles from Pompanoosue, and 10 miles from Sharon, the nearest rail station. The Elizabeth mine was opened 1793, to get pyrrhotite with which to make copperas and at one time had quite an extensive plant for roasting the ore, leaching and making copperas. Early in the nineteenth century the Vermont Copperas Co. operated the mine and is said to have made as much as 6,000,000 lb. of copper yearly, beginning with a small incidental production of copper about 1830, when it was found that the ore carried an average of about 3 per cent. copper as chalcopyrite disseminated in pyrrhotite. Six different smelters have been built on the property at various times, the last one in 1916, for pyritic smelting.

Geology: a lens of pyrite ore, wedging out at the bottom, occurs in foliated quartz mica-schist. The orebody has been mined for 700′ in length and opened up for more than 2,000′ in length, ranging from 15′ to 60′ in width. Management estimates upwards of 500,000 tons of ore in sight, consisting of pyrrhotite carrying chalcopyrite, and with average assay of 2¼% copper. Diamond-drill borings, made 1909-1916 show ore to continue for 250′ depth below the present workings.

Development: by a 1,340′ tunnel with back of 225′, and an 800′ incline blind shaft. The dumps carry about 50,000 tons of discarded ore, a large part of it said to average 1.75 per cent. copper.

A 500-h. p. hydro-electric power station on the White river, transmits current 9 miles to the mine and works. There also is a small steam plant and an air compressor at the mine. Electric haulage is used underground.

After an idleness of several years the property was reopened in 1916, the smelter remodelled for pyritic smelting and the mill equipped for flotation work. Metallurgically, the smelter operated successfully under the supervision of Prof. George A. Guess of the University of Toronto, but operations were discontinued on account of the cost and trouble in hauling in fuel and flux.

The flotation process worked successfully on this ore. The ore is a heavy pyrrhotite carrying disseminated chalcopyrite and assays about 2.25% copper. The mill produces concentrates assaying 18% to 24% copper, with tails running from .2% to .3%. Another unit added in 1919, increased the daily capacity of the mill to 200 tons. Hardinge mills are used for grinding and Callow cells for flotation.

Production: in 1918, 300,000 lb. copper, and 35 oz. silver.

VIRGINIA

ALLEGHANY ORE & IRON CO. **VIRGINIA**

Address: care H. B. Spackman, pres., Buena Vista, Va.; Arcade Bldg., Philadelphia, Pa.; and Coatesville, Pa. The Lukens Steel Co. owns entire capital stock.

Property: iron ore mines at Oriskany, Va., having an annual output of 225,000 tons. The iron furnaces have an annual output of 100,000 tons; the quarries have an output of 50,000 tons limestone.

AMERICAN CHEMICAL & INDUSTRIAL CO. VIRGINIA

Address: Philadelphia, Pa.

Reported in March, 1919, that company had bought property of the Crimora Manganese Corp., which see.

AMERICAN RUTILE CO. VIRGINIA

Address: 622 F. St., N. W. Washington, D. C. W. M. Slater, pres.

Inc. in Virginia. **Cap.,** $100,000; $100 par; issued $97,500.

Property: 550 acres at Roseland, Nelson county. Rutile containing 96% titanium oxide, and ilmenite are mined from open-cut workings.

Equipment: includes power and milling machinery to handle about 100 tons daily, also a 2,500′ aerial tram. The mill is equipped with crushers, stamps, Dorr classifier, tables, and a magnetic separator.

Production: 260 tons of rutile concentrate in 1918 was sold for $39,150, and 444 tons of ilmenite concentrate for $11,100.

ARMINIUS CHEMICAL CO., INC, VIRGINIA

Operated by Grasselli Chemical Co.

Office: 44 Pine St., New York. J. Frederick Kernochan, pres.; T. McGovern, mgr., Mineral, Louisa county, Va., at last accounts.

Cap., $10,000.

Property: shows a large lens of pyrite in ancient schistose rocks. The ore was 30′ to 50′ wide and persisted below the 1,200′ level.

Development: a new 60° incline shaft being sunk in 1919 (down 750′ by August), and connected at 700′ with the old workings.

Equipment: steam power, hoist, compressors, and 350-ton concentrating mill.

CABIN BRANCH MINING CO. VIRGINIA

Office: 1015 Fidelity Bldg., Baltimore, Md. **Mine office:** Dumfries, Prince William county, Va. Is owned by the American Agricultural Chemical Company.

Property: has a large lenticular body of iron pyrites carrying up to three-fourths of 1% copper recovered as a by-product after roasting.

Development: by 1,200′ vertical shaft. **Equipment:** includes steam hoist, air compressor, and a 200-ton mill. Employs 150 men.

CRIMORA MANGANESE CORPORATION VIRGINIA

Office: 30 E. 42nd St., New York, and Crimora, Augusta county, Va.

Directors: Geo. C. Allen, pres.; Geo. Burnham, Jr., v. p.; Walter Whetstone, sec.-treas.; A. M. Yonge, gen. mgr.

Inc. Sept. 29, 1914, in Virginia. **Cap.,** $1,000,000; shares $100 par; all outstanding. **Transfer office:** Security Transfer & Registrar Co., New York. Annual meeting, last Monday in September.

Bonds: authorized and issued $500,000 1st mtge. 6% sinking fund gold bonds, due 1929.

Property: 946 acres, including the Crimora mine, 2 miles east of Crimora station, on the Norfolk & Western R. R. The mine was first opened in 1867 and acquired by present company in 1914. Deposit consists of manganese-ore masses of various sizes scattered through a clay basin, ½ mile long, several hundred yards wide and 200′ deep. The ore is hard and consists of psilomelane and pyrolusite. Percentage of ore to clay varies considerably, from 2 to 20% of ore to the clay, by volume. Ore assays 42 to 48% manganese. (See U. S. G. S. Bull., No. 427, pp. 58-61, pp 101, 270.)

Development: formerly by underground workings, now done with two No. 36 Marion steam-shovels. Management claims 1,000,000 tons ore proven, with probable reserves of 3,000,000 tons.

Equipment: electric power, and a 200-ton mill, which started operating in June, 1916. Management anticipated a yearly production of 15,000 to 25,000 tons ore.

The property was closed down in March, 1919, and reported sold to the American Chemical and Industrial Co., Philadelphia.

In August, 1919, A. W. Blakemore, of 40 Central St., Boston, attorney for the minority bondholders committee advertised that those who wished to know

what was being done and to understand the effect of the injunction against the present management, should communicate with him.

GOONEY MANOR COPPER CO., INC. **VIRGINIA**

Address: Front Royal, Warren county, Va.

Officers: Hugh E. Naylor, pres., gen. mgr. and purch. agt.; Lewis E. Cooper, v. p.; S. M. Chiles, sec.; Geo. H. Bowman, treas.; preceding officers, H. C. Sheetz, N. S. Waller, S. R. Millar, J. S. West, A. J. Sager, H. R. Kern, directors.

Inc. July 12, 1909, in Virginia. **Cap.**, $500,000; shares $100 par; issued 3,763. Annual meeting, third Thursday in July.

Property: 84 acres, 5 miles south of Front Royal, reported to carry a fissure vein in porphyry and contact deposits between limestone and porphyry, with generally N. E.-S. W. strike and dip of about 55°. Main orebody is reported to average 7′ width, and to be traceable 800′, carrying a little malachite near surface, with chalcopyrite at depth, averaging 5% copper, 1 to 6 oz. silver and $2.50 gold per ton. Orebodies apparently are lenticular.

Development: by a 40′ open cut, a 65′ tunnel and by shafts of 250 and 228′ without laterals, estimated by the company to show 35,000 tons of ore.

Equipment: includes a 150-h. p. steam plant, with a 50-h. p. hoist good for 800′ depth, a 1-drill air compressor, ½ mile standard railroad, 3 complete quarry plants and pumps for water supply. Buildings include a smithy, engine house, tool house and dwelling.

A 120-ton mill for crushing alumina was erected in 1917, equipped with crushers and 4 screens. Employs 20 to 50 men. Product was regularly shipped, but no figures published.

HELEN ZINC CO. **VIRGINIA**

Address: S. L. Boggs, Ivanhoe, Virginia.

Property: a zinc mine and small mill near Ivanhoe.

HIGH TOP MINING CORPORATION **VIRGINIA**

Is successor of the High Top Copper Mining Co. of N. J.

Morris D. Brown, pres., 26 Beaver St., New York City. Walter Hall, supt., Elkton, Rockingham county, Va.

Property: about 1,000 acres in Greene county, Virginia, 10 miles from Elkton, on the Norfolk & Western railway.

Development: by 140′ shaft, with a 30′ crosscut said to show 8′ of rock dotted with bornite and chalcocite, giving assays as high as 7% copper. There also is a 55′ shaft and several shallow pits and open cuts, proving mineralization of the outcrop 3 miles or the entire length of the property. According to J. Boardman Cann, the only money spent on the property since the company acquired it, was for the limited amount of exploration work noted above, plus considerable stripping, open cut and quarry work in an endeavor to prove that the tract is underlain by a mineralized stratum 60′ thick, carrying bornite. Property shows spots and bunches of copper ore and a few tons of selected ore have been shipped, but the mineralized zone as a whole is considered too lean to work at a profit. The property has been visited by various geologists and described in official government reports and the guarded warning given therein should be heeded.

HOLLOWAY MINE **VIRGINIA**

Idle. Owned by Wm. M. Pannebaker estate. Virgilina, Va.

Property: the old Holloway or Eustis mine, 3½ miles S. of Virgilina, Halifax Co., Va., on a spur of the Southern railway. Has a 460′ shaft, and levels at about 70′, 140, 190′, 290′, 390′ and 445′. The vein is strong, persistent and 3 to 33′ wide, owing to lenticular expansions. The ore is chalcocite in quartz with epidote. About 20,000 tons of hand-picked ore have been shipped; 6,000 tons shipped about 1900, said to have averaged 12% copper. Is described in detail by Weed in Bull. 455, U. S. Geol. Survey, p. 79, also in Virginia Geol. Survey, Bull. 14, p. 114.

IRISH CREEK TIN MINES, INC. **VIRGINIA**

Address: Wiley S. Young, treas., 200 Causeway St., Boston, Mass. Geo. W. Schultz, supt., Montebello, Nelson county, Va.

Inc. Sept., 1918, in Massachusetts. **Cap.**, $100,000.

Property: 300 acres at Irish Crek, Rockbridge county, said to show tin, wolframite, and silver, in a fissure vein in granite. Greatest depth of development is but 40′. **Equipment:** includes 100-ton mill.

Reported in March, 1919, that according to an examination by the U. S. Bureau of Mines, the orebodies are so far disappointing, both as to size and metal content. Of 19 samples taken, 14 gave blank returns, and the remainder, an average of less than 1.5% tin.

KAY MINE SMELTING CO. **VIRGINIA**

Officers: at last accounts, Z. L. Kay, pres.-gen. mgr.; J. R. Wilbourne, v. p.; H. P. Wilder, sec.; H. J. Watkins, treas., and Jas. S. Sebree, directors.

Inc. Aug. 8, 1905, in South Dakota. **Cap.**, $1,000,000; $1 par; 525,000 shares paid Z. L. Kay for property; 200,000 issued.

Property: 261 acres, comprising the Kay farm at the N. end of the Virgilina district, 9 miles from South Boston, in Halifax county, Virginia. The tract shows lenticular quartz veins enclosed in schistose rocks formed from old volcanic tuffs and andesite of the type characteristic of the Virgilina district. Veins consist of white quartz and carry primary copper glance below the water level with carbonates, oxides and some native copper in the oxidized zone. One vein varies from 3 to 6′ in width and is said to be traceable 1 mile. A recent report tells of 2 veins 10′ wide. The future of the entire district, including this property, depends upon the use of some cheap method of concentration, which flotation may supply.

In July, 1917, 9 tons sent to Pueblo, Colo., carried 8% copper.

MT. TORY MINING CO., INC. **VIRGINIA**

Address: Lyndhurst, Va.

Officers: Mark D. Meek, pres.-mgr.; Lyndhurst, Va.; C. D. Mikelson, v. p.; W. D. Cochran, sec., 612 Andrus Bldg., Minneapolis, Minn.; G. G. Luhman, treas., with C. B. Cochran, directors. Van B. Clark, supt.

Inc. in South Dakota and Virginia. **Cap.**, $1,500,000; $1 par.

Property: 3,000 acres in Augusta county, Virginia, said to have a deposit 200′ deep, and of variable width, proven for length of 3,000′; manganese ore averages 42 to 45% manganese; manganiferous iron ore 10% iron and 38% iron.

Development: mainly by 7 open cuts, 150′ to 900′ long, and average width of 45′. Company claims 2,000,000 tons ore blocked out.

Equipment: includes steam hoist, and a mill, also hydraulic system for stripping overburden.

Output to date, 950 tons ore. Mine said to be in position to produce 50 tons manganese, and 250 tons manganiferous iron ore daily. Company claims to have spent $30,000 in 1918, preparing for 1919 operations, but work ceased on account of signing of Armistice.

NORFOLK SMELTING CO. **VIRGINIA**

A New York corporation; operates under lease on a royalty basis, the smelting department of Virginia Smelting Co.'s works, which see.

ROANOKE ORE & IRON CORPORATION **VIRGINIA**

Address: E. E. Francy, pres., 315 Stephen Girard Bldg., Philadelphia, Pa.

Capital outstanding, $1,220,000. Par, $1. U. S. Corporation Co., New York City, registrar and transfer agent.

Company, through a subsidiary corporation, has a 99 year lease on 8,000 acres of iron, coal and timber land in Roanoke and Botecourt counties, Virginia, the tract being 11 miles long and including the old Harvey furnace erected in the 18th century. Property is said to contain 8,000,000 tons of iron ore in sight, and a total of 50,000,000 tons belonging to the Oriskany formation.

Company also owns, through its subsidiary, an 11-mile right of way on which grading for an 11-mile railway from mine to the Norfolk and Western line is three-quarters completed.

Property appears promising, now that rail connections are assured.

SEABOARD COPPER CO. **VIRGINIA**

Idle. **Office:** 77 South Market St., Boston, Mass. **Mine office:** Virgilina, Halifax county, Va.

Officers: Geo. R. Leghorn, pres.; Edward L. Pond, sec.

Inc. July, 1902, in New Jersey. **Cap.,** $300,000; shares $1 par.

Property: the Dorothy and Bailey mines, 135 acres, in the Virgilina district, 3 miles from the Southern railroad, shows an 8′ fissure vein in schist, carrying bornite ore, estimated to average 3 to 4% copper, with combined gold and silver values of $1 to $1.20 per ton.

Development: by shafts of 30′, 265′ and 115′, and by 2 tunnels, of 165′ each, with a total of 840′ of workings. The ore occurs in well-defined shoots; the proportion of shipping ore is small but mine might be profitably worked if flotation is used.

Equipment: includes a 275-h. p. steam plant, with a 25-h. p. hoist, good for 500′ depth, and a 5-drill compressor. There is a 100-ton mill and buildings include an engine house, bunkhouse and office. Company inactive since 1904, but still alive.

SULPHUR MINING & RAILROAD CO. **VIRGINIA**

Office: 11 S. 12th St., Richmond, Va.

Officers: S. D. Crenshaw pres.; A. R. Ellerson, v. p.; Thos. Armstrong, sec.-treas.; P. H. Haskell, supt.; Mineral, Louisa county, Va.

Property: a pyrite mine whose ore carries low copper content. Has 600′ shaft with steam power, compressor, etc. Ore treated in 500-ton concentration mill. Company makes cement copper from its mine and seepage waters, but is primarily a producer of pyrite for sulphuric acid plants. Is controlled by Virginia-Carolina Chemical Co.

In August, 1919, the mill was making over 100 tons of concentrate daily. Little development was done in 1919, all the ore coming from old pillars as the deposit is nearly exhausted.

UNITED STATES MANGANESE CO. **VIRGINIA**

Office: 50 E. 42nd St., New York. **Mine address:** Elkton, Va. D. F. Newman, supt.

Property: a tract of several hundred acres on or near Hances mountain, S. E. of Elkton, shows 5′ of manganese ore mostly psilomelane and pyrolusite, occurring disseminated and massive in yellow clay overlying quartzite. Mine has a washer and concentrating tables, and railway running from main plant to N. & W. R. R. No production figures available.

Mines and plant advertised for sale by Trustees at Harrisburg, Va., February 28, 1919.

VIRGINIA-CAROLINA CHEMICAL CO. **VIRGINIA**

General office: Richmond, Va. **Corporate office:** Jersey City, N. J.

Officers: S. T. Morgan, pres.; E. B. Addison, 1st v. p.; S. D. Crenshaw, v. p.-sec.; C. G. Wilson, v. p.-counsel, with N. S. Meldrum, Henry Walters, Harry Bronner, B. Cutler, A. J. Hemphill, Alvin W. Krech, C. I. Stralem, S. H. Miller, and Geo. W. Watts, directors. S. W. Travers, treas.; E. T. Orgain, aud.

Inc. September 12, 1895, in New Jersey. **Cap.,** authorized, $38,000,000 com, and $30,000,000 8% cumulative pfd.; increased May 12, 1914, from $20,000,000; shares $100 par; outstanding $27,984,400 com .and $20,425,890 pfd. The $9,766,836 unissued pfd. stock is reserved to provide for conversion of the 10-year 6% debentures. Annual meeting, first Wednesday in September. New York Trust Co., New York, transfer agent. Guaranty Trust Co., New York, registrar. Listed on New York and Richmond Stock Exchanges.

Bonded debt: $12,000,000; first gold 5's dated November 2, 1908; due December 1, 1923; $4,029,440 10-year 6% convertible gold debentures dated May 15, 1914, due May 15, 1924.

Company was formed to consolidate a number of manufacturers of fertilizers, acids, chemicals, and kindred products. It owns and operates large pyrite mines, producing a large portion of the pyrite used by it in manufacturing sulphuric acid; in addition it has foreign potash, sulphur, and other properties.

Controls the Sulphur Mining & Railroad Co. (which see), which owns pyrite mines in United States, and sulphur deposits in Mexico.

Also the Charleston, S. C., Mining & Manufacturing Co., which owns and mines phosphate rock in Florida, Tennessee, South Carolina, and Kentucky.

Comparative General Balance Sheet, Years ending May 31:

Assets.	1919	1918	1917
Real Estate, Plants, etc	$45,352,081	$45,707,718	$45,556,563
Investments	8,241,625	8,339,234	8,302,443
Manufactured Products	18,594,077	18,706,853	13,260,988
Accounts and Bills Received	31,961,182	25,629,595	22,281,234
Other Currents	8,672,130	8,371,951	4,593,082
Insurance, Interest, etc	833,425	688,564	481,834
Total	$114,654,520	$107,443,915	$94,476,149

Liabilities.	1919	1918	1917
Capital Stock	$48,410,291	$47,996,655	$47,996,655
Bonds	16,029,440	16,909,385	17,334,505
Current	23,102,650	17,103,886	12,039,141
Contingent	1,445,022	3,504,356	1,153,017
Reserves	1,557,884	377,338	344,696
Surplus	24,109,233	21,552,295	15,608,135
Total	$114,654,520	$107,443,915	$94,476,149

General Summary of Results:

	Turnover	Repairs and Maintenance	Net Profits	Per Cent. Net Profits to Turnover
1913-'14—	$60,863,107	$1,194,280	$2,550,377	4.19
1914-'15—	62,218,078	1,476,125	3,714,208	5.97
1915-'16—	67,899,444	1,924,749	4,507,548	6.64
1916-'17—	83,774,580	2,145,830	4,656,386	5.56
1917-'18—	122,463,670	2,998,552	8,384,668	6.85
1918-'19—	136,379,925	3,696,400	6,665,256	4.89

Dividends: present rate: 2% quarterly on pfd.; on common, 1% quarterly since July 31, 1918, with 2% extra October 1, 1918, and October 1, 1919.

VIRGINIA COPPER MINE **VIRGINIA**

Office: care Richard Lamb, 90 West St., New York. **Mine address:** High Hill, Halifax county, Va.

Property: the High Hill mine, 617 acres, in the Virgilina district, developed by 8 shafts of 140 to 340′ depth, with about ½ mile of workings. Mine shows 2 veins giving assays up to 5.9% copper, 2 oz. silver and 80c. gold per ton. Ores are highly silicious, the gangue containing about 87% silica, which precludes smelting and wet process concentrating. Property was formerly operated by the Virginia Copper Co., Ltd.

Equipment: includes a 350-h. p. steam plant. Idle several years.

VIRGINIA IRON, COAL & COKE CO. **VIRGINIA**

Officers: Roanoke, Va., and 40 Wall St., New York City.

Company owns and controls about 225,000 acres of iron ore, coal and timber lands in Georgia, Kentucky, Tennessee and Virginia.

VIRGINIA LEAD & ZINC CORPORATION. **VIRGINIA**

Address: J. H. Batcheller, mgr., Mineral, Va.

Officers: Berkeley Williams, pres.; W. M. Cary, v. p.; Norwood Bentley, sec.-treas.

Inc. November 30, 1915, in Virginia. **Cap.,** $600,000, including $200,000 10% cumulative pfd. $5 shares, and $400,000 com. $5 shares. Debentures $200,000 3-year 6% convertible gold notes.

Property: 1,200 acres; the Valznico mine in Spotsylvania county and the Valcooper mine in Louisa county, under development during 1916.

The Valznico mine has a fissure vein in schist, dipping 75° S. E. and pitching N. 40° E. The ore is a complex sulphide, containing 4% lead, 12% zinc and silver, copper, gold and iron.

Development: by 250′ vertical shaft and 2,400′ of workings. **Equipment:** hoist, compressor, pump, steam plant and 50-ton concentrating mill.

Production: in 1916 was 2.300 tons of ore, averaging 4% lead and 12% zinc. Company does not reply to requests for information.

VIRGINIA MINING CO. **VIRGINIA**

Controlled through stock ownership by General Chemical Co. Operates the Gossan pyrrhotite mines at Monarat, Carroll county, Va. W. S. Smith, supt.

Two mines are worked, the old Huey pit, 200′ deep, and the Bombarger, both by open cut methods. They are located about 2,000′ apart on the same vein which varies up to 60′ in width and is enclosed in mica schist. The ore contains about ½% copper and 30% sulphur, and is shipped 48 miles to Pulaski, Va., where it is milled and the product burned to make sulphuric acid.

During 1918-'19 about 100,000 yards of overburden was removed, exposing a three-year ore supply. About 100 men are normally employed.

VIRGINIA SMELTING CO. **VIRGINIA**

Office: 131 State St., Boston, Mass. **Works office:** West Norfolk, Norfolk county, Va.

Officers: W. E. C. Eustis, pres.; A. H. Eustis, v. p.; F. A. Eustis, sec.-treas. W. B. Durant ,engr.

Inc. November 10, 1909, in Maine, as successor of Eustis Smelting Works. **Cap.,** $1.000,000; shares $100 par; in $500,000 preferred and $500.000 common stock. Annual meeting, first Tuesday in October.

Company owns the Eustis Smelting Works, or Norfolk smelter, on tide water, near Norfolk, with railroad facilities to all points. The situation is favorable for custom smelting; as more coal is shipped from this vicinity than from any other center in North America and traffic commands favorable freight rates on return cargoes. The location also insures the best coke for metallurgical use, on advantageous terms. Ore received from vessels is unloaded by machinery into standard railway cars, with facilities to set aside any desired portion into a sample car, standing on a separate track. The unloader has a maximum capacity of 1,000 tons in 24 hours. Loaded cars containing ore are hauled by locomotives upon trestles, and ore and coke dumped into storage bins having capacity for 25,000 tons of ore.

The smelter has a single water-jacket blast furnace of 600 tons daily capacity, using sea water for the jackets. The plant does a general custom business, treating iron bearing ore from Sherbrooke, Quebec, Canada. The smelting works contain 2 Dwight-Lloyd sintering machines; one operates on copper material in connection with the blast furnace, the other treats the leached residue and pyrite cinder to produce sinter, which is shipped to pig iron blast furnaces. The leaching department contains a Ramen-Beskow chloridizing furnace; two Holt-Dern chloridizing furnaces, and a precipitating plant. In order to prevent the sulphur smoke from becoming a nuisance to the surrounding farmers, the plant has developed a complete system for washing the gases, and the manufacture of liquid sulphur dioxide from them.

The smelting department of the works is operated under a lease on a royalty basis, by the Norfolk Smelting Co., a New York corporation.

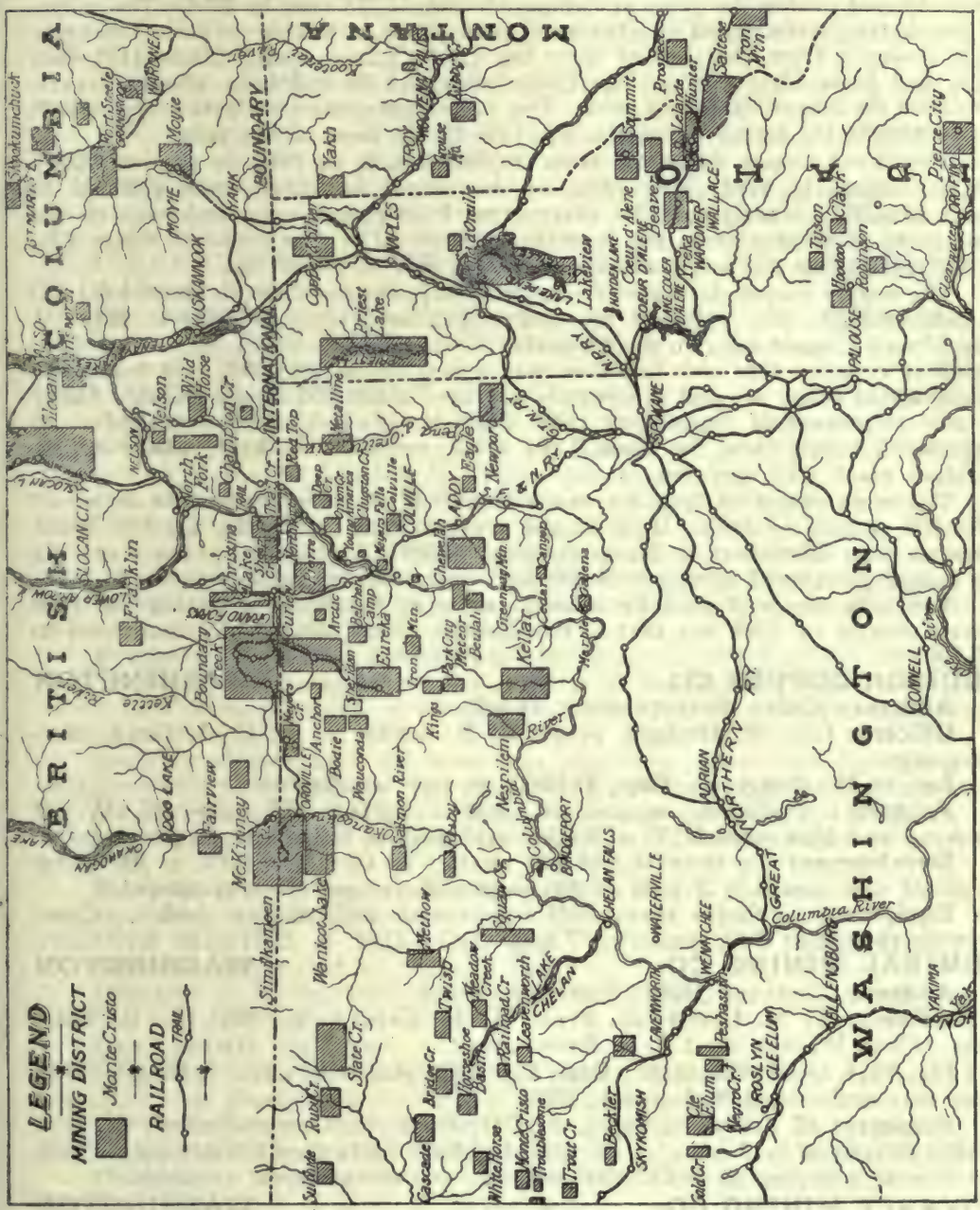
VIRGINIA ZINC & CHEMICAL CORPORATION, LTD. **VIRGINIA**

Liquidated. Properties acquired by the Virginia Consolidated Chemical Corporation, which see.

WASHINGTON

Spokane is the natural center for the mining districts of eastern Washington, as well as the Coeur d'Alene region, and Seattle for western Washington, but the descriptions are arranged alphabetically for greater convenience of reference.

The value of the metals mined in Washington in 1919, was $959,000, a decrease of $518,000 from that of 1918. No zinc ore was marketed. The copper output in the Chewelah district, Stevens county, was somewhat less than in 1918, and there was a marked decrease in the shipments of siliceous ore from the Republic district, in Ferry county. Most of the ore and concentrate from the


LEGEND
MINING DISTRICT
Monte Cristo
RAILROAD
TRAIL
BRITISH COLUMBIA
MONTANA
IDAHO
WASHINGTON
INTERNATIONAL BOUNDARY
Spokane
Colville
Republic
Chewelah
Metaline Falls
Newport
Priest Lake
Sandpoint
Coeur d'Alene
Wallace
Kellogg
Pierce City
Moscow
Pullman
Lewiston
Clarkston
Asotin
Grand Coulee
Ephrata
Wenatchee
Chelan
Entiat
Leavenworth
Winthrop
Twisp
Methow
Okanogan
Omak
Tonasket
Oroville
Nelson
Kaslo
Slocan City
New Denver
Sandon
Rossland
Trail
Nelson
Fairview
McKinney
Greenwood
Midway
Grand Forks
Boundary Creek
Republic
Curlew
Aeneas
Kettle River
Columbia River
Okanogan River
Methow River
Wenatchee
Entiat
Chelan
Lake Chelan
Stehekin
Twisp
Winthrop
Mazama
Loup Loup
Conconully
Tonasket
Oroville
Molson
Curlew
Republic
Aeneas
Kettle River
Boundary Creek
Greenwood
Midway
Grand Forks
Fairview
McKinney
Nelson
Kaslo
Slocan City
New Denver
Sandon
Rossland
Trail
Metaline Falls
Newport
Priest Lake
Sandpoint
Coeur d'Alene
Wallace
Kellogg
Pierce City
Moscow
Pullman
Lewiston
Clarkston
Asotin
Grand Coulee
Ephrata
Wenatchee
Chelan
Entiat
Leavenworth
Winthrop
Twisp
Methow
Okanogan
Omak
Tonasket
Oroville

The price of silver increased to about $1.12 an ounce, but the average prices of copper, lead, and zinc were even less than those of 1918.

The gold output decreased from $304,658 in 1918, to about $280,000 in 1919, a decrease of nearly 8 per cent. Nearly all the gold came from the Republic district, but there was a distinct decrease in ores amalgamated throughout the State. From the Republic district approximately 25,600 tons of siliceous ore were shipped during the year, as compared with 42,275 tons in 1918. The mines of the district were closed on October 9, as a result of a labor strike. The principal shippers from the district were the Last Chance, Quilp, Knob Hill, San Poil, and Lone Pine mines. The Quilp mine, which had been idle for years, produced the largest output of gold. The Lone Pine-Surprise-Pearl group, which was formerly the largest producer, was idle during most of the year.

The silver output decreased from 310,093 ounces in 1918, to approximately 299,000 ounces in 1919. The value of the output increased from $310,093 to about $333,000. Nearly half the silver came from copper ores, and most of the remainder from ores from the Republic district. The Consolidated Mines Co., in the Springdale district, made several shipments of silver ore.

The copper output decreased from 1,922,406 pounds in 1918, to about 1,321,000 pounds in 1919. The value of the output decreased from $474,834 to $248,700. The United Copper mine, in the Chewelah district, was as usual, the largest producer of copper. Ore rich in silver was mined below the 1,300-foot level, and shipments of crude ore and concentrate averaged about 350 tons a month. Other notable shipments of copper ore came from the Sunset mine, near Index, in Snohomish county, and the Loon Lake mine, north of Spokane, where a new flotation plant was operated.

The mine output of lead decreased from 5,271,815 pounds in 1918, to about 1,700,000 pounds in 1919. Most of the product came from the Electric Point property, near Northport, in Stevens county, which was idle most of the year. As the company resumed mining in November, the output is largely estimated.

The only dividend paid by a metal mine in Washington during the first eleven months of 1919 was that of the Electric Point mine, which amounted to $23,790.*

ADDISON COPPER CO. **WASHINGTON**

Address: Keller, Ferry county, Wash.

Officers: Geo. R. Hodges, pres.; R. B. Smith, v. p.; C. A. Gray, sec.-treas.-mgr.

Inc. in Washington. **Cap.,** $75,000; 5c par; assessable.

Property: 5 claims, unpatented, and a millsite, 75 miles N. W. of Spokane, and four miles N. E. of Keller, said to show lead-silver-copper ore.

Development: by tunnels and 150′ shaft. In October, 1919, at 307′ from portal of new tunnel, a 2′ vein of $66 copper-silver-lead ore was opened.

Equipment: includes three-drill compressor and 40-h. p. boiler. Company developing in 1919, employing 7 men.

ADMIRAL MINING CO. **WASHINGTON**

Address: Rookery Bldg., Spokane, Wash.

Officers: T. H. Greenway, pres.; T. R. Tate, v. p.; Mrs. T. R. Tate, treas.; Chas Warsth, sec.; J. R. Brown, mgr.

Inc. 1914, in Washington. **Cap.,** $1,50,000; shares $1 par. A $75,000 bond issue was authorized in January, 1919.

Property: 65 acres, patented, in Colville district, near Valley, Stevens county, developed by 3 tunnels. Reported to have opened up a silver-copper vein 18″-8′ wide, assaying from $30-$100 per ton. No recent report available.

ADVANCE MINING CO. **WASHINGTON**

Address: Spokane, Wash.

Officers: Frank Johnson, pres.; H. I. Parr, v. p.; A. M. Campbell, sec., treas., with W. F. Johnson, C. G. Staples, M. V. Burr, all of Spokane; M. Kulzer, and W. H. Wiscombe, directors. O. F. Parmeter, supt., Daisy, Wash.

Cap., $2,000,000; $1 par; outstanding 1,000,000 shares, assessable.

* Above statements from U. S. Geol. Survey, press bulletin January 2, 1920.

Property: 9 claims in Beulah district, Ferry county. **Development:** by tunnels 400′ and 1,400′ long.

AICHAN BEE SILVER-LEAD MINING CO. **WASHINGTON**

Office: 401 Jamieson Bldg., Spokane, Wash.

Officers: H. M. Howard, pres.-mgr.; Emma S. Stephan, v. p.; Dr. B. F. Blosser, sec.-treas. with Dr. C. S. Kalb and H. Schwitzer, directors. J. Currie, supt., Fruitland, Wash.

Inc. August 1, 1916, in Washington. **Cap.,** $100,000; shares 10c par; 624,000 outstanding.

Property: 8 patented claims, 160 acres, in Deertail district, Stevens county, 25 miles W. of Springdale.

Ore: occurs as a contact deposit in granite. Three veins under development, said to give assays of about 44 oz. silver and 20% lead.

Development: by tunnels crosscutting property through main working tunnel to ascertain value and extent of ore. Management expected to finish this work in July, 1919. A small flotation plant was erected early in 1920.

ALASKAN COPPER RIVER MINING CO. **WASHINGTON**

Address: Everett, Snohomish county, Wash.

Inc. in 1917 to develop gold mines in Alaska. **Cap.,** $2,000,000. Incorporators: E. B. McGill, T. M. Williams and Dr. C. A. Mead.

No recent information.

ALLIANCE MINING CO. **WASHINGTON**

Address: 622 Old National Bank Bldg., Spokane, Wash.

Officers: M. C. Hunter, pres.; F. H. Hunter, v. p.; W. W. Gifford, sec.-treas., with J. M. Lloyd and S. S. Frantz, directors.

Inc. September 9, 1913, in Washington. **Cap.,** $1,500,000, shares $1 par, outstanding $1,303,288; assessable, not exceeding 5 assessments of 5 mills each year. Bonds authorized $100,000, outstanding $32,400. In 1914 the company took over for $171,000 the property of the Anaconda Gold Mng. & Reduction Co., paying $120,000 in Alliance stock, and assuming an indebtedness of $51,000 for the remainder.

Property: 7 claims, 5 patented, 100 acres, in the Eureka mining district, Republic, Wash., adjoining the property of the Republic mine, and said to cover 3,500′ along the strike of the Republic vein, 12′ to 30′ wide, and the Princess vein, 2′ to 10′ wide.

Early development of the properties was done when only high-grade ore was shipped, and the Alliance Co. acquired the holdings of 4 different companies for the purpose of mining and milling the low grade ore. The veins are developed to a depth of 600′ by a 385′ tunnel and a 400′ winze, with total workings of 5,000′.

Equipment: includes gasoline hoist and a 3-drill compressor. No work reported since organization.

ALPINE MINING & MILLING CO. **WASHINGTON**

Address: Alaska Bldg., Seattle, Wash.

Officers: J. H. Starbird, pres.-mgr.; H. C. Ash, sec.-treas.; with M. R. Starbird and T. P. Revelle, directors.

Cap., $50,000; $100 par.

Property: four lode claims and one placer claim on Negro creek, Chelan county, said to show a vein 1½′ to 3½′ wide of free milling gold ore.

Development: several tunnels, 100′ to 200′ in length. Is a prospect.

AMALGAMATED GOLD MINES CO. **WASHINGTON**

Officers: C. R. Hesseltine, pres., 756 New York Block, Seattle, Wash.; G. W. G. Litherland, v. p.; J. E. Reynolds, sec.

Cap., $2,000,000; $1 par; assessable to 10c.

Property: the Blewett mine, 7 claims, and two millsites, on E. slope of Cascades, Chelan county, said to show well defined fissure veins in serpentine with gold ore, containing a small amount of silver.

Development: by 7,000′ of tunnels. **Equipment:** includes 20-stamp mill compressor, water power, etc. Credited with past production of over $1,000,000. No recent information, probably idle.

AMAZON MINE **WASHINGTON**

J. Oppenheimer, owner, Chewelah.

Property: 3 claims, patented, 51 acres, 5 miles N. W. of Chewelah, said to show a vein uncovered for 2,200′. Ore said to assay about 2½ oz. silver, 2% copper, and up to 2½ oz. gold per ton.

Developed by several tunnels, to depth of 300′ with 1,330′ of workings.

Production in 1918, 187 tons ore; total production, 725 tons. Idle in 1919.

AMERICAN FLAG MINE **WASHINGTON**

Owned by Maurice Snyder, and W. D. Hoover, of Aberdeen, Wash.

Property: at Sheridan, Okanogan county, 11 miles W. of Republic, Ferry county, said to show silver-gold ore that assays $10 to $200 per ton, value mainly in silver.

Development: by tunnels and 100′ shaft.

AMERICAN MINERALS PRODUCTION CO. **WASHINGTON**

Address: 140 S. Dearborn St., Chicago, Ill.

Officers: H. F. Wierum, gen. mgr.; H. L. Griswold, supt., Valley, Wash.

Cap., $1,500,000; $1 par.

Property: in Stevens county, Wash., has a large bedded deposit of magnesite, dipping 40 to 70°. The enclosing rocks are slates, schists and quartzites; the deposits being replacements of dolomite by magnesite. These deposits of crystalline magnesite, a few miles west of Valley in Stevens county, discovered in the summer of 1916, excel in size and purity any known deposits of this material.

Development: by quarries. The crude magnesite is shipped to Irvin, Wash., where it is dead-burned, on toll, and shipped thence to steel works and refractories trade.

Company states there are 300,000 to 500,000 tons shipping grade in sight; quarries have a monthly capacity of 12,000 tons, and the calcining plant at Irvin, 6,500 tons monthly.

Production: in 1918, the company mined 67,855 tons of crude magnesite, analyzing approximately Mg CO_3, 91%; CaO, 1.90%; SiO_2, 2.50%. Total dead-burned shipped East amounted to 17,664 tons.

AMERICAN REDUCTION CO. **WASHINGTON**

Address: Republic, Ferry county, Wash.

Inc. in 1915 by F. R. Clark, of Spokane; P. N. Clark and G. W. Sommer.

The property of the North Wash. Power & Reduction Co., which had been held by a receiver for 2 years, was purchased together with adjoining holdings.

Equipment: includes concentrator, mill, and power plant. Idle for two years.

AMERICAN TUNGSTEN CONS. CORP'N. **WASHINGTON**

Company a reorganization, 1912, of the Germania Mng. Co. Cap., $1,000,000 shares $1 par.

The Germania Co., composed principally of German investors, was organized 14 years ago to develop the Roselle mine, 25 miles west of Springdale, Stevens county. It is said that $500,000 was spent in driving tunnels, in the concentrator and buildings. In 1911 the company became involved in litigation, later going into bankruptcy.

In January, 1916, eastern interests, represented by F. T. Hamshaw, of Seattle, obtained a lease and bond on the properties held by the Corporation and started operations. Holdings include the Germania and Roselle mines. Development, consisting of a 200′ shaft and 3 tunnels with 3,000′ of work, is said to have exposed a considerable tonnage of ore. Property sold by Alien Property Custodian in October, 1919, along with the Roselle Mining Co.

APACHE MINING CO. **WASHINGTON**

Address: 1408 Pioneer Bldg., St. Paul, Minn. **Mine address:** Nespelem, Wash. Leased to Beggs and Ostrasky.

Officers: F. A. Day, pres., Fairmont, Minn.; F. A. Hoyt, v. p.; M. H. Evans, sec.-treas., with J. C. Wilson and G. B. Hoyt, directors.

Inc. 1904, in Washington. **Cap.,** $1,000,000; $1 par; issued 750,000.

Property: 6 unpatented claims, 90 acres, at Nespelem, Okanogan county, said to show gold, silver ore in a quartz vein in granite.

Development: 75′ shaft and 300′ tunnel.

APEX MINING CO. **WASHINGTON**

Address: James P. Blaine, superintendent, Chesaw, Okanogan county, Wash.

Property: the Ben Harrison mine, showing fissure veins carrying gold-silver-copper ores. Developed by a shaft with gasoline hoist. Mine intermittently operated. No recent information.

APOLLO CONS. GOLD MINING CO. **WASHINGTON**

Mine office: Republic, Wash.

Officers: H. D. Clark, pres.; E. C. M. Hall, sec.; H. B. Ives, treas.; all of New Haven, Conn. T. J. Howell, mgr.

Cap., $1,500,000; 50c par.

Property: 9 claims, patented, 165 acres, in Ferry county, 10 miles S. E. of Republic, show gold, silver, lead and zinc ore. Said to have made shipments totaling $200,000. No recent returns.

ARADIUM COPPER MINING CO. **WASHINGTON**

Officers: C. A. Maxwell, pres., Puyallup, Wash. J. C. Wright, gen. mgr.

Property: 67 acres in Carbon river district, Pierce county, said to show copper, gold, and silver ore.

Development: over 1,300′ of tunnels. **Equipment:** includes a stamp-mill and electric power plant.

ARK MINES CO. **WASHINGTON**

A reorganization of the Ark Group Mng. & Milling Co., Ltd., described in Vol. XIII.

Address: Spokane, Wash. **Mine address:** Kettle Falls, Wash.

Officers: J. J. Budd, pres.-mgr.; H. L. Nelson, v. p.; O. L. Budd, sec.-treas.; directors, J. J. Budd, H. Karlsten, W. P. Maurer, and Dr. H. Hornby.

Inc. 1918, in Washington. **Cap.,** $375,000; par 25c; assessable in treasury 500,000 fully paid shares, and 400,000 paid up to 15c.; 600,000 shares given for property.

Property: 10 claims, the Silver Queen group, 3 miles S. of Kettle Falls, Stevens county. Ore occurs in contact between granite and lime with S. W. strike and dip of 45°. Vein reported to be from 30 to 60′ wide, traceable for ¾ of a mile.

Development: by shafts, 3 tunnels, longest being 800′ and a 150′ upraise. This work has shown copper ore containing silver values but silver-lead ore also occurs near face of tunnel, with back of 300′ with hanging wall not yet cut. Equipped with steam power, air compressor and 2 air drills. The Washington property has been under development for several years.

Company also owns 3 gold claims in the Kootenai district, British Columbia.

ARLINGTON SILVER MINING CO. **WASHINGTON**

H. S. Stoolfire Mgr., Sherwood Bldg., Spokane. Company was formerly the Arlington Mng. Co., but was reincorporated in March, 1918, under present name.

Property: 10 claims, near Ruby, Wash., developed to the 450′ level. Ore is said to assay $30 per ton in gold and silver. Small shipments made in 1918.

AURELIA CROWN CO. **WASHINGTON**

Office: P. O. Box 187, Seattle, Wash. O. Robert Dahl, pres., treas. and gen. mgr.; A. E. Coxhead, v. p.; H. M. Dahl, sec.; preceding officers, Geo. C. Whipple and C. E. Horton, trustees.

Inc. in Washington. **Cap.,** $10,000,000; shares $10 par; non-assessable; issued $8,137,600.

Property: 36 claims, 730 acres and 2 millsites of about 10 acres, 16 miles west of Lucerne, Chelan county, Wash. Property includes gold, copper, silver-lead and molybdenite mines, having 8 tunnels, of about 1,300′ aggregate length, and several open cuts. The Crown Point molybdenum mine has 3 tunnels, said

to develop 2,000 tons ore. The Silver Trail silver-lead mine has a 6′ fissure vein. Tunnel No. 3, on the copper vein, shows 4 ore shoots, of 4 to 8′ width, carrying ore said to give average assays of 15.5% copper and $8.65 gold and silver per ton.

Equipment: includes hydraulic plant, air-compressor, machine shop, engine house, saw-mill, warehouse and 3 cabins. The mill has 2 crushers, rolls and a Schull concentrator.

AURORA COPPER MINING CO. **WASHINGTON**

Inactive. Conrad Wolfle, pres., Symons Block, Spokane, Wash.

AZURITE COPPER CO. **WASHINGTON**

Office: 80 Broadway, New York.

Officers: C. H. Ballard, pres.; W. G. Hughes, v. p.; Wm. Tensan, sec.; W. T. Behire, treas.

Inc. December, 1916, in Delaware. **Cap.,** $3,000,000; par $1; 2,600,000 shares issued.

Property: a prospect in Whatcom county. Claims show gold and copper ore.

BEAD LAKE GOLD-COPPER MINING CO. **WASHINGTON**

Address: 608 Hyde Bldg., Spokane, Wash.

Officers: G. C. Geisler, pres., E. 1111 Augusta Ave., Spokane, Wash.; C. C. Wilt, v. p.; W. E. Allen, sec.-treas.-mgr.

Cap., $3,000,000; $1 par; assessable.

Property: several hundred acres in the Newport district, Pend Oreille county, Wash., carrying veins of silver-lead, and copper ore. In December, 1919, company bought the Conquest mine for $20,000. The Comstock mine had been previously acquired for $2,500.

Development: by over 5,000′ of tunnels and 600′ of shafts, which it is claimed, has blocked out sufficient ore to justify the installation in 1919 of a 100-ton concentrator, moved from the Western Union mine in Idaho. The plant includes a flotation unit.

BEECHER GOLD MINING CO. **WASHINGTON**

Address: Orient, Wash. Alex A. Anderson, mgr.

Property: the Beecher mine near Orient, Ferry county, in which gold-quartz ore occurs in stringers.

Idle since 1917.

BELCHER MINING CO. **WASHINGTON**

Property was reported to have been bought, 1918, by Frank Babcock, Ewan, Wash., for $50,000, payable in instalments over a period of two years.

Property: the Belcher claim N. of Republic, Ferry county, shows irregular replacement deposits of pyrite associated with garnet, epidote, tremolite and magnetite in marble and interbedded shale, etc., intruded and metamorphosed by monzonite porphyry dikes and sheets.

Development: by 3 tunnels showing sulphide orebody 5′-20′ thick, on dip plane (see Bull. 550 U. S. G. S., 1914, pp. 167, 175, 179). Over 5,000′ of work has been done.

A 1,000′ aerial tram connects the tunnels with ore bins on the railroad. Water, brought 2,000′ from Lambert creek, through a steel pipe, generates electric power, supplemented by a gasoline auxiliary plant.

Equipment: includes an air compressor and power drills.

Property, reopened May, 1911, shipped low-grade gold-bearing pyritic copper ore to Granby smelter. In 1917, reported to have shipped 3,000 tons ore, assaying 6% copper and $1 gold.

BENDER METALS MILLING CO. **WASHINGTON**

Officers: Henry Bender, pres.; B. W. Johnson, sec.; Robt. Baur, treas., all of Toledo, Ohio. J. W. Douglas, v. p., Spokane, Wash.

Cap., $30,000; par $25. Early in 1918, the company finished converting an old stamp-mill in the Oroville district, Stevens county, into a flotation mill to treat ore from the nearby Rich Bar, and Caaba mines. No recent information.

BEN HUR LEASING CO. **WASHINGTON**

Dissolved.

Address: S. P. Domer, 623 Rookery Bldg., Spokane, Wash.

Company was a co-partnership formed to operate the Ben Hur mine at Republic, Ferry county, Wash., under lease.

Property: the Little King and Queen claims on Gold Hill, developed by 800′ shaft, showing gold, silver, and copper ore. Equipped with steam power, compressor, etc. New plant installed, 1913. Property was intermittently worked, 1911-12, and drifting done on the 200′ and 400′ levels. Mine was operated under lease by Cons. Mining & Smelting Co. of Canada, Ltd., during 1914-15, but given up early in 1916. Lessees worked the mine; made small shipments in 1919. See Vol. X, of the Copper Handbook.

BLUE LEDGE MINING & MILLING CO. **WASHINGTON**

Officers: Geo. W. Steele, pres., 355 Head St., San Francisco; Geo. A. Chamook, v. p.; Wm. R. Rae, sec., all of San Francisco; Geo. A. Steele, asst. sec., Keller, Wash.; Louis Reiss, treas., Cheney, Wash.

Cap., $175,000; 10c par, assessable.

Property: 5 claims, 3 patented, in Ferry county, 4½ miles E. of Keller, said to show silver bearing copper and gold ore in a 2′ to 6′ vein that outcrops for 600′.

Development: tunnels and shafts, total 1,255′. Idle many years.

BLUESTAR MINING CO. **WASHINGTON**

Address: Chewelah, Wash.

Officers: L. R. Nestos, pres.; H. C. Moltern, v. p.; Fred W. Dickey, sec.-treas., with Wm. Boyd and S. F. Doran, directors.

Inc. 1906. **Cap.,** $1,600,000; $1 par; 990,000 issued.

Property: 8 claims, 1 patented, N. W. of Chewelah, Stevens county, said to carry silver-lead ore. Idle several years.

BONANZA MINE **WASHINGTON**

Property: 200 acres, located 3 miles from Bossburg, Stevens county, Wash. The mine, an old-time producer, said to have had an output of $1,000,000, and idle for 15 years, was reopened in 1915 by lessees, who started shipping silver-lead ore to the Trail smelter. Reported in 1918, that property was under 10-year lease and bond to Geo. Vervaeke, that $20,000 in ore had been shipped and modern machinery added.

Developed: by 450′ incline shaft to 700′ level, and a total of over 3,000′ underground workings. All ore above 600′ level has been stoped. See U. S. G. S. Bulletin 550, p. 63.

BOSTON-AMERICAN MINING CO. **WASHINGTON**

Office: 217 Commerce Bldg., Everett, Wash. **Mine office:** Monte Cristo, Snohomish county, Wash.

Officers: H. D. Cowden, pres.; C. A. Riddle, v. p.; L. E. Engel, sec.; F. W. Boston, treas., with J. H. Adams, P. E. Low, E. Garber and H. B. Cowden, directors. D. R. Kyes, supt.

Company is not a reorganization of the United Mining Co., Nevada, which see., but stockholders of the United Mining Co., with few exceptions, have more than an equal proportional holding in the Boston-American Mng. Co.

Inc. in 1913, in Washington. **Cap.,** $2,000,000; $1 par; 1,600,000 common, 400,000 preferred; 1,344,200 common and 293,450 preferred issued.

Financial statement, January 1, 1917, showed: receipts for 1916, $107,678; expenditures, $68,928; balance on hand, $38,750.

Property: 88 claims, 26 patented, and 4 patented mill sites, at Monte Cristo, Wash., said to show a dike of low-grade ore 300′ wide, containing fissure veins with streaks of ore from a few inches to 4′ in width. Ore said to contain gold, silver, copper, zinc and arsenic. Mineralized zone said to have been proven by workings over a length of 750′ and to show for 5,000′ on surface.

Development: 14 tunnels, the longest, 1,850′, is 1,400′ below the next higher tunnel. Total underground workings about 19,600′. This work is claimed to have proven up five distinct ledges at depths from the surface to 2,000′ the ledges being regular, well defined, true fissure veins. Management claims

to have 120,000 tons ore blocked out and to have shipped 18 carloads ore that assayed $29 per ton in gold, silver and copper, 8% arsenic and 2½% zinc.

The mine was examined by I. H. White, of Butte, Mont., who is quoted as having reported that there is more than enough ore blocked out to warrant the construction of a 200-ton mill.

Company's former literature considered grossly misleading and creating an unfavorable impression, which can only be remedied by frank statements of operations and economical development. No recent returns; probably idle.

BOUNDARY GOLD CO. **WASHINGTON**

Officers: I. D. Sperry, pres.-treas., Glacier, Wash.; Geo. G. Gilchrist, sec., 747 Gas & Electric Bldg., Denver, Colo.

Cap., $1,000,000; $1 par.

Property: 5 claims patented, on S. E. slope of Bear mountain, Whatcom county, said to show free milling gold ore with small values in silver.

Development: by 1,000′ of tunnels. **Equipment:** includes 76-h. p. waterwheel, 10-stamp mill, 3-drill compressor, and 2,600′ aerial tram.

Total shipments to 1918, reported about $225,000.

BOUNDARY RED MOUNTAIN MINING CO. **WASHINGTON**

Address: Reno, Nev.

Officers: Geo. Wingfield, pres.; E. A. Julian, gen. mgr.; C. F. Burton, sec.-treas. Stock is closely held.

A. H. Westall, supt., Sardis, B. C. Control purchased June, 1916, by George Wingfield and associates.

Property: in Whatcom county, shows a fissure vein containing an oreshoot developed for 750′ and averaging 4′ in width, of $20 ore.

Development: carried on intermittently since 1889, is by tunnels. A crosscut tunnel driven 500′ below upper tunnel has a 500′ drift on the vein, whose width and values are larger than above; new tunnel started, 1919, is 700′ lower.

Equipment: includes a hydro-electric plant and a 10-stamp mill.

BRUCE CREEK MINES CO. **WASHINGTON**

Officers: Bob Mabry, pres.-mgr., Hutton Bldg., Spokane, Wash.; J. P. Dillard, v. p.; E. A. Mabry, sec.-treas.

Inc. in Washington. **Cap.,** $100,000; 10c par; assessable.

Property: 120 acres, leased from the State, in Stevens county, 16 miles N. E. of Colville. Mine is said to have a contact deposit, between limestone and granite, with silver-bearing lead ore and a little zinc blende.

Development: by tunnels and open cuts. **Equipment:** includes gasoline engine and compressor. Was developing late in 1918; no later report.

BUNKER HILL MINING & SMELTING CO. **WASHINGTON**

Dissolved. Was successor of Bunker Hill-Sullivan Copper Mng. Co. and operated near Reiter, Wash. Described in Volume XIII.

Mining property and other assets were purchased by the Western Copper Mining Co. in June, 1917, and the mine is described under that title.

BUTTE-CHEWELAH COPPER CO. **WASHINGTON**

Address: J. O. Gillice, pres., Paulsen Bldg., Spokane, Wash.; F. M. Bell, v. p.; P. L. Eberhardt, sec.-treas., with G. B. Harrington and R. J. Davis (gen. mgr.), directors, at last accounts.

Inc. March, 1913, in Washington. **Cap.,** $1,000,000; shares $1 par; fully paid and non-assessable; 500,000 issued.

Property: 4 claims, 75 acres, in the Valley mining district, shows vein in sedimentaries close to a diabase intrusion; average strike N. 25° E., and dip 60°. Ore contains chalcopyrite and gray copper in a gangue of quartz, calcite and spathic iron. At 100′ in depth the vein is said to be 6′ wide and the ore to average 2 to 5% copper, 1 to 5 oz. in silver and 50 cents to $1 in gold per ton.

Developed by 100′ winze, reported all in ore, a 300′ shaft and 125′ tunnel. Equipment includes a hoist and air-compressor. No recent report, probably idle.

CAREY MINING & MILLING CO. **WASHINGTON**

P. P. Rooney, mgr. Company has lease and bond on the Phil Sheridan and other claims in Sheridan camp, Ferry county, near Toroda, said to show a 6′

vein of silver ore with some gold and copper. Developed by 400′ shaft. In 1917 company built a flotation plant. One car of ore shipped is said to have returned $2,800. No recent returns.

CASCADIA MINING & DEVELOPMENT CO. WASHINGTON

Mine office: Toledo, Wash.

Officers: E. A. Sessions, pres., 212 Abington Bldg., Portland, Ore.; W. A. Gray, v. p.; W. D. Scott, sec.-treas., with M. A. Poppleton, J. P. Finley, Geo. S. Reid, F. H. Dowler, directors. J. F. Hartley, asst. sec.

Inc. March 12, 1887, in Washington. **Cap.,** $6,000,000; shares $1 par; $1,164,615 in treasury.

Property: 108 claims, 2,170 acres; 330 patented in St. Helens mining district on the divide at the head of the Toutle river in Cowlitz, Lewis and Skamania counties, includes the Polar Star and Minnie Lee groups. Properties show fissure veins in grano-diorite, running N. E.-S. W. and dipping 40-60°. The copper ore, which carries gold and silver, occurs in shoots, 2-12′ thick and 20-100′ long. This ore is said to average 17.9% copper, 24.85% iron, 10.75% silica, 4% aluminum, 1.2% lime, 34.5% sulphur, 5.68% antimony, 0.8% zinc and 0.05% nickel.

Development: 5,000′ of work including 300′ to 700′ tunnels with about 1,500′ on ore. About 100,000 tons of shipping ore has been mined and put on the dump, waiting for cheaper transportation. The mines are 16 miles from a railroad over a heavy grade. Property has been under development in a small way for 19 years past.

Examined and reported on by Prof. F. L. Barker, Robt. E. Hanley and G. B. Wilson.

CAYWASH MINING CO. WASHINGTON

Officers: L. H. Prather, pres., Tacoma; W. R. Weisel, v. p.; D. L. Taylor, treas., both of Kennewick, Wash.; S. S. Callahan, sec., Twisp, Wash., with W. Wood, directors.

Cap., $1,000,000; par $1; assessable to 10 mills.

Property: 3 claims on Methow river, and 5 claims on Goat creek, both groups near Mazama, Okanogan county, are said to show silver and gold-bearing copper ore. The ore from the Goat Creek group said to assay $33 to $54, and that of the 3 claim groups $8 to $32 in copper, with a little gold and silver.

Development: shallow shafts and 3 tunnels, longest, 250′.

Management thinks it has a good prospect, but only assessment work has been done recently, as company expects a railway to be built soon that will give cheap transportation.

CHATTERBOY MINING CO. WASHINGTON

Office: Dayton, Wash.

Officers: A. D. Monnett, pres.; Judge C. F. Meller, sec.-treas.; J. C. Leonard, mgr.; J. J. O'Connor, supt.

Property: the Lucille Dreyfus mine, including 8 claims, 1½ miles S. of Danville, reported in 1917, as held by Virginia Mining Co., and operated under a $50,000 lease and bond by A. A. Dumphy and associates, of Spokane. Said to have a 7′ vein with gold value ranging from $6 to $17 per ton.

The Chatterboy Co. is driving a tunnel to cut the vein at a depth of 800′, an additional depth of 500′. Company also has an option on the adjoining property of the Minnehaha Mining Co.

CHELAN CONSOLIDATED COPPER CO. WASHINGTON

Michael J. Corcoran, asst. sec.-treas., 180 Broadway, New York.

Operating office: 811 Lowman Bldg., Seattle, Wash. **Mine office:** Leavenworth, Chelan county, Wash.

Officers: F. D. Wilsey, v. p.; Thos. J. Higgins, sec.-treas., with Henry D. Bristol, Edw. W. Kuhn, A. T. La Vallette, J. L. Jurey and Louis Arndt Stein, trustees.

Inc. May, 1906, in Wash. **Cap.,** $12,000,000; $10 par; issued, $5,779,140. Guaranty Trust Co., New York, registrar. Annual meeting, first Tuesday in June. Company absorbed the Red Mountain Gold & Reduction Co., the North Star Mng. Co. and a large number of individual mining properties.

Property: 14 claims at Index, Snohomish county, and 130 claims at Red Mountain, Chelan county, Wash., 50 miles north of Leavenworth.

The Index mine, between the Ethel and Bunker Hill Sullivan mines, has a 4′ vein, opened by tunnels of 600′ and 700′, with aboutk 2,000′ of workings, showing a 6″ paystreak of high-grade bornite and chalcopyrite ore.

The Red Mountain lands, unpatented, 4 miles west of Phelps creek, include 67 claims owned outright, and 58 additional claims held through the North Star Mining Co., which is controlled through stock ownership.

Development: by 2,000′ main tunnel, supplemented by 600′ of diamond-drill borings, showing a 5′ vein carrying values in copper and gold, and 2 smaller veins.

Equipment: includes gasoline power, air compressor, and 7 buildings.

Company is inactive, as ore is low-grade and with low copper prices the mine could not be operated profitably.

CHEROKEE MINING CO. **WASHINGTON**

Incorporators: Wm. Rakestraw, M. E. Bennett, Lloyd Harris, C. G. Edwards, all of Wilbur, Wash., and I. Toner, of Spokane.

Inc. 1917 in Washington to develop the Cherokee group of claims. **Cap.,** $1,500,000.

CHEWELAH COPPER KING MINING CO. **WASHINGTON**

Defunct. See full description of organization, etc., in Vol. XIII. Property bonded at various times to King Mng. Co., Copper King Mng. Co., and United Copper M. Co.

CHEWELAH GREY COPPER MINING CO. **WASHINGTON**

Dead, 1917. Formerly at Chewelah, Stevens county, Wash. See Vol. XII.

CHLORIDE HILL MINING CO. **WASHINGTON**

Officers: E. G. Ross, pres.; R. B. McClary, sec.-treas. both of Spokane.

Cap., $1,000,000; $1 par; outstanding 600,000 shares.

Property: formerly owned by Santiago Mining Co., 2 miles S. of Hunters, Stevens county, shows a 5½′ vein in which some 80 oz. silver ore was found.

Development: 90′ shaft and 240′ tunnel. Small shipments made in 1917.

CLEVELAND MINING CO. **WASHINGTON**

Described in Vol. XIII. Reorganized as Santa Rita M. & M. Co., which see.

COLUMBIA COPPER CO. **WASHINGTON**

Officers: C. M. Carroll, pres., Alex. Robinson, v. p.-mgr.; Oscar Olson, sec.-treas., all of Spokane, Wash. T. J. Vaughan Rhys, cons. engr.

Property: a 10-year lease and bond, for $100,000 on the High Grade S. & C. Mining Co. claims in Deertrail Mining district, formerly owned by Carson Bros., of Reardon, Wash. Company sold property to the Granby Cons. of B. C. for $120,000, but the High-Grade Co., controlled by Carson Bros., refused to sign deed, claiming failure to carry out contract. The High Grade Co. resumed control and was working the mine at last report. The Columbia brought suit against the High Grade Co. for damages and secured judgment for a small sum.

CONSOLIDATED COPPER CO. **WASHINGTON**

Officers: W. H. Stowell, pres.; Geo. C. Gates, v. p.; V. W. Brasch, sec.-gen. mgr., all of Spokane, with Chas. A. Libby and E. R. Traeger, directors.

Inc. 1913 in Washington. **Cap.,** $1,500,000; shares $1 par, assessable; Annual meeting, January. Company is a reorganization of the Togo Mining & Smelting Co.

Property: about 240 acres, 160 patented in Cedar Canyon district, near Springdale, Stevens county. Ore occurs principally as copper pyrite in slate, serpentine and quartzite with a N.-S. strike and 40 to 60° dip. One orebody, developed by tunnels, with about 2,000′ of workings, reported by management to average 3 to 5′ in width, in upper levels, and to carry 8% copper, 3½ to 5 oz. silver and a trace of gold. Upper levels said to show bornite, copper glance and a little native copper.

Equipment: includes gasoline engine and hoist. The mine has been closed down for several years.

CONSOLIDATED FIRST THOUGHT MINES CO. WASHINGTON

Succeeds First Thought Mining Co.

Address: Orient, Stevens county, Wash.

Officers: M. B. Grieve, pres., Old Natl. Bank Bldg., Spokane, Wash.; O. J. Smith, sec.-treas., with J. E. Pickerell and S. Eslick, directors.

Inc. 1919, in Washington. **Cap.,** $1,000,000; $1 par.

Property: 94 acres of gold-silver bearing claims in Pierre Lake district, near Orient, acquired under option from P. Burns and others of Calgary, Alberta.

Development: bottom level shows 5′ of $12 ore, which will be developed further. Other workings show considerable low-grade ore, with some of shipping value.

Equipment: includes a 6-drill compressor, hoist, 2½-mile aerial tram, assay-office, and complete mining plant.

Production: by former owners, 35,627 tons averaging $16.88 per ton. Idle since 1910, but operations to be resumed, 1919-20.

CONSOLIDATED MINES CO. WASHINGTON

Address: Clark Bros., Paulsen Bldg., Spokane, who acquired control early in 1918.

Property: the old Deer Trail silver mine in Cedar Canyon district, Stevens county, which was operated 25 years ago. In 1919, mine produced and shipped 208 tons ore up to September.

COPPER BUTTE MINING CO. WASHINGTON

Orient, Ferry county, Wash. J. D. Gumpper, pres.; H. J. Miller, sec.; Willis Townsend, gen. mgr.

Inc. December, 1905, in Washington. **Cap.,** $1,000,000; shares $1 par.

Property: 4 claims, patented, in the Pierre Lake district, south of Orient, shows 2 veins in open cuts, 14′ and 15′ wide, respectively.

Development: by 300′ shaft with drifts on the 100′ level shows copper-gold ores, but not in commercial quantity. During 1916-17, a 1,000′ tunnel was expected to cut the ledge at a depth of 430′ below the surface. Inactive at last report.

COPPER CLIFF COPPER MINING CO. WASHINGTON

Inactive. **Office:** 724 Peyton Blk., Spokane, Wash. **Mine office:** Chewelah, Stevens county, Wash.

Officers: T. F. Wilson, pres., treas., and gen. mgr.; J. O. Blair, v. p.; L. C. Dougherty, sec.

Inc. February 24, 1912, in Washington. **Cap.,** $1,000,000; $1 par; issued $62,000.

Property: 60 acres and 40 acres timber lands, held under bond and lease, in the Chewelah district, shows contact deposits between altered granite and limestone. Ores are mainly copper, with small silver and gold values.

Development: by tunnels, longest 1,026′, giving depth of 800′.

COPPER HOARD MINING CO. WASHINGTON

Property: the Lookout claim, formerly under bond to the Chewelah Grey Copper Mng. Co.

COPPER KING MINING CO. WASHINGTON

Address: Chewelah, Wash. F. M. Jarvis, receiver.

United Copper Mining Co. had $75,000 bond on group in 1917, but relinquished control, 1918.

The receiver advised stockholders, in June, 1919, that company owed $65,000, including bond issues of $31,396, and suggested that company be re-organized as the Victory Copper Co., with a bond issue to cover the old company's debts.

The United Copper Mining Co. did considerable development both underground and by diamond- drilling. Is said to have disclosed large bodies of low-grade ore, which, however, can not be worked profitably with present mill equipment. The plan to reorganize, block out ore, and build a flotation mill seems the logical solution of the company's difficulties.

COPPER KNOB MINING CO. **WASHINGTON**

Officers: Wm. H. Stevens, pres., Hillyard, Wash.; with J. S. Meyers, J. T. Brunskill, Laurier, Wash.; J. E. Winters, and E. O. Conner, Spokane, directors.

Cap., $100,000; par 10c; non-assessable.

Property: 7 claims, unpatented, near Laurier, said to show copper ore, with small precious metal content. Has a 60′ shaft. In 1918, a crosscut then being driven showed a little ore.

COPPER QUEEN MINING CO. **WASHINGTON**

Property taken over by Copper King Mining Co. and a new company organized under title of King Mining Co., which see.

COPPER WORLD EXTENSION MINING CO. **WASHINGTON**

Address: Loomis, Okanogan county, Wash. Walter A. Boyle, pres.; Edw. H. Caylor, v. p.; Alfred F. Carman, sec.-treas.

Property leased to C. Dempster & Sons, New York (R. C. Dempster, supt.). who are said to have spent $80,000 for equipment and development work to end of 1919.

Inc. January 11, 1904, in Washington. **Cap.,** $1,500,000; shares $1 par.

Property: 8 claims, 160 acres, on Palmer mountain, in the Wannicut lake district. The ore is pyrrhotite containing copper and occurs in lenticular masses in a schistose formation opened by a 335′ 2-compartment shaft, with total workings of 2,000′. Diamond-drilling being done in 1920.

In 1917-18, shipments amounted to 3,500 tons ore, assaying 4% copper, 0.6 oz. silver, and 0.025 oz. gold per ton.

Equipment: includes steam plant, with 40 h. p. hoists and 4-drill air-compressor. A 2-mile Riblet aerial tram was completed in 1919; capacity, 400 tons in 24 hours. Employs 14 men.

COPPER WORLD GOLD MG. & SM. CO. **WASHINGTON**

Office: 401 Columbia Bldg., Spokane, Wash. **Mine office:** Loomis, Okanogan county, Wash. Jerome L. Drumheller, pres. and mgr.; John Wentworth, v. p. and supt.; S. A. Child, sec.-treas.

Inc. in Washington. **Cap.,** $3,000,000; shares $1 par, non-assessable.

Property: 2 claims, patented, lying between the Copper World Extension on the east and the Leadville mine on the west, on Palmer mountain, 6 miles N. E. of Loomis. The mine has several short tunnels and shallow shafts and a 135′ two-compartment incline shaft, having a 125′ crosscut.

This and adjoining property, Copper World Extension (which see), are under 5-year lease to C. Dempster & Sons, New York.

CRESCENT MINING CO., LTD. **WASHINGTON**

Company is a reorganization of the Crescent C. Mng. Co.

Office: at last accounts, 201 Lindsey Bldg., Winnipeg, Manitoba, Can. **Mine office:** Twisp, Okanogan county, Wash.

Officers: D. C. McFee, pres.; C. H. McNaughton, v. p.; J. H. Sutherland, sec.-treas., with F. J. Carr, D. D. Young and D. Munroe, directors. G. B. Creighton, mgr.

Cap., $3,000,000; unsubscribed stock, $1,291,786; $1 par.

Property: 48 claims, about 960 acres, and a mill-site on the east side of Cascade Range, in Okanogan county, about 100 miles S. W. of the Granby. Ore occurs in fissure veins, carrying chalcopyrite, bornite and quartz. Main development by tunnel over 900′ long. A good deal of graphite is mixed with ore.

Equipment: includes a turbine, electric plant, air drill, saw-mill, mine buildings and miners' lodgings. Management does not reply to requests for information.

CRYSTAL MINE **WASHINGTON**

Property: 40-acre mining group 35 miles W. of Lincoln, in Lincoln county. Developed by 200′ shaft.

Reported under option to E. S. Campbell and associates for $200,000.

DEER TRAIL NO. 2 MINES **WASHINGTON**

The mines were notable producers 25 years ago, with a credited yield of

$3,000,000. Ore carries silver, with some lead. 200,000 tons of $10 ore are reported on the dump and in stopes. Mine has 2 miles of workings.

Reported under a lease and bond in 1918 to W. A. Corey, of the Finch estate.

DIAMOND R. MINING CO. **WASHINGTON**

Officers: R. A. Hutchinson, pres.; W. H. Crawford, v. p.; E. S. Campbell, sec.-treas., 311 Hyde Bldg., Spokane; Oscar DeCamp, supt., with T. S. Hutchinson, directors.

Cap., $100,000; 10c par.

Property: 6 claims, patented, in Pend Oreille county, one mile from Metaline, said to have argentiferous lead-zinc ore assaying 7% lead, 10% zinc, and 1 to 3 oz. silver. In 1918, company claimed to have 15,000 tons milling ore on dump and in the mine.

Development: by tunnels. Lessees are said to have made small shipments of 60% lead ore. No recent information.

DOMINION SILVER LEAD CO. **WASHINGTON**

Officers: early in 1918 were, W. H. Linney, pres., 2805 Summit Blvd., Spokane; Roy C. Lammers, v. p.-treas.; Roy H. Clarke, sec., all of Spokane.

Inc., 1919, in Washington. **Cap.**, $100,000; par $10; non-assessable. Owing to litigation property has been idle for several years. Company was organized to work Old Dominion group, operated for many years by G. B. Dennis, Spokane, and Peck Bros., Chicago. Property sold at sheriff's sale, 1916. Bought by W. H. Linney, who formed present company. Peck Bros. then brought suit and won the case in the lower court, but company has appealed.

Property: Old Dominion group, 2 miles E. of Colville, said to show high-grade silver-lead ore. Developed by tunnel to depth of 800', with 17,000' total workings. Mine first opened in 1865, has produced 3,061 tons of ore worth $602,536.

DOUBLE EAGLE MINING CO. **WASHINGTON**

Officers: M. Kulzer, pres., Valley, Wash.; W. S. Rose, v. p.; E. E. Edwards, sec., Valley, with J. L. Dirks, W. H. Button, and A. Morrison, directors.

Cap., $1,000,000; $1 par.

Property: 4 claims, and 200 acres leased land in Stevens county, 12 miles W. of Valley, said to show silver-lead-copper ore.

Development: by tunnels. At last account company was driving a 1,600' tunnel to cut the vein at 700' depth. Several cars of ore have been shipped.

DOUBLE HEADER MINING CO. **WASHINGTON**

Officers: Geo. M. Quinn, pres.; L. C. Shuff, sec.-treas.; with E. Moore, C. J. Kennedy, and E. Smith, directors. Reported in November, 1918, that property was being operated by a close corporation, the Jenkins-Hammond Co., with Frank C. Hammond, mgr.

Inc. 1914, in Washington. **Cap.**, $1,500,000; $1 par; 1,174,326 issued. Annual meeting, first Tuesday in June.

Property: 7 claims, 120 acres, 1½ miles S. of Nespelem, Wash. Examined by A. O. Ingalls and others. Claims cover a quartz vein in granite, dipping 50° N. E., with N. W.-S. E. course.

Development: by 80' vertical and 125' incline shafts, workings totaling 1,000'. InNovember, 1918, rich ore was reported cut in a band paralleling the lower-grade ore. A 100-ton flotation mill has been installed in which an 80% recovery is reported.

DUTCH MILLER MINING & SMELTING CO. **WASHINGTON**

H. P. Fogh, pres. and agent for majority stockholders, 1403 Howell St., Seattle, Wash. Geo. H. Law, sec.-treas.

Cap., $2,000,000; shares $1 par; all issued; 1,000,000 shares in escrow for 5 years. Majority of stock is held by an ore contract association, which made a 5-year contract for output, the Dutch Miller to get 40% of earnings as royalty, one-half to apply on 500,500 shares optioned to the association.

Property: 2 patented claims, on summit of range, 12 miles south of Skykomish, Wash., formerly worked by the Seattle-Boston Copper Co. Claims show an orebody in a vein in granodiorite. Ore is chalcopyrite with tourmaline

and quartz, and is high-grade. Mine lacks transportation facilities and rope tramway must be installed to get ore to the wagon-road.

Examined by W. H. Weed. Inactive for several years, but company still alive.

EAGLE PEAK COPPER MINING CO. **WASHINGTON**

Mine office: Longmire, Pierce county, Wash. **Main office:** Tacoma, Washington.

Officers: R. H. Wheelock, pres., Ashford, Wash.; J. E. Walker, v. p.-mgr.; M. A. Long, sec.-treas., with G. W. Anderson and A. Lundin, directors.

Inc. 1908 in Washington. **Cap.,** $150,000; $1 par; issued, 130,000. Annual meeting, September 10.

Property: claims, 40 acres in Cascade mining district, 14 miles from railroad, in the heart of the Tatoosh range, near Mt. Tacoma. Claims show fissure veins in granite with ore carrying bornite and chalcocite and said to average 17% copper, $4 gold and some silver.

Development: by tunnel. **Equipment:** includes 25-h. p. power plant, air compressor and 4 buildings. Reported, 1919, that a small mill will be built.

ECLIPSE CONS. MG. & INVESTMENT CO. **WASHINGTON**

Address: 528 New York Bldg., Seattle, Wash.

Officers: Robert Dahl, pres., John E. Newall, v. p.; John B. Van Dyke, sec., with Andrew Chilberg, directors.

Inc. 1906, in Washington. **Cap.,** $3,000,000; $1 par; $2,000,000 in stock given for the property.

Lands: 9 claims, unpatented, and a mill site.

Mine has 3 tunnels and a shaft on a fissure vein in slate, carrying mercury, gold and silver, claimed to assay $61.50 per ton. Workings total 1,825′. Management estimates 90,000 tons ore blocked out, March, 1919. Water power from the Stillaguamish river develops 830 h. p. by turbine. The concentrator, rated at 300 tons daily capacity, has tank room for cyanide treatment. A compressor of 600 cu. ft. capacity has recently been added.

ELECTRIC POINT MINING CO. **WASHINGTON**

Address: Roy A. Young, pres.-gen. mgr., Northport, Wash., Dan Dodds, supt., Cummings, Wash.

Officers: J. E. Yoder, v. p.; F. A. Turner, sec.; F. T. McCollough, treas., with L. C. Jesseph and R. A. Young, directors.

Cap., $1,000,000; $1 par; 793,000 shares issued. One quarter interest owned by Walter J. Nicholls, Spokane. Financial statement shows operating loss in 1918 of $25,917. Cash reserve, December 31, 1918, reported as $148,222.

Dividends: initial on Jan. 31, 1916; last, of 3c a share, was paid Dec. 22, 1919, making total of $301,530.

Property: 13 claims, 245 acres, unpatented, 20 miles E. of Northport, Stevens county, and 13 miles from Boundary, the shipping point. Mine is on top of a mountain, 4,000 to 5,000′ high.

Ore: a low grade lead ore mainly carbonate that occurs in chimneys of variable size. Shipments run about 25% lead.

Development: to 800′ level by tunnels and shaft. Reserves are unofficially estimated as 25,000 tons of 30% ore, plus 2,000 tons in bunkers at tram terminal. In October, 1919, it was reported that a new chimney of ore, 80′ wide, had been developed.

Equipment: includes a 2½ mile aerial tram, from mine to Leadpoint, and another section to be built to Wood Spur; orebins and suitable mining plant.

Production: in 1917, shipments totaled 16,310 tons ore; in 1918, 8,214 tons were shipped, returning $241,138.

Property was idle for several months in 1919. Future of the mine seems to depend on the possibility of finding a market for the ore. Reported, August, 1919, that the U. S. S. R. & M. Co. at Midvale, Utah, had arranged to treat the entire output. If the ore carried 30% lead, and the metal is 6 cents a pound, equal to $18 per ton of ore, and charges are $3 per ton for treatment and $8.80 for freight, the profit will be $6.20 per ton.

ELIZABETH GOLD HILL MINING CO. **WASHINGTON**

Address: North Yakima, Yakima county, Wash.

Officers: L. L. Matterson, pres.; P. J. Eschbach, v. p.; Frank X Nagler, sec.-treas., with Jos. Feser, Thos. Hope, E. P. Sanford and Rudolph Mayer, directors.

Inc. 1900, in Washington. **Cap.,** $1,000,000; $1 par. Annual meeting second Monday in March.

Property: 14 claims, unpatented, 200 acres, adjoining the Blue Bell mine on the north, about 65 miles N. W. of North Yakima, in the Summit district, shows a number of orebodies in granite, carrying gold-silver-lead-copper ores, with 1,600′ of workings.

Ore reserves: estimated by management, 150,000 tons of ore, with 100,000 tons blocked out for stoping, averaging $40 per ton, which figures are excessive.

Equipment: includes steam and water power, and a small sawmill, with material for a 10-stamp mill on the ground. Idle since 1917.

EMPIRE MOLYBDENITE M. & M. CO. **WASHINGTON**

Address: M. B. Le Page, sec., 621 S. Adams St., Spokane, Wash.

Officers: T. Le Page, pres.; D. J. Whelan, v. p.; Fred Le Page, treas., with A. G. Clark, directors.

Cap., $100,000; shares 10c par.

Property: 8 claims, unpatented, on Molybdenite peak, Metaline district, Pend Oreille county, 11 miles from Ione. Claims carry molybdenite ore that has been worked in a small way for several years, and some shipments made.

FAVORITE GOLD & COPPER MINING CO. **WASHINGTON**

Probably dead. See Vol. XII.

Mine at Nighthawk, Okanogan county, Wash.

F. H. & C. GOLD MINING CO. **WASHINGTON**

Officers: S. A. McCay, pres.; M. J. Luby, v. p.; J. J. Hennessy, treas.-mgr.; Mary Hennessy, sec., with Martin Woldson, directors, all of Spokane.

Cap., $250,000; shares 25c par.

Property: 53 acres, 2½ miles N. W. of Rockcut, Ferry county, has gold-silver ore.

Development: 170′ shaft, with about 1,000′ of workings. **Equipment:** includes gasoline hoist and compressor. Small shipments were made to Granby smelter in 1918. No later information.

FIRST THOUGHT MINING CO. **WASHINGTON**

Succeeded by Cons. First Thought Mines Co., which see.

FLORENCE-RAE COPPER CO. **WASHINGTON**

Address: Index, Snohomish county, Wash. N. Rudebeck, mgr.; Fred Booth, supt.

Property: on Copper mountain, about 4 miles E. of Index, has a tunnel showing a 10′ paystreak of chalcopyrite in the Margurite vein and assay of 400 lb. sample taken across 6′ of the vein averages 12 oz. silver, 18.5% copper, 29.6% iron, 7.2% silica, and 35.8% sulphur. Idle.

FRANK MINING CO. **WASHINGTON**

Address: Chewelah, Wash.

Officers: A. C. Weary, pres.; W. B. Stuart, sec.-treas.-mgr., with Wm. Thompson, directors.

Cap., $80,000; 5c par.

Property: 4 claims, 80 acres, near Chewelah, said to show copper-lead ore in quartz vein. Developed by 120′ shaft. A prospect.

GALENA FARM MINING CO. **WASHINGTON**

Address: Dr. W. J. Keyes, sec., Fernwell Bldg., Spokane, Wash.

Property: 6 claims, in Stevens county, 16 miles S. E. of Northport, said to show lead-silver-gold ore.

Development: by open-cuts and 200′ tunnel. No recent report.

GLADSTONE MOUNTAIN MINING CO. **WASHINGTON**

Address: 201 Sherwood Bldg., Spokane, Wash. **Mine office:** Northport, Wash.

Officers: F. T. McCollough, pres.; T. S. Lane, v. p.; W. J. Nicholls, mgr.-sec.-treas., with J. A. Welch and H. M. Stephens, directors. D. D. Dodd, supt.

Inc. August, 1916, in Washington. **Cap.,** 1,500,000 shares, 10c par; non-assessable; 1,201,056 outstanding; 100,000 shares sold 1917 at 15c per share.

Property: 16 claims, 11 surveyed for patent, 291 acres, situated 20 miles E. of Northport, and but 900′ from Electric Point mine, the claims almost surrounding that property.

Geology: vertical chamber or so-called "chimney" deposits in limestone. Ore contains lead as carbonate, 1 oz. silver, trace of gold. Sulphides were opened in 1919.

Development: by Setting Sun shaft 275′ with drifts at 50, 100, 200 and 260′; total openings, 450′. Shaft and drifts show pay-shoot 120′ long with workable width, of carbonate lead ore. Also has 120′ Lone Star shaft with ore.

About $35,000 has been spent on the property.

Equipment: 15-h. p. gasoline hoist.

Production: in 1917 shipped 22 cars of 15 to 18% lead ore netting $12,000. Closed down in 1917, owing to lack of funds, but was reopened in 1919 and by October, carbonate and sulphide ore had been found carrying up to 65% lead. Is a speculative proposition.

GRANT CONSOLIDATED COPPER MINING CO. **WASHINGTON**

Officers: at last accounts, C. H. Clodins, pres., Ritzville, Wash.; J. MacDonald, v. p.; J. A. MacLean, sec.-treas., Spokane.

Inc. 1907, in Washington. **Cap.,** $1,650,000.

Property: 14 claims, on Copper mountain, 9 miles from Chesaw, Okanogan county, developed by an open cut and tunnel planned to be driven 1,500′, cutting 2 strong veins carrying medium-grade chalcopyrite in considerable quantities. Shipments said to have returned about 6% copper and $3 gold per ton.

Equipment: includes two 80-h. p. boilers and an air compressor. Letters neither answered nor returned. Presumably idle.

GREAT METALS MINING & MILLING CO. **WASHINGTON**

Address: Nespelem, Okanogan county, Wash. E. C. Williamson, mgr.; Albert Nelson, supt.

Property: in the Nespelem district, also reported to have leased a property from the Double-Header Mining Co., which see. At depth of 200′ in September, 1919, a foot of $20 and five feet of $15 ore had been opened in company's mine.

Equipment: includes a gravity concentration and flotation mill, treating 80 tons of silver ore and 10 tons of lead ore daily, at last account.

GREAT NORTHERN MINING CO. **WASHINGTON**

Address: Jos. Rosslaw, Hyde Bldg., Spokane, part owner in 1918.

Property: 4 patented claims, on San Poil river, Ferry county, 15 miles from Kellar, said to show gold-copper ore, with some nickel and cobalt. In 1918, workings totalled 1,850′.

GWINN MINING CO. **WASHINGTON**

Property said to have been acquired by Hall Creek Mining & Milling Co., 1919.

Address: Meteor, Ferry county, Wash. Peter Proff, mgr. at last accounts.

Property: a group of claims in the Meteor or Covada district, showing fissure veins in sedimentary rocks cut by diorite and carrying complex ore said to average about $16 per ton in gold, silver, copper and lead.

Development: by shafts and tunnels, said to have blocked out considerable low-grade ore which is being treated in a 50-ton concentrator. Company erected a dam on Hall creek for its hydro-electric plant.

HALL CREEK MINING & MILLING CO. **WASHINGTON**

Officers: at last accounts, M. W. Merritt, pres.; Peter Proff, Jr., sec.-treas.-mgr., Rosalie, Wash.

Inc. in Washington. **Cap.,** $1,000,000; shares $1 par.

Property: 240 acres including the Gwinn mine and group of claims, shows a fissure vein carrying gold-copper ore, developed by 400′ shaft. (See Gwinn Mng. Co.)

Equipment: includes steam plant and water power, hoist and 4-drill Fairbanks compressor. Has a 75-ton concentration mill, driven by electric power.

No recent returns; presumably idle.

HAMMOND MINING CO. **WASHINGTON**

Dead. Former property, the Great Excelsior mine.

This was an attempt to work a $4 gold deposit. See Vol. XIII for details.

HECLA COPPER-SILVER MNG. & MLG. CO. **WASHINGTON**

Chewelah, Wash.

Officers: J. C. Argall, pres., Spokane; Howard McPhee, v. p.; V. R. Hoar, sec.-treas.; Fred F. Foster, supt., with C. W. Linscott, directors.

Property: 11 claims 3½ miles N. E. of Chewelah and S. of the United Silver Copper Co. Claims show 4 ledges, the main vein varying from 6 to 14′ wide, traceable by cuts and pits for nearly a mile and averaging 5.4% copper, $1 in gold and $1.80 in silver.

Developed: by a 75′ tunnel and a 150 vertical shaft. **Equipment:** includes a 50 h. p. hoist and a 4-drill compressor. No recent returns; probably idle.

HIGH GRADE SILVER & COPPER MINING CO. **WASHINGTON**

Office: Chewelah, Wash.

Officers: Oscar Carstens, pres.; Henry Carstens, v. p., 828 Old National Bank Bldg., Spokane; J. A. Hansen, treas.

Inc. July, 1909. **Cap.,** 1,500,000 shares, assessments of 9 mills levied to date.

Property: 3 claims, about 3 miles N. E. of Chewelah, Stevens county shows a granite intrusion in lime with mineralization along contact. **Ore:** high-grade copper with silver and lead values.

Development: by 125′ shaft and a new 60′ shaft being sunk on a body of oxidized iron ore. **Equipment:** includes hoist, boiler, pump, etc.

See Columbia Turk Copper Co., for lawsuit, etc.

HOLDEN GOLD & COPPER MINING CO. **WASHINGTON**

Mine near Lucerne, Chelan county, Wash.

Officers: J. H. Holden, pres.-mgr., Chelan, Wash.; A. W. Lachapelle v. p.; O. A. Hoag, sec.-treas., with Chas. N. Boon, directors.

Cap., $250,000. Company has no debts and no earnings to date.

Property: 6 claims, 120 acres, on Railroad creek, near Lake Chelan, 60 miles N. of Wenatchee on the G. N. R. R., shows gneiss and schist cut by granite with a vein of 40′ average and 185′ claimed maximum width.

Development: by 6 tunnels, Nos. 2 and 3 being connected by a blind shaft with about 2,000′ of workings on 3 levels and several hundred feet of diamond-drilling. There also are numerous open cuts. Mine shows ore said to assay from 7 to 10% copper, 2 oz. silver and $5 to $10 gold per ton. Idle, except for annual assessment work.

HOMESTEAD COPPER CO. **WASHINGTON**

Address: W. H. Angel, mgr., Colman Bldg., Seattle, Wash.

Officers: C. Dell Floyd, pres., Chehalis, Wash.; Mrs. Peter McLane, v. p.; Peter McLane, treas., with W. H. Angel (mgr.), directors. Agnes W. Floyd, treas.

Inc. in Washington. **Cap.,** $1,000,000; par $1.

Property: 9 claims, 180 acres, 6 miles from Index, Snohomish county, said to show copper ore. Workings amount to only 200′ of tunneling. Is a prospect.

ILLINOIS COPPER & SILVER MINING CO. **WASHINGTON**

Address: Keller, Ferry county, Wash. J. C. Davis, pres. and gen.

mgr.; J. D. Nighbert, v. p.; R. Shoemaker, supt.; Edwin Johnston, sec.; J. D. Hess, treas.

Inc. in Washington. **Cap.**, $2,000,000; $1 par; in $1,000,000 preferred and $1,000,000 common stock.

Property: 10 claims, in the San Poil district, and "a ⅛ interest in 160 acres of granite" 21 miles N. of Keller.

Development: by 3,000′ of tunnels, exposing a 3½ vein of zinc-copper ore with silver values. In a second vein said to be 50′ wide, $10 ore is cut, and a third vein, 12′ across, shows $30 ore. Mine under development since 1907.

Equipment includes $5,000 worth of machinery, all well housed.

INSURGENT GOLD MINING CO. **WASHINGTON**

Address: G. B. Dennis, Knickerbocker Apts., Spokane, Wash.

Inc. in Washington. **Cap.**, $500,000; $1 par.

Property: 1 claim and fraction adjacent to the Hope mine of the Northport S. & R. Co., at Republic, Ferry county, controlled by the Day Bros.

Development: by 540′ shaft, opening a 15′ vein.

In 1919, the Days started suit against the Insurgent and Lone Pine-Surprise Consolidated, claiming $100,000 damages for ore alleged to have been wrongfully removed by those companies.

Production: to 1918 amounted to 12,000 tons of $19.76 gold ore.

INTERNATIONAL GOLD MINING CO. **WASHINGTON**

Head office: Empire State Bldg., Spokane, Wash.

Officers: Peter Reid, pres.; D. F. Kizer, v. p.; G. H. Walters, sec.; C. L. Russell, treas., with H. L. Williams, directors.

Cap., $1,000,000; shares, $1 par.

Property: 6 claims in the Orient district, Ferry county, developed by tunnels and equipped sufficiently for a small mine.

INTERSTATE-SULLIVAN MINING CO. **WASHINGTON**

Officers: Dennis Sullivan, pres., Rockford, Wash.; H. F. Phillips, v. p.; A. E. Barnes, sec.-treas., Hyde Bldg., Spokane; Jack Ashley, Jr., supt.

Cap., $100,000; shares, 5c par.

Property: Hidden Treasure group, 6 claims, on Goat mountain, N. of Clark's Fork, Wash., said to show a fissure vein with silver-lead ore. In June, 1919, a 3-drill compressor had been added to equipment, and a tunnel was being run to cut the vein at a depth of 800′.

IRON CREEK MINING CO. **WASHINGTON**

Address: Keller, Wash.

Officers: R. J. Clark, pres.; J. E. Angel, sec.-treas.; both of Keller, Wash.; J. W. Duncan, v. p., 1311 McClellan St., Spokane; J. E. Kennedy, and Chas. W. Clark, directors.

Inc. in Washington. **Cap.**, $1,500,000; par $1.

Property: several claims, unpatented, on Iron creek, 12 miles N. E. of Keller, in Ferry county, said to show silver-lead ore.

Development: 1,200′ of workings, mainly tunnels.

In 1917, 20 tons, valued at $491, were shipped. At last report, company was planning the erection of a 25-ton mill, and resumption of work.

IROQUOIS MINING CO. **WASHINGTON**

Address: Chas. E. Bisbee, receiver, Rookery Bldg., Spokane, Wash., appointed in May, 1918.

Officers: C. W. Horne, pres.; Jas. A. Crowther, sec.-treas.; with H. G. Verich, all of Spokane; John Kalscheuer, and Geo. H. Bessler, directors.

Cap., $1,500,000; par $1.

Property: had a lease and bond for $50,000 on 3 claims on Flanogan Mtn. 6 miles S. W. of Boundary, Wash. No payments made, though a 700′ tunnel was run and expensive machinery installed. The property has reverted to the original owners, as a report by W. Earl Greenough was unfavorable.

IVANHOE MINING CO. **WASHINGTON**

W. B. McChesney, mgr., Oroville, Wash.

Property: on Palmer mountain, 7 miles from Oroville, Okanogan

county, developed by a 4,400′ tunnel to a vertical depth of 1,559′, at which depth the main orebody was intersected.

JUNO-ECHO COPPER CO. **WASHINGTON**

Address: Albert E. Kulzer, Chewelah, Wash.

Officers: Dr. C. A. Hauber, pres.; C. T. Winslow, v. p.; with H. R. Spedden, of Colville; F. L. Reinoehl, Chewelah, and F. H. Alm, directors.

Inc. in Washington. **Cap.,** $150,000; par 10c; assessable up to 3c a share. Three assessments of one mill called, 1917.

Property: the Juno, Echo and Ibex lode claims, 2 miles E. of Chewelah and adjacent to Security Copper Co. and Standard Chewelah Co. holdings. Is presumably a consolidation of Juno Copper Co. and Juno-Echo M. & M. Co.

Development: by 320′ shaft with levels at 150′ and 300′, exposing 6′ vein of copper ore carrying molybdenite.

Property has shipped two carloads of high-grade ore.

JUPITER LEAD CO. **WASHINGTON**

Address: Northport, Wash., or care Al Baker, Spokane, Wash.; Chris. Knutson, Wm. Bynan, C. Basler, and others, of Northport, Wash., lessees.

Cap., $300,000; par $1.

Property: the Last Chance group, 6 miles S. E. of Northport, which during 1908-10 produced about 1,400 tons of lead ore, valued at $65,000. Idle until 1916, when Norman Mines Co. took lease and bond on property for $30,000. Several carloads of ore were shipped, assaying 60% lead and zinc. Option was relinquished in October, 1916, and mine was idle until late in 1918.

JUST TIME MINING CO. **WASHINGTON**

Office: 326 Rookery Bldg., Spokane, Wash.

Officers: F. C. Descent, pres.; A. Anderson, sec.; with D. Danielson, directors, all of Spokane.

Inc. 1917, in Washington. **Cap.,** $300,000; par $1.

Property: 2 unpatented claims, in Stevens county, 3 miles from Electric Point mine, said to show silver-lead ore in a 70′ shaft. No recent report.

KANKAKEE MINING CO. **WASHINGTON**

Officers: H. L. Mayberry, pres.; Wm. Barnard, sec., Nespelem, Wash.; J. M. O'Neill, treas., with F. M. De Camp, G. G. Sather, E. Christensen, and D. W. Smith, directors.

Inc. in Washington. **Cap.,** $850,000; $1 par.

Property: 11 unpatented claims, and a millsite in Okanogan county, 3 miles W. of Nespelem, has zinc-copper ore with silver and a little gold. Said to have 15,000 tons of ore blocked out.

Developing in 1918; no later report.

KING MINING CO. **WASHINGTON**

Dead. See Copper King Mining Co.

Officers: V. D. Williamson, pres., Empire St. Bldg., Spokane, Wash.; J. W. Douglas, v. p.-gen. mgr.

Inc. in 1916, to take over the Copper King and Copper Queen mines at Chewelah, Stevens county, Wash. See Vol. XIII.

KNOB HILL MINING CO. **WASHINGTON**

Office: 622 Old National Bldg., Spokane. **Mine office:** Republic, Wash.

Officers: John Byrne, pres.; Chester Shoudy, v. p.; with T. A. White, H. V. Chamberlain, H. Kreysler, Mrs. John Byrne, and J. E. Daley, directors. O. A. Broyles, sec.-treas.

Cap., $1,000,000; shares $1 par; all issued. Stock listed on Spokane Exchange. Annual meeting, January.

Profits in 1916 were $33,812; in 1917, ore sales totaled $102,143 net. In 1918, ore sales were $33,933; total income, $37,330; expenses, $46,546; cash on hand, $336; operations resulting in a loss of $9,216.

Dividends: resumed in March, 1917, after a 3-years' lapse paid $34,784 in that year, bringing total dividends to $105,000.

Property: the Knob Hill and Mud Lake mines at Republic, Ferry county, Wash. The Knob Hill is developed by shafts and crosscuts.

Company maintains a sphinx-like silence to all requests for information, but is presumably a small shipper.

KROMONA MINING & SMELTING CO. **WASHINGTON**

Office: 615 Peyton Bldg., Spokane, Wash.

Officers: C. B. Krom, pres.-treas.; J. F. Krom, v. p.-gen. mgr.; W. Y. Sanborn, sec., with J. P. Shattuck, directors. Julius Rickert, Calgary, Alberta, Can., supt.

Inc. 1916, in Washington. **Cap.,** $1,500,000; $1 par. Annual meeting, fourth Tuesday in January.

Property: 9 claims, 180 acres in Sultan district, Snohomish county, about 21 miles from Sultan, Wash., showing a fissure vein in granite with copper ore containing gold and silver. The vein runs 5° E. of N., with a 60° westerly dip. Ore said to average 10% copper, 5 oz. silver, and $10.35 gold per ton.

Development: by 85′ adit. Management plans to install complete equipment, including a compressor, and aerial tram, etc.

A promising prospect.

LA FLEUR MOUNTAIN COPPER CO. **WASHINGTON**

Address: Colville, Stevens county, Wash.

Officers: W. A. Acorn, pres.; I. J. Lasswell, sec., E. J. Millberg, treas.; with George Wisner and J. L. Lasswell, directors.

Inc. November, 1919, in Washington. **Cap.,** $1,000,000; $1 par, 343,000 in treasury.

Property: 2 groups of 6 claims and 4 fractions, on La Fleur mountain, Ferry county, 1½ miles from rail. Two veins, 25′ and 6′ wide, cross the claims. Ore is said to carry gold, silver, copper, and platinum. The 25′ vein has a shoot 4′ wide, averaging $70 per ton, the platinum content is alleged to be from $2 to $272 per ton.

Development: includes a 50′ and a 37′ shaft, but a 2,000′ adit tunnel is planned.

The doubtful factor in this project is the platinum; too often people are enthusiastic over apparently rich platinum ore, which careful tests show is very low grade if not barren.

LAKINA COPPER CO. **WASHINGTON**

See same title under Idaho mines.

LAURIER MINING CO. **WASHINGTON**

Office: 410 Columbia Blk., Spokane, Wash. **Mine office:** Laurier, Ferry county, Wash.

Officers: Dayton H. Stewart, pres.-mgr.; Grant A. Stewart, v. p.-supt.; E. K. Erwin, sec.-treas., with J. S. Talkington and Guy P. Linville, directors. G. A. Stewart, supt.

Inc. October 22, 1908, in Washington. **Cap.,** $1,000,000, increased later to $1,500,000; shares $1 par; all issued.

Property: 7 claims unpatented, about 120 acres, in the Curlew district, 9 miles from Grand Forks, B. C., and 127 miles N. W. of Spokane. Developed by 140′ shaft and several tunnels, showing a vein of pyrrhotite ore said to show copper, silver and gold values.

Equipment: includes a 2,900′ aerial tramway connecting the mine with a railroad siding and gasoline compressor.

Shipments: commenced in 1915, were sent to the Granby smelter; about 500 tons of copper-silver ore from development work averaged 4.16-7.66% copper and 2 oz. silver, netting $30 per ton.

In 1916, 1,200 tons shipped reported to have averaged 4% copper and 3 oz. silver per ton, netting $30 per ton. Small shipments made in 1917-18. Reported under 1 year lease from May, 1919, to C. A. O'Neill.

LAWRENCE MINING & MILLING CO. **WASHINGTON**

Address: S. Hilliard, sec.-treas., Eagle Bldg., Spokane, ash.

Officers: Jos. Reed, pres.-gen. mgr.; W. W. Wood, v. p.; with A Loding and O. A. Turnbow, directors.

Property: claims on Antelope mountain N. of Clark's Forks, said to show a fair grade of silver-lead ore.

Equipment: includes a 60-ton concentrator, hoist, and compressor. Occasional shipments made in 1918.

LEAD TRUST MINE **WASHINGTON**

Address: Wenatchee, Wash.

Officers: J. A. Scaman, pres.; F. C. Scaman, v. p.; D. A. Shiner, sec.; F. N. Mintzer, treas., with J. C. Gollehon, trustees.

Inc. in Washington, August, 1909. **Cap.,** $1,000,000; $1 par; 417,433 shares outstanding.

Property: 5 claims, 100 acres, on Gladstone mountain, Stevens county, said to have rich lead-silver ore in a contact deposit assays reported 40 oz. silver and 77% lead.

Developed by tunnels, total workings about 1,200′. Equipment includes compressor and steam power. Total output, about 200 tons.

Management plans building a mill and continuing main tunnel.

LEAD & ZINC CO. **WASHINGTON**

Controlled by L. P. Larsen and Jens Jensen, of Metaline Falls, Wash.

Property: the Josephine mine, at Metaline Falls, Pend Oreille district, once one of the biggest zinc producers in the State. Operated under lease by this company; previous lessee was Butte & Superior Mining Co. In December, 1917, company filed a petition in bankruptcy, as a result of litigation with the B. & S. Co. In 1918, surface equipment, including the 175-ton mill was sold at public auction.

LIBERTY COPPER MINING CO. **WASHINGTON**

Office: Spokane, Wash. **Mine office:** Bluecreek, Wash.

Officers: J. H. Reser, pres.; C. Oldfather, v. p.; A. Haas, sec.; S. G. Neff, treas. and gen. mgr.; R. E. McVicar, trustee.

Inc. in Washington. **Cap., $1,000,000; shares $1 par.**

Property: 6 claims, well watered and timbered, on Blue creek, about 1½ miles from Blue creek station, and 6 miles N. W. of Chewelah. The main vein, developed by 4,000′ of tunnels, is about 18″ wide, carrying auriferous and argentiferous copper and lead ores.

Equipment: includes steam hoist, 100-h. p. boiler and an air compressor. The mine was under development from 1906 to 1915 and made its first carload shipment March, 1909. Reported that capital would be increased to $1,500,000 to provide money for resuming work, at last account.

LITTLE COVE MINING CO. **WASHINGTON**

Address: Republic, Wash.

Officers: John W. Lloyd, pres.-gen.-mgr.; F. W. Cleator, v. p.; W. W. Montieth, sec.-treas.

Inc. in April, 1918. **Cap.,** $100,000; par 10c.

Property: a lease and bond on the Little Cove and Mammoth claims in Eureka gulch, Republic district. Owned by Jonathan Bourne, Jr., and operated many years ago. Developed by 150′ shaft exposing ore said to assay $14.50 per ton. No recent returns.

LONE-PINE SURPRISE CONS. MINING CO. **WASHINGTON**

Address: Hyde Block, Spokane, Wash.

Officers: Chas. P. Robbins, pres.-mgr.; W. J. C. Wakefield, v. p.; Chas. Theis, sec.; J. E. Hopper, asst. sec.; E. E. Sizemore, supt.

Cap., $3,500,000; $1 par; 3,126,000 shares issued. Company controlled by Northport Smelter Co.

Property: Last Chance mine, at Republic, Ferry county, said to show an 8′ vein carrying $13 ore for 190′ along drift on 500′ level. Developed by a 650′ two-compartment shaft. Reserves were equal to several thousand tons in 1918. By mid-1919, the shoot at 650′ averaged 6′ in width. Equipped with a 514 cu. ft. compressor, hoist, and boiler.

Production: daily shipments were 50 tons during 1919. In 1918, tonnage mined was 16,535.

In August, 1919, the Day interests (Northport M. & S. Co.) started suit

against Lone Pine-Surprise and the Insurgent companies, claiming $100,000 damages for ore removed by them from the Hope vein.

It is reported that mine was acquired in 1910 by J. L. Harper of Seattle, who sold control to the Day Bros. Company went into receivers hands, 1916.

LONE STAR COPPER MINING CO. **WASHINGTON**

Officers: Oscar De Camp, pres.; Wm. S. Thyng, sec. and engr., and R. C. Rimertsen, directors.

Inc. April, 1910, in Washington, practically as a reconstruction of the Copper Hill M. & Milling Co. **Cap.,** $1,500,000; shares $1 par. Owns sundry claims, including the Copper Hill mine, near Newport, Stevens county, developed by several shallow shafts and tunnels. Mine has an 18′ vein, carrying chalcopyrite, disseminated in pyrrhotite. There is no machinery. Idle several years, except for annual assessment work.

LOON LAKE BLUEBIRD COPPER CO. **WASHINGTON**

Officers: H. D. Trunkey, pres.; H. H. Shallenberger, v. p.-mgr.; Jos. McCarthy, sec.-treas., with J. C. Haas, all of Spokane, and A. R. Ammundsen, directors.

Cap., $375,000; 25c par.

Property: 2 patented claims, 6 miles N. of Loon Lake, and adjoining Loon Lake Copper Co., on E., said to carry gold-silver-copper ore. Developed by shaft.

Equipment: includes a boiler and compressor. Has made small shipments.

LOON LAKE COPPER CO. **WASHINGTON**

Office: 43 Leon St., Boston, also 801 Old Natl. Bank Bldg., Spokane, Washington.

Officers: Jas. C. McCormick, pres.-treas.; F. W. Dewart, v. p.; R. L. Flanders, sec., with C. S. Kalb, J. W. Brock, J. H. MacAlman, and Alfred De Voto, constitute board of trustees. W. L. Zeigler, mgr., Loon Lake, Wash.

Inc. January, 1916, in Washington. **Cap.,** $375,000; shares 25c par; $355,000 issued.

Bonds: authorized $90,000; outstanding, about $45,000. **Dividends:** 1c a share monthly declared July, 1917.

Property: the Kemp-Komar and O. K. mines, 310 acres on Grouse creek, 6 miles N. of Loon Lake, Stevens county, on the Great Northern R. R., said to carry a well-defined fissure vein, 20′ wide, running E. W., which gave returns of from 24 to 30% copper when formerly worked.

Development: by 500′ incline shaft with levels at 200, 300 and 500′. A level at 200′ goes E. on the vein for 477′, cutting 2 orebodies. On the 300′ level the vein has been drifted on for 590′ and on the 500′ level for 410′. There are also two tunnels, the 320′ O. K., and the 300′ Chapple tunnel. One chalcopyrite ore-shoot, exposed from the O. K. tunnel down to 500′ level, has an average width of 4′, and estimated July, 1918, to have 28,000 tons of ore assaying 2½ to 3% copper and 1 to 2 oz. silver per ton.

Equipment: a 100-ton concentrator (flotation) was completed in 1919; other additions include a new generator set, 6-drill compressor, and 50 h. p. hoist; 35 men employed.

Production: property resumed shipments in 1916 after 15 years idleness. Shipped regularly until 1918, when internal dissension among stockholders caused a cessation of operations, except for work by lessees. The new management is the result of this trouble. The mill was at work in July, 1919, and in August, 6 cars of 20 to 25% copper and 10 oz. silver concentrate had been shipped to smelters. In December, 1919, work was again suspended, and J. W. Hancox was appointed receiver on the petiton of several creditors, whose claims amount to $20,000, while wages due amount to $5,000.

MANILA MINING & MILLING CO. **WASHINGTON**

Idle and probably defunct. Mail returned in 1918 from former address at Keller, Ferry county, Wash.

Property: the Manila mine, 4 claims, with 20-acre reservoir and mill site, well timbered, in the San Poil district, 7 miles from the Columbia river

and 4 miles W. of Ferry, the nearest rail station. The Manila mine is on the summit of a mountain and shows a large deposit of disseminated chalcopyrite ore, traceable 1,000′.

Development: by tunnels, the oldest 100′ below the apex, another 150′ lower. Mine was under option for $60,000 to the Keller Indiana Co., now bankrupt, which put up a smelter in 1906, but failed to develop mine and property supposedly reverted to Farr Bros. Has 20,000′ sawmill.

MELROSE MINING CO. **WASHINGTON**

Address: Boundary, ash.

Officers: Jos. Cohn, pres.; O. M. Mathews, v. p.-mgr.; Sam Edelstein, sec.-treas., with J. W. Smyser, and F. M. Nudell, directors.

Inc. February, 1918, in Washington. **Cap.,** $500,000; 50c par; issued 275,000 shares.

Property: 2 claims, including the Maple Leaf mine, near Boundary, Stevens county.

The vein, encased in schist, dips 45° E. and carries shoots of copper and lead ore; one 40′ long, is 8′ wide, carries ore averaging $100.

Development: by 1,000′ tunnels to depth of 750′, with 2,000′ of workings. Reserves aggregate 2,000 tons of $20 ore. Ore shipped in 1919 averaged $98 per ton, with value of $8,000.

METALINE ORIOLE MINING CO. **WASHINGTON**

Address: Metaline, Pend Oreille county, Wash. Fred N. Davis, pres. and gen. mgr.; Stella M. Davis, sec.

Inc. December 30, 1910, in Washington. **Cap.,** $2,000,000; shares $1 par, assessable. Total calls to end of 1916, $37,500.

Lands: 7 claims, 140 acres, and a 5-acre millsite, unpatented. Property has a fissure vein in quartzite 6 to 8′ wide. A carload of ore shipped in 1917 assayed 0.25 oz. gold, 42.1 oz. silver, 15.3% lead, 21.9% zinc, and 1.1% copper.

Development: by 200′ shaft and tunnels of 50′, 400′ and 750′. A 100′ incline shaft sunk on the vein from the lower tunnel shows ore throughout a 70′ drift.

Equipment: includes steam power, with small hoist and 3-drill air compressor, a 75-ton mill was completed in 1919. Operated intermittently under lease to the president.

METHOW GOLD & COPPER MINING CO. **WASHINGTON**

Office: 419 C. of C. Bldg., Spokane, Wash.

Officers: W. D. Scott, pres. and mgr.; J. N. Tewinkel, sec.-treas., with F. S. Dow, W. G. Traub and N. O. Baldwin, directors, at last accounts.

Inc. 1899, in Washington. **Cap.,** $2,500,000; $1 par; 2,400,000 issued.

Property: 8 patented claims 20 miles from Twisp, on west fork of Methow river, Methow valley, Okanogan county, said to show fissure veins in Algonkian rocks. Ore (sulphide) carries copper, with silver, and gold values.

Development: includes 3 tunnels, longest 600′ with openings of 1,200′ to depth of 500′. Has available water power and timber. Idle, except for annual assessment work, on account of lack of transportation.

MICHIGAN GOLD MINING CO. **WASHINGTON**

Officers: Cornelius Dow, Jr., pres.; T. Otto, v. p.; T. B. Furnival, sec.; A. B. Frost, treas., with H. J. Gorke, directors, all of Syracuse, N. Y.

Cap., $1,500,000; shares, $1 par. Majority of shares said to be held by Orient Metal M. & S. Co.

Property: 4 claims, 2½ miles from Orient, Stevens county, and adjoining First Thought mine.

MOUNT ST. HELENS CONS. MINING CO. **WASHINGTON**

Office: 516 Selling Bldg., Portland, Ore. **Mine office:** Spirit Lake, Skamania county, Wash.

Officers: Thos. Prince, pres.; J. P. Tamiesie, v. p.; J. M. Bell, sec.; E. L. Harmon, treas.; Dr. Henry Waldo Coe, principal shareholder; Andrew Olson, supt.; Geo. W. Lilly, engr.

Inc. 1902, in Oregon. **Cap.,** $1,800,000; shares $1 par.

Property: 65 claims, patented, 1,300 acres, estimated to carry 45,000,000′

of standing timber, on the North Fork of the Toutle river and on the shores of Spirit Lake, 50 miles from Portland. It includes the former holdings of the Sweden Copper Co., Calumet Copper Mng. Co., Bronze Monarch Mng. Co., Chicago Mng. Co., Yellow Metal Mng. Co., Earl Mng. Co. and Cascade Copper Mng. Co. The company also owns a three-fourths interest in the United mines. In addition to copper ores the tract contains gold veins, an ochre bed, a granite quarry and a deposit of pumice stone.

Claims are said to show syenite, diorite and slate with fissure veins carrying about 20 orebodies ranging from 5 to 100′ in estimated width. The ores carry chalcocite, bornite and chalcopyrite and vary from 2 to 25% copper, some lead, 2 to 50 oz. silver and $1 to $40 gold per ton.

Development: by 5 tunnels, longest 2,300′, and 50′ shaft, with about 5,500′ of workings, estimated by the management to show 125,000 tons of medium and high-grade ores with a greater tonnage of milling ore.

Lands are owned outright and the company has no bonds or debts, but the property has been practically idle for some years awaiting the construction of a much-needed railway. Mines fully described Vol. XI, Copper Handbook, the predecessor of this book.

MULTNOMAH MINING, MILLING & DEV. CO. **WASHINGTON**

Idle. **Office:** 405 Kuhn Bldg., Spokane, Wash.

Officers: M. J. Hills, v. p.-sec.; Dr. F. O. Hudnutt, asst. sec.-gen. mgr.

Inc. 1901, in Washington. **Cap.,** $2,000,000; shares $1 par.

Property: about 600 acres, in 4 groups, including the River group of 260 acres, patented, carrying placer gold; the Mineral Hill group of 100 acres, 3 miles west of Nespelem, Okanogan county; the Ramsey group of 60 acres, adjoining the Nespelem Central Mining Co., 5 miles west of Nespelem, and the Multnomah group of 180 acres, 4 miles west of Nespelem, with a tunnel of about 1,100′, said to cut a 15′ vein, showing argentiferous lead ore. There are 5 buildings, and a dam built across the Nespelem river.

NATIONAL LEAD-SILVER CO. **WASHINGTON**

Office: at last report, Old Natl. Bank Bldg., Spokane, Wash.

Officers: C. D. Muxen, pres.; E. D. Weller, v. p.; E. H. Pattison, sec.-treas. and mgr. trustee; J. E. Orr, asst. sec., and G. F. Ingraham, directors.

Inc. 1915, in Washington, as successor to the Phoenix G. & C. M. & M. Co. **Cap.,** 2,000,000 shares; 5c par; assessable. Annual meeting, third Tuesday in November.

Property: 9 claims, known as the Panama group, and mineral rights to 159 acres, about 2 miles N. of Curlew, Ferry Co., said to show 4 veins carrying gold-silver-lead-copper-iron. Ore occurs as replacement deposits, in veins carrying quartz, lime and iron carbonate. The country rock is fine-grained syenite with large dikes of porphyry with strata of lime lying parallel, running nearly N. and S., with dip of 80° W. Ore was encountered on 3 different contacts in the first 500′ of the tunnel. The first vein, about 40′ wide, was intersected 600′ from the portal of the tunnel. A second vein cut at 820′ proved to be 5′ wide.

Development: consists of 1,200′ main lower tunnel, 225′ Panama, and several shorter tunnels, numerous open cuts and prospect shafts. Property favorably reported on by G. Cleveland Taylor in 1914.

Company does not reply to requests for data; probably idle.

NEW CRYSTAL MINING CO. **WASHINGTON**

Office: 3-4 Fall City Blk., Spokane, Wash., at last accounts **Mine office:** Miles, Lincoln county, Wash.

Officers; John O' Connor, pres.; Fred J. Becker, v. p.; C. L. Colby, sec.-treas., with John Gray, C. C. Lantey, directors. M. H. O'Connell, supt.

Inc. in Washington. **Cap.,** $1,500,000; shares $1 par; assessable; 1,000,000 shares outstanding. Annual meeting, May 12.

Property: 4 patented claims, 80 acres, near Miles, an old-time producer, in the Deer Trail district.

Development: by shaft to 181′ depth, with 1,200′ of workings, shows a fissure-vein 6′ wide in limestone. Shoots are 28″ wide. Ore carries lead, silver

and zinc, the latter veins being 75′ from the former. Equipment includes 35 h. p. hoist, compressor, pump, steam plant, etc.

Ore reserves: estimated at 48,000 tons blocked out, and 1,000 tons on the dumps.

No recent returns; probably idle.

NEW CURRENCY MINING CO. **WASHINGTON**

Organized to take over the property of the Jay Gould Mining Co., at Chewelah, Stevens county, Wash. said to show copper-lead-silver ore.

NEW YORK-SEATTLE COPPER MINING CO. **WASHINGTON**

Inactive, but still has interest in a mine near Index, Wash. Described in Copper Handbook, Vol. XI.

NORMAN MINES CO. **WASHINGTON**

Out of existence. Described in Vol. XIII.

NORTHPORT SMELTING & REFINING CO. **WASHINGTON**

Office: Northport, Stevens county, Wash.

Officers: J. J. Day, pres.; E. R. Day, sec.; with Edw Boyce, E. H. Knight and F. M. Rothrock, directors; R. W. Marston, mgr.

Cap. $1,000,000; shares $1 par.

Controlled by Hercules Mng. Co., of Idaho, which owns 500,000 shares, and by Tamarack & Custer Consolidated Mining Co., which holds the remainder. Both of these are controlled by the Days.

Property: the Northport smelting plant and the Hope mine at Republic. The mine, acquired in April, 1918, has over a mile of tunnels and other workings, developing a gold-silver vein. The mine is between the Lone Pine and Surprise mines, whose workings connect with it. Ore from these mines is used by the smelter as a flux. An apex suit against the above companies was started in 1919 by the Day interests, which control the Northport company.

Equipment: smelter blown-in March 7, 1916, consists of 3 lead furnaces, 42″ wide and 16′ long, of 300 tons daily capacity; also a Cottrell electric fume-precipitator, costing $100,000, and a drossing plant. The lead bullion is refined by the Pennsylvania Smelting & Refining Co. at Pittsburgh. Company treats ores and concentrates from the Hercules, Tamarack & Custer and other mines.

Production: in 1916 and 1917 the plant treated 225,999 tons. Treatment charges for Hercules and Tamarack & Custer ores was $27.45 and $25 per ton in 1916, and $32.09 and $23.33 in 1917, respectively.

NORTHWEST MAGNESITE CO. **WASHINGTON**

Address: Roy Bishop, gen. mgr., Chewelah, Wash.

Officers: R. S. Talbot, pres.; S. F. V. Morse, v. p.; S. Merritt, sec.; D. J. Murphy, treas.

Cap., $1,000,000.

Property: 480 acres, 5½ miles W. of Chewelah, Stevens county, has large deposits of magnesite, which occurs in beds, several hundred feet thick. The mineral is a replacement of lenses of dolomite in sedimentary rocks. Surrounding rocks are slates, schists, and quartzites. It is quarried in open cuts. Drilling to depth of 300′ has revealed about 1,000,000 tons.

Equipment: short aerial tram, crushing plant, making 2 in. size, compressor, 5½-mile aerial tram, 800-ton bins, crushing rolls making 10-mesh product which is mixed in proportion of 2,000 lb. of magnesite to 40 lb. of high-grade magnetite and calcined in six 125 by 7½′ rotary kilns fired by a Bonnet pulverized coal plant. Each kiln can produce 70 tons of dead-burned magnesite daily. About 2.2 tons of raw material is used to make 1 ton of finished product. The calcine is ground by rolls into sizes required by the trade.

Production: capacity is 9,000 tons of calcined magnesite per month, equal to 35% of the total output of the United States. An average of $29 per ton has been received at the plant for the product. Costs are $21 per ton.

Company has invested over $700,000 in the property.

NORTHWEST MINES DEVELOPMENT CO. **WASHINGTON**

Dead. Mail returned, 1919, from former address, 204 Paulsen Bldg., Spokane, Wash. Mine office, Keller, Wash.

Officers: Wm. E. Johnson, pres.-supt.; H. J. Lefevre, v. p.; Harry J. Neely, sec.-treas.; Wm. E. Malm, mgr., Keller., with Henry Osterman, H. J. Earnest, directors.

Inc. December 15, 1915, in Washington. **Cap.,** $200,000; $100 par; 500 outstanding. Authorized bond issue, $300,000; none issued. Annual meeting, second Monday in January.

Company was organized to take over the property of the Manila M. & M. Co., and the old smelter at Keller, built by the Keller & Indiana Cons. Sm. Co.

NORTHWEST MINING ASSOCIATION **WASHINGTON**

Address: Frank C. Bailey, Spokane, Wash.

Officers: F. A. Ross, pres.; F. C. Bailey, sec.; with J. V. Richards, Edward Pohlman, J. C. Haas, and O. Jeldesness, directors.

The Association conducts no operations, but its purpose is to aid and protect the mining industry in Idaho, Washington, Oregon, and British Columbia, generally known as the "Northwest," and "The Inland Empire."

OLD DOMINION MINING & MILLING CO. **WASHINGTON**

Address: W. H. Linney, 2805 Summit St., Spokane, Wash.

Officers: at last accounts, G. B. Dennis, pres.; Paul Blackmar, sec.

Inc. 1891. **Cap.,** $5,000,000.

Property: 10 claims, patented, including Old Dominion mine, 8 miles from Colville. The mine was discovered in 1885, and considerable high-grade silver-lead ore was shipped in the succeeding decade.

Development to 800′ depth, with 17,000′ of workings. On lowest level a fault cut off the ore and work was discontinued in 1907. Has been worked in a small way since then by lessees.

In 1915, property was bought at a tax sale by Linney, but title was disputed by Peck interests, and Supreme Court of the State is said to have cancelled the sale, though Mr. Linney still controlled and worked the mine at last report.

O-LO-LIM COPPER CO. **WASHINGTON**

Office: 310 Hyde Block, Spokane, Wash.

Officers: Jas. Keeth, pres.-mgr.; F. T. McCormick, v. p.; D. R. Riegel, secretary.

Inc. May 11, 1917, in Wash. **Cap.,** $100,000; shares 10c par; assessable; 675,000 outstanding. Annual meeting, first Tuesday in December.

Property: 160 acres in the Spokane Indian Reservation, Stevens county, leased for 25 years from the Government; 10% of net smelter returns to be paid the Government. Lands were opened to leasers in May, 1916, and work started on company's ground in January, 1917.

Ore: copper occurs in contact in shale and granite; 10 carloads ore shipped, assayed 7.5 to 9.8% copper, and 1.4 oz. silver per ton.

Development: by shaft and short tunnel. Shaft being sunk to 200′.

Equipment: an engine, compressor, pump, etc., to be installed.

Total shipments, about 350 tons, averaging 8.5% copper and 1.4 oz. silver. Ore is hauled to Davenport, 26 miles.

ORIENT GOLDEN ROCK MINING CO. **WASHINGTON**

Office: 205 Hyde Block, Spokane, Wash. Mine at Orient, Ferry county, Wash.

Officers: C. E. Gray, pres. and gen. mgr.; Thos. R. L. Harris, v. p.-treas.; C. E. Ficks, sec.

Inc. 1917. **Cap.,** $1,500,000; shares $1 par.

Property: the White Elephant mine with 6 claims, located 3 miles from the Canadian border, and an equal distance from Rock Cut. The mine is a gold producer, but contains gray copper ore. The mineral zone, 75′ wide, lies between diorite and andesite.

Development: by a 225′ incline shaft sunk on the vein with a dip of 70° E. Workings on the 100′ level show disseminated pyrite ore carrying from $3 to $6 per ton, with occasional shoots of copper ore.

Equipment. includes steam plant, compressor, sawmill, etc.

Believed to be idle.

ORIENT GOLD MINES, LTD. **WASHINGTON**

Company had financial troubles in 1914 and property sold in November, 1915, to settle labor liens. See Orient Golden Rock Mng. Co.

ORIENT METALS MINING & SMELTING CO. **WASHINGTON**

Officers: Cornelius Dow, Jr., pres.-mgr.; T. Otto, v. p.; T. B. Furnival, sec.-treas., with A. B. Frost and H. J. Gorke, all of Syracuse, N. Y.; J. H. Weidemiller, and A. E. Wilson, directors.

Cap., $1,500,000; par $1. Said to have a controlling interest in Michigan Gold Mining Co., which see.

Property: the Avondale—Dome group, 11½ miles N. E. of Colville, Stevens county. A prospect.

OROVILLE COPPER CO. **WASHINGTON**

Officers: C. D. Jones, pres., Milwaukee, Wis.; Geo. A. Blackwell, v. p.; H. D. Jones, sec.

Inc. in 1918. **Cap.,** $1,000,000.

Property: the O. K. mine on Kruger mountain, N. of Oroville, Okanogan county, said to contain 6 to 12% copper ore, with low gold and silver values. Reported early in 1919 that company was driving a tunnel on the vein, and mining good ore.

PHOENIX GOLD & COPPER MNG. & MILL. CO. **WASHINGTON**

Curlew, Ferry county, Wash.

Succeeded by National Lead-Silver Co., which see.

PUGET SOUND COPPER CO. **WASHINGTON**

Address: 312 Baum Bldg., Danville, Ill.

Officers: C. B. Hebron, pres.-mgr., Darrington, Wash.; G. M. Wood, v. p.; Frank Lindley, sec.; C. B. DeLong, treas., Fithian, Ill., with J. W. McCoy, cons. engr., Danville, Ill.; A. B. Knowlson, directors.

Inc. June 21, 1916, in Arizona. **Cap.,** $2,000,000; $10 par; $830,000 outstanding. Reported that $30,400 was spent on development during 1918.

Property: 28 claims, 19 patented, 401 acres, in Darrington, Snohomish county. The group shows schists cut by andesite and diorite dikes, with veins paralleling the dikes. Ore occurs as bands, shoots and impregnations, and is said to average $12 per ton. The richer ore contains high gold values.

Development: by 4 tunnels, to depth of 400′, with about 4,000′ of workings. Company plans continuation of development work, constructing surface tram, hydro-electric power plant and compressor.

Reserves: 15,000 tons of 8% ore, containing $12 a ton in gold and silver values.

PYRARGYRITE MINING CO. **WASHINGTON**

Successor to Ruby Mining Co.

Office: Oroville, Okanogan county, Wash.

Officers: Monroe Harman, pres. and gen. mgr.; Jas. A. Hower, v. p.; Chas. B. Bushnell, sec.-treas., with Dr. S. P. Ecki and M. L. Branyan, directors.

Inc. November 5, 1902, in Washington. **Cap.,** $1,500,000; shares $1 par; non-assessable; issued, $1,175,000. **Bonds:** $100,000 authorized, at 7% maturing 1915; issued, $35,100. Annual meeting, second Tuesday in June.

Property: 5 claims, patented, 80 acres, with 46 acres miscellaneous freehold lands, on Mt. Chopaca, near Similkameen river, 3 miles south of the international boundary and within 600′ of the Great Northern railroad.

Geology: claims show syenite, cut by veins containing lenticular orebodies running N. W.-S. E. and dipping at 47°. The vein under development is about 4′ thick, traceable for 1,000′, and carries cupriferous ore stated by management to assay 0.5 to 10% copper, 1.5% lead, 2.5% zinc, 5 to 2,800 oz. silver, and from a trace to $4 gold per ton.

Development: by 3 crosscut tunnels with drifts on the vein. The main working tunnel, 300′ below the old workings and about 350′ below the outcrop, is 1,110′ long, and has 550′ of drifting on the vein and an equal amount of drifting run from a 100′ upraise. An inclined shaft sunk on the vein from the lower tunnel has short levels at 100′ and 200′ depth.

Ore reserves: estimated at 135,000 tons of ore blocked out, carrying 30

oz. silver besides copper and gold values and which it is believed can be profitably mined and milled.

Equipment: includes a 15-h. p. electric hoist and 5 buildings. Company's last report shows a total expenditure at the mine from beginning of work to April 28, 1913, of $118,000, of which ore sales furnished $17,062, bonds $35,100 and stockholders (175,000 shares), $65,838.

In 1917 company expected to erect a mill including flotation, which process is expected to save at least 90% of the metal contents. A Hardinge 75-ton mill was ordered in December, 1919.

Property promises to make a good small mine.

Q. S. COPPER CO. **WASHINGTON**

Mail returned from former office, 229 North Division St., Spokane, Wash. Mine office: Q. S. Ranch, Cuess, via Loomis, Wash.

Officers: A. M. Dewey, v. p.-gen. mgr., 4042 Arcade Bldg., Seattle, Wash.; J. P. Heckert, sec.; A. F. Suksdorf, treas.

Inc. April 10, 1914, in Washington. **Cap.,** $2,000,000; shares $1 par. Is successor of the Q. S. Mining Co. Property was purchased by the new corporation, which paid all the debts, amounting to more than $25,000, and issued stock at 2c a share to the old stockholders; forfeited stock was left in the treasury, which gave the corporation a majority of the stock. Bad management in 1912 wrecked the former company and led to a receivership, no annual meeting being held that year. Property was sold for taxes, but sale set aside by the courts when the receiver was appointed. Litigation involving ownership pending.

Property: 13 claims, with 10 acres of mill sites, and water rights on Sinlahekin creek, about midway between Loomis and Conconully, along the flank and crest of Aeneas mountain, in the Salmon River district. The property shows fissure veins in diorite carrying mainly low-grade copper ores. The company claims an orebody 300′ wide at surface, which has been crosscut for 238′ at a depth of 800′ below the outcrop without reaching the wall, and traced by stripping for 6,000′ on surface, showing a ledge of 212′ width at the north, 300′ in the middle and 285′ at the southern end of the property.

Development: begun 1897, is by 2 open cuts at either end, a pit of 50x 150′ in the middle, and a tunnel 1,063′ long cutting the vein at depth of 800′, with another tunnel, intended for the main avenue of extraction, 540′ long, planned to cut the orebody at depth of 2,000′. One tunnel shows chalcopyrite ore said to give assays of 11.4% copper and estimated to average 2 to 4% copper, with small and variable silver values and about $1 gold per ton. The company claimed an average ore value of $14 per ton from several hundred assays.

Assessment work only done by new company. No recent information; probably idle, or out of business.

Q. S. MINING CO. **WASHINGTON**

Succeded by Q. S. Copper Co., which see.

QUILP GOLD MINING CO. **WASHINGTON**

Address: Republic, Wash.

Officers: Jas. Hutchinson, pres.; W. G. C. Lanskail, sec.-gen. mgr., with G. V. Alexander, H. J. Lycett, and John Stack, directors. Alex. McKay, supt.; S. H. Richardson, cons. eng.

Cap., $1,500,000; par $1; 67,500 shares outstanding.

Property: 1 claim and a fraction including the Quilp mine at Republic, Ferry county. It is adjacent to the Insurgent, Last Chance and Surprise mines. The Quilp was located in 1896 and operated intermittently by several companies. It paid five dividends, totaling $67,500; last payment in 1912. Mine was reopened in 1914 after lengthy litigation with the defunct Republic Mines Corporation; and again opened in 1918. In 1919 the Quilp mine was the largest gold producer in the district. Shipments made to Tacoma smelter. Ore carries gold and silver.

Development: by over 6,000′ of workings to depth of 800′. Recent results at 800′ have been good.

Equipment: steam power, hoist, 7-drill compressor, drills, bins, and regular mining plant.

Production: 39,653 tons valued at $492,843 to end of 1918. Shipments in 1919 estimated to be worth $100,000.

RATHFON REDUCTION WORKS **WASHINGTON**

Officers: A. L. Bradley, pres., Danville, Wash.; D. W. Rathfon, gen. mgr., Republic, Wash.

Cap., $500,000; par $1; 400,000 shares common stock, assessable up to 50 cents.

Property: company in 1913 acquired the famous Republic mine and one other claim in Ferry county, at one time operated by New Republic Mining Co., and before that by Patrick Clark, of Spokane. Said to have produced $2,000,000 in gold. Ore was shipped in 1918. November 22, 1919, the Republic mine was sold at sheriff's sale to satisfy a judgment of $43,406 in favor of Fred Keibaum, J. T. Hollis and Frank Babcock.

REARDON COPPER CO. **WASHINGTON**

Officers: Oscar Carstens, T. J. Carstens, Henry Carstens, all of Reardan, Wash., and A. H. Kenyon, of Spokane.

Cap., $50,000; par 5c. A close corporation.

Property: near Turk, Stevens county, includes the High Grade mine.

Development: mainly by tunnels. Shipments were made in 1918, and in 1919 shipped 137 tons of ore up to September.

REDWOOD COPPER MINING CO. **WASHINGTON**

Dead. Mine at Chewelah, Stevens county, Wash. Developed by 400′ tunnel with several hundred feet of raises and winzes expected to expose copper at greater depth. Operations ceased in April, 1912, and property was lost under foreclosure of mortgage. Present owners are Chas. Stevens and others, of Robinson Straus & Co., St. Paul, Minn.

REPUBLIC CONS. MINES CORPORATION **WASHINGTON**

Property now operated by the Northport Smelting & Refining Co., which see. Vol. XIII contains details of the corporation's checkered career.

RIES MINING CO. **WASHINGTON**

Address: Newport, Stevens county, Wash.

Officers: A. Ries, pres.; E. E. Jones, sec.; F. W. Vawater, treas., with C. F. Bell, directors.

Inc. in Washington. **Cap.,** $100,000; $1 par.

Property: 4 claims near the Pend d'Oreille river, 2 miles N. of Newport, on the Washington side of the State border, about 30 miles E. of Chewelah Three veins have been found, carrying silver, lead, and gold. A shipment of 11 tons from an old shaft returned 288 oz. silver, 4,245 lb. lead, and 4.4 oz. gold, or an average of $47 per ton. A 200′ shaft is being sunk.

Mine is favorably situated and the owners are sanguine of success.

ROYAL COPPER MINING & MILLING CO. **WASHINGTON**

L. J. Winslow, pres. **Mine address:** Chewelah, Stevens county, Wash.

Property: 7 claims said to show 3 parallel ledges having slate and granite contacts.

Development: by 400′ tunnel said to carry copper, lead, silver, and gold, with small amounts of copper. Company probably dormant, as letters are returned unclaimed.

RUBY MINING CO. **WASHINGTON**

Nighthawk, Okanogan county. Succeeded by the Pyrargyrite Mining Co., which see.

SANTA RITA MINING & MILLING CO. **WASHINGTON**

Address: F. C. Merriam, Wallace, Idaho.

Officers: John H. Hemphill, sec.-treas., Peyton Bldg., Spokane, Wash.

Inc. 1918 in Delaware to take over property of Cleveland Mining Co. **Cap.,** $500,000; par $1.

Property: 10 claims, including the old Cleveland mine, 18 miles W. of Springdale, Stevens county, discovered nearly 30 years ago. The ore is a complex lead-zinc-silver sulphide, containing antimony and bismuth, and difficult to treat profitably. Mine is developed by a 265′ shaft and tunnels. The Cleveland company started operations several years ago, but lack of capital caused a shut-

down after a concentrator had been built. In August, 1919, control passed to First National Bank of Devils Lake, North Dakota.

SEATTLE-BOSTON COPPER CO. **WASHINGTON**

Idle since 1916. Company owns water-rights of 40,000 est. h. p. and a charter for a railway to open large timber tracts and reach the Dutch Miller mine, described under title of Dutch Miller M. & S. Co. The former mine holdings of the Seattle-Boston C. Co. are described in Vol. VIII, Copper Handbook.

SECURITY COPPER CO. **WASHINGTON**

Address: 720 Peyton Bldg., Spokane, Wash. **Mine office:** Chewelah, Stevens county, Wash.

Officers: J. F. McGinnis, pres.; M. C. Hunter, v. p.; A. H. Syverson, sec.-treas., with L. K. Armstrong, gen. mgr., and F. H. Fulton, directors.

Inc. 1913, in Washington. **Cap.**, $1,500,000; shares $1 par; 1,200,000 outstanding; assessable. Total expenditures, $275,000.

Property: Security group, 200 acres at Chewelah: Copper Butte group, 80 acres, and Champokane group, 600 acres, 16 miles W. of Springdale. The first-named shows fissure veins cutting shales and schists; the Champokane group has 5 veins, from a few feet to over 100′ in width, and the Copper Butte has one vein, over 50′ wide. All the groups carry argentiferous copper ore. Five cars shipped from the Copper Butte are said to have averaged 3.8% copper.

Development: on Security group by about 1,150′ of workings on a series of six veins by 550′ shaft, levels, and tunnel. The Copper Butte has about 500′, and the Champokane 1,000′ of workings.

Equipment: includes a gasoline hoist and a 3-drill air-compressor on the Security.

Refinancing was arranged in August, 1919.

SHIPPER GOLD MINING CO. **WASHINGTON**

Address: Chesaw, Wash.

Officers: J. P. Blaine, pres.-mgr.; H. L. Mooney, v. p.; A. C. Blaine, sec.; W. A. Harry, treas.

Inc. May 31, 1916, in Washington. **Cap.**, $1,000,000; $1 par;; 600,000 issued.

Property: 3 claims, unpatented, 56 acres, located one-fourth mile north of Chesaw, contains a 3½′ flat quartz vein running E.-W., with 22° dip.

Ore: contains gold values with pyrite, and is said to average $20 per ton.

Development: 700′ of work, including 110′ shaft, connected with 380′ tunnel, blocking out 1,000 tons of $20 ore.

Production: 1,200 tons of $40 ore. Company owns 25-ton mill. No recent information; probably idle.

SILVER ANTIMONY MINING CO. **WASHINGTON**

Address: Uniontown, Wash.

Officers: J. J. Welle, pres.; Jos. Kuntz, v. p.; H. J. Hoefer, sec.-treas.; with Albert Carbuhn, directors.

Inc. January 16, 1916, in Washington. **Cap.**, $1,500,000; par $1 assessable.

Property: one claim, one mile from Chewelah, Stevens county, said to show a quartz vein in serpentine, containing streaks of sulphide ore carrying gold-copper-antimony ore that averages $4.80 gold, $11.40 silver and $22 in copper. Has a shaft 170′ deep and 2 short tunnels.

SILVER BASIN MINING CO. **WASHINGTON**

Address: C. S. Turner, Davenport, Wash.

Cap., $1,500,000; par $1; non-assessable.

Property: 2 claims, unpatented, in Deer Trail district, Stevens county, said to have silver ore. Total production to 1918 reported as 7,500 tons, worth $200,000. The 1917 output was 180 tons, valued at $6,000; none reported since.

Development: by shafts and crosscuts. **Equipment:** includes hoist, 3-drill compressor and a pump.

SILVER BELL MINING CO. **WASHINGTON**

Address: E. H. Belden, 1208 Old National Bank Bldg., Spokane, Wash.

Officers: E. H. Belden, pres.; R. F. Blackwell, v. p.; with W. R. Dwyer J. M. Fitzpatrick and J. C. Broad, directors; E. F. McCabe, sec.-treas.

Inc. November, 1916, in Washington. **Cap.,** $1,500,000; $1 par; 1,100,000 issued. Expenses in 1918 were $5,000.

Property: 8 claims, 160 acres, 5 miles S. E. of Loon Lake, Stevens county, and 35 miles N. W. of Spokane, Wash.

Development: by 125′ shaft, and 300′ of drifting, shows 4½′ quartz vein in granite. Ore said to contain 25 oz. silver per ton, with gold up to $4. Sinking is to be continued.

Equipment: 16 h. p. gasoline hoist. Is a silver prospect.

SILVER CREEK MINING & MILLING CO. **WASHINGTON**

Company dead and property, the Gold Cord mine, sold for taxes. Bought in by Steil and company reorganized as Gold Cord Mining & Milling Co., Keller, Wash., also dead.

See operations, 1904-1912, described in Vols. VIII and IX of Copper Handbook. Property favorably reported on by Wm. J. Elmendorf.

SILVER TIP MINING & POWER CO. **WASHINGTON**

Office: J. H. Beattie, 718 Green Bldg., Seattle, Wash.

Officers: A. Julian, pres.; G. B. Gilfillan, v. p.; J. H. Ferguson, J. J. McLean, P. D. Roberts and H. R. Sanderson, directors. M. S. Davys, engr.

Inc. January 15, 1910, in Washington. **Cap.,** $1,000,000; shares $1 par; 615,862 issued. Bonds, $700,000 of 7%.

Property: the Lake Side mines, 557 acres, Skagit county, Wash., also the Hewitt and Lorna Doone mines in Slocan district, B. C. No recent information. Probably idle.

SILVER TRAIL MINING CO. **WASHINGTON**

Office: care J. Richard Brown, W. 1619 Clark St., Spokane, Wash.

Officers: J. R. Brown, pres.; A. L. Hooper, sec.; W. S. Haish, treas.; with Robert Bell, A. J. Bell, Peter Reid and M. S. Peters, directors.

Inc. 1915 in Washington. **Cap.,** $125,000; shares 10c par.

Property: the old Clungstone mine, 8 miles E. of Evans in Colville mining district, opened in early '90s by Col. I. N. Peyton.

Development: tunnels, the lower one 700′, with 400′ drift on a 2-6′ vein of silver-lead ore. Shipments made to Trail, 1916.

No recent information. Probably inactive.

SPOKANE CONS. TUNGSTEN CO. **WASHINGTON**

Officers: F. E. Parks, pres., Deer Park, Wash.; E. N. Robinson, v. p.; with A. M. Winston, O. F. Kelly and A. M. Wood, directors.

Cap. $625,000; non-assessable. Company is a merger of the Deer Park Mng. Co., Spokane Tungsten Co., and Beard & Myers mining leases.

Property: about 360 acres, held under 30-year lease from the State, 12 miles N. of Deer Park, Stevens county, said to show tungsten ore. Shipments by former owners reported as $30,000. Present company commenced work in 1918 and planned erecting a 50-ton mill.

SPOKANE COPPER CO. **WASHINGTON**

Address: C. H. Harvey, Co., 618 Paulsen Bldg., Spokane, Wash.

Officers: B. Mabry, pres.; D. K. McDonald, v. p.; E. A. Moye, sec.-treas., with J. S. Ramage and J. Dillard, directors.

Inc. 1917 in Washington. **Cap.,** $100,000; shares 10c par; 600,000 issued.

Property: in Loon Lake district, Stevens county, 46 miles from Spokane. Examined by C. A. Low in August, 1917.

Development: by 100′ shaft and small opencut. In latter at depth of 4′, a 27′ orebody is said to have been uncovered, 8′ on the footwall showing leached carbonate ore. Reported late in 1918 to have cut 4½′ of copper ore on 110′ level.

Company's backers seem to bank on conditions in adjoining mines, and in the company's literature these conditions constitute the burden of the song.

SPOKANE TIN MINES CO. **WASHINGTON**

Address: Hyde Bldg., Spokane.

Officers: C. P. Robbins, pres.; Richard Marsh, v. p., 1727 E. 11th St., Spokane, Wash.; Chas. Theis, sec.-treas., with W. J. C. Wakefield, director.

Inc., 1907, in Washington. **Cap.,** $1,500,000; shares $1 par.

Property: 312 acres, 8 miles S. of Spokane, said to show tin and tungsten ore in pegmatite dikes in granite and schist. It was first worked in 1907, when a shaft was sunk 165', several hundred feet of work done, a little ore extracted, and the property closed down. Reported under 3-year bond and lease from 1918, for $75,000, to F. C. Bailey, of Spokane, who organized the Spokane Tin and Tungsten Co.

SPOKANE TIN & TUNGSTEN CO. **WASHINGTON**

Address: F. C. Bailey, 2107 Pacific St., Spokane, Wash.

Inc. 1918, in Washington. **Cap.,** $1,500,000.

Property: a 3-year lease on the Spokane Tin Mines company's holdings near Spokane.

STANDARD CHEWELAH MINING CO. **WASHINGTON**

Address: 1112 Paulsen Bldg., Spokane, Wash.

Officers: F. R. Clark, pres.; Thos. Bowers, v. p.; R. N. Clark, sec.-treas., with G. W. Sommer, and F. F. Jarvis, directors.

Inc. in Washington. **Cap.,** $1,500,000; shares $1 par; 853,620 issued.

Property: 5 claims, 91 acres, 2 miles east of Chewelah, said to show silver-copper ore, assaying about 5 oz. silver and 2 to 15% copper. Developed by a 200' shaft and 600' of workings. Mine has been idle for 2 years.

STERLING SILVER-LEAD CO. **WASHINGTON**

Officers: Dr. J. W. Cosford, pres., N. 1716 Monroe St., Spokane, Wash. B. C. Gochenouer, sec.-treas.; R. O. Campbell, v. p.; with Carl Anderson, B. J. Lindsay, all of Spokane, Wash.; E. Pearson and F. W. Brennan, directors.

Cap., $2,000,000; shares $1 par.

Property: 12 claims, patented, near Metaline, Pend d'Oreille county, said to show silver-lead-zinc ores. **Development:** by tunnels. In 1918, a small force was working. No later report.

SUNSET COPPER CO. **WASHINGTON**

Address: E. A. Sims, pres.-mgr., Index, Washington.

Property: the Sunset mine, near Index, Snohomish county, on G. N. R. R., has a considerable tonnage of low-grade ore that can be treated profitably in the 150-ton mill built in 1917. Developed by a 1,000' tunnel.

The mine, idle for several months, was unwatered in June, 1919, and operations at mine and mill resumed with a small force.

TACOMA SMELTER **WASHINGTON**

Office: American Smelters Securities Co., 120 Broadway, New York. **Works office:** Tacoma, Wash.

H. Y. Walker, mgr.; Willard V. Morse, asst. mgr.

The plant was formerly operated under name of Tacoma Smelting Co.

Property: a smelting plant with a 52-acre site, 6 miles from Tacoma, on Puget Sound. Property is well located for receipt and dispatch of materials, and has extensive wharves, with ore bunkers and automatic devices for unloading cargoes.

The smelter has 2,500 tons daily capacity, and treats copper, silver, gold ores and concentrates, from the entire western coast of North America, and a considerable tonnage of South American ores.

Equipment: 2 blast and 1 reverberatory furnaces. The 575' stack is one of the highest in the world. The converter department has a capacity of 300 tons of blister copper daily. One of the copper furnaces was wrecked in December, 1919, by an explosion due to accumulation of steam formed by molten slag running into a water drain.

The electrolytic plant capacity is 8,500 tons per month.

Electric power is received at 40,000 volts and stepped down to 100 volts for use, the works requiring about 6,000 h. p. Fuel is petroleum, brought in tank steamers from the oilfields of southern California.

The Tacoma smelter is one of the most important custom plants on the Pacific coast, the management is progressive, and the metallurgical practice excellent.

TENAS MINING CO. **WASHINGTON**

Idle. **Office:** 370 California Bldg., Tacoma Wash. Mine near Keller, Ferry county, Wash.

Officers: J. R. Turner, pres.; P. J. Sweeney, v. p.; C. E. Peterson, sec.; D. McPherson, treas.; with M. Schmidt, and F. W. Haide, directors, all of Tacoma, Wash.

Inc. Sept., 1910, in Washington, succeeding the Iconoclast Consolidated Mines Co., whose property was sold for debt. **Cap.,** $10,000; shares $1 par; fully paid and assessable up to 25% per year; issued, 3,448. Assessments to 1916, 71 cents per share.

Property: 5 claims, 80 acres, relocated 1912, 2 miles N. of Keller, shows 3 contact deposits with an orebody 30′ in maximum width, giving average assays of 3.6% copper and 2 oz. silver per ton with some gold.

Development: by 325′ main shaft and 3 tunnels with claimed total length of 514′. Annual assessment work only has been done since 1908. Company is a holding corporation, awaiting an opportunity to sell or bond the property.

THUNDER CREEK MINING CO. **WASHINGTON**

Henry S. Volkmar, gen. mgr.

Property: 9 claims on Thunder Creek, 2 miles N. W. of Park Creek Pass, in Skagit county, said to show lead-silver ore in a well-defined fissure vein. Developed by a 700′ tunnel at an elevation of 4,600′. No recent report; probably idle.

TILLICUM DEVELOPMENT CO. **WASHINGTON**

Probably dead. Letters returned unclaimed.

Is the successor of the Palmer Mountain Tunnel Co., inc. Aug., 1912, in Washington.

Cap., $300,000; shares $1 par; 50,000 preferred, 250,000 ordinary; issued, 30,000. Debentures, $19,000, 6%, none issued.

Property: 15 claims, 250 acres, in the Loomis (Palmer Mt. or Wannacut Lake) district, Okanogan county, 12 miles from the Great Northern railroad. The Summit claim shows a N. W.-S. E. fissure vein in diorite, averaging 8′ wide and proven to depth of 115′.

Development: 3 tunnels, all on the vein, said to show ore of commercial grade in small amounts.

Equipment: includes 750-h. p. water power and 450 k. w. electric plant, transmission line and machinery, as well as 100-stamp mill and sawmill.

TRINIDAD MINING & SMELTING CO. **WASHINGTON**

Office: Tonasket, Wash.

Officers: Jos. Coleman, pres.-mgr.; E. F. McNall, v. p.; T. W. Brown, sec.-treas.

Inc. Dec. 1, 1911, in Washington. **Cap.,** $1,000,000; shares $1 par; 714,300 issued.

Property: the Central group, 12 unpatented claims, 240 acre in the Galena mining district, Okanogan county, shows gold and silver-bearing lead-copper ores, occurring as a dissemination in an andesite dike cutting through slate. Orebody runs N. W.-S. E., has dip of 70° and is 25′ wide. The ore is a sulphide carrying from $12 to $30 gold, with 18% iron and 61% silica.

Development: by shafts, trenchings and open cuts, with a total of 1,200′ of workings. Small shipments of $13 ore have been made.

UNION MINES CO. **WASHINGTON**

Union, Wash.

Company owns a group of claims carrying veins with silver-lead ore, said to average $25-$45 per ton.

Development: by 200′ shaft with a level at 190′. Twenty-five men em-

ployed at last accounts, and made occasional shipments. Company planned sinking shaft to depth of 400′. No recent information; probably idle.

UNITED SILVER-COPPER MINING CO. WASHINGTON

Name changed in 1919 from United Copper Mining Co.

Office: 217 Symons Bldg., Spokane, Wash. **Mine office:** Chewelah, Stevens county, Wash.

Officers: Conrad Wolfle, pres.-gen. mgr.; W. G. Collins, v. p.; E. C. Blanchard, sec.-treas., with Daniel Hoch and J. H. Griffith, directors. E. A. Wolfle, supt.; H. D. Quimby, mill supt.

Inc. July, 1906, in Washington. **Cap.,** $1,000,000; shares $1 par; fully issued; assessable by majority vote. Last assessment Sept., 1914, ½c a share. Annual meeting, Jan. 28. Company and Guaranty Trust Co., New York, transfer agents; Registrar & Transfer Co., and Spokane & East Trust Co., Wash., registrars. Listed on New York Curb, May 1, 1917.

Treasurer's Report for years ending December 31st showed:

	1918	1917
Operating revenue	$282,966	$354,372
Operating expenses	234,291	240,699
Net operating profit	*18,174	113,672
Net indebtedness	39,879	61,577
Dividends	None	100,000

*After deducting depreciation charges and taxes.

In April, 1919, management stated that indebtedness was practically wiped out as a result of finding high-grade silver ore in sinking a winze from the 1,200′ level. Estimated net profit for April was $26,000.

Dividends: total to date, $150,000. None since 1917.

Property: 16 claims, patented, 103 acres, 4½ miles N. E. of Chewelah.

Geology: claims show a 6′ vein cutting through shale and schist. Ore contains chalcopyrite, with streaks of gray copper ore on both walls. The high-grade ore above the 1,000′ level has been practically mined out, but the low-grade ore, which assayed 1.5% copper and 2 oz. silver, cannot be mined clean and the admixed waste lowers the grade so that the mill feed carries only 0.75% copper, and 1 oz. silver. In March, 1919, a new high-grade ore-shoot 4 to 5′ wide, was found in sinking a winze from the 1,250′ level; about one foot of this was rich silver ore, and the remaining 3 to 4′ was good milling ore assaying 20 oz. silver and 5% copper.

Development: by shafts 250′ below 1,000′ level, and 5,000′ tunnel, giving depth of 1,250′. Considerable development work was done in 1914-15; diamond-drilling reported to have proven the orebodies to depth of 1,400′. The mine has over 40,000′ of workings. Report of Raymond Guyer, cons. engr., in March, 1919, estimated ore reserves at 50.836 tons above the 1,000′ level, and below this level, 45,173 tons positive, 47,241 tons probable and 30,658 tons possible ore; grade about 1.35% copper and 3 oz. silver.

Equipment: includes electric hoist, air-compressors, capacity 1,300 cu. ft., 11 power drills, 2 pumps, and an electric lighting plant. Electric power is obtained from the Stevens County Power & Light Co. The mill uses flotation; in June, 1919, it was treating 225 tons ore daily, and this was to be raised to 300 tons. Employs about 90 men.

Production: 1910, 608 tons, $5,878; 1911, 1,134 tons, $11,184; 1912, 13,395 tons, $240,798; 1913, 14,938 tons, $171,617; 1914, 18,527 tons, $90,356.

	Tons mined	Value	Copper lb.	Silver oz.
1918	66,181	315,448	907,422	130,914
1917	59,600	354,371	1,147,014	147,573
1916	40,000	372,296	1,179,178	159,271
1915	25,000	145,632	650,995	103,195

Output for first quarter of 1920 was 400 tons of $100 crude ore, and 750 tons of concentrate carrying 17% copper and 45 oz. silver per ton.

Profit from ore mined above tunnel level is expected to pay off all indebtedness by midsummer when contract will be let to sink shaft to 1,200 or 1,400′ depth.

VALLEY MAGNESITE CO. **WASHINGTON**

Office: Old National Bank Bldg., Spokane, Wash. **Mine office:** Valley, Washington.

Officers: F. M. Handy, pres.; B. E. Kehler, v. p.; W. J. Matthews, sec.; Robert Carnochan, treas. and Irving Whitehouse, asst. sec.-treas.; also directors.

Inc. 1917, in Washington. **Cap.,** $1,500,000; shares $5 par; 213,000 issued.

Property: about 1,300 acres at Valley, Stevens county, Wash.

Development: to 100′ depth, is estimated to expose 1,000,000 tons of magnesite, one exposure being 75 to 200′. Mining is by quarry methods. The ore is a gray, coarsely crystalline magnesite, containing 0.5% lime and 2.7% silica, which is well within market requirements.

Equipment: 10 kilns with accessories. Capable of making 150 tons of calcined magnesite daily.

About $300,000 has been spent on the property to date. As company does not even reply to repeated requests for information, production figures cannot be given. The company's prospectus estimated costs at $12 per ton and a sale price of $32.50 per ton, equivalent to earnings of $3,000 daily for a 150-ton plant.

VALLEY MINING CO. **WASHINGTON**

Officers: W. R. Tuttle, pres., 1816½ 7th St., Spokane, Wash.; A. L. Hooper, sec.-treas.; with H. M. Ross, V. P. Adams, and S. Van Hook, directors, all of Spokane, Wash.

Property: 3 unpatented claims, locally known as the Edna mine, 9 miles W. of Valley, Stevens county. Idle for 12 years, but in September, 1917, mine was unwatered to 400′, and levels have been driven at 100, 200, and 300′ depth. Copper-silver ore exposed is said to have a value of $600,000.

Equipment: includes a hoist and 3-drill compressor.

VICTORY COPPER CO. **WASHINGTON**

See Copper King Mining Co.

VIRGINIA MINING CO. **WASHINGTON**

See Chatterboy Mining Co.

VULCAN MINING CO. **WASHINGTON**

Office: 2025 West 3rd Ave., Spokane, Wash. Mine at Orient, Stevens county, Wash.

Officers: H. M. Gibson, pres.; P. Lewis, v. p.; A. O. Stuberg, sec.; P. Larsen, treas., with J. D. Grimes, directors.

Inc. July, 1914, in Washington. **Cap.,** $1,500,000; par $1; assessable.

Property: 7 claims, 4 miles N. E. of Rock Cut at 3,850′ elevation, shows 3 veins with gold ore; also some silver.

Development: by several hundred feet of tunnels and shallow shafts.

Present owners have spent over $20,000 on development. No recent information. Probably idle.

WALLA WALLA COPPER MINING CO. **WASHINGTON**

Office: Walla Walla, Wash. **Mine office:** Keller, Ferry county, Wash.

Officers: J. G. Muntinga, pres.; W. H. Meyer, v. p.; W. P. Lathrop, sec.-treas., with H. Osterman, Wm. Pfeiffer, Geo. Bradbury, C. M. McKinney, all of Walla Walla, and J. T. Leonard, director.

Cap., $1,000,000; par $1.

Property: 10 claims, 2 patented, and a millsite 1 mile N. E. of Keller, in the southern half of the old Colville Indian reservation, shows a vein of 30′ estimated width, partly mineralized with gold-copper ore of fair assay value.

Developed by an open-cut, shaft, and tunnel. In January, 1919, a 500′ tunnel was started.

WASHINGTON COPPER MINES DEV. CO. **WASHINGTON**

Officers: P. H. Nester, pres.; J. L. Linn, v. p.; J. N. Hart, sec., all of Portland, Ore.

Cap., $500,000; par $1.

Property: 9 claims, unpatented, in Bald Mt. district, Skamania county,

ore carries copper,gold, and silver. In 1918 company was reported putting about 30 tons of ore daily through a small mill. Said to have a considerable tonnage opened, but no shipments made to date.

WASHINGTON-IOWA COPPER MINING CO. **WASHINGTON**

Idle at last accounts, 1917. W. D. Gibson, pres.; P. R. Screven, sec., both of Seattle.

Property: on the eastern fork of Silver creek, 2 miles above Mineral and 14 miles N. W. of Index, Snohomish county, adjoins the Edison Mining & Development Co., and both properties are under one management. Claims said to show 5 veins, carrying complex ore, consisting of chalcopyrite, galena, sphalerite and pyrite, with quartz gangue.

Development: by the 1,200′ Bonanza crosscut tunnel.

WASHINGTON TUNGSTEN MINES CO. **WASHINGTON**

Address: Miller Bldg., Yakima, Wash.

Officers: D. B. McMahon, pres.-treas., Seattle, Wash.; J. Lenox Ward, sec., with Geo. Kerr, E. B. Sanford, E. G. Tennant, and J. J. Miller, directors.

Inc. November, 1915, in Washington. **Cap.,** $350,000; $1 par.

Property: 15 unpatented claims, in Bumping Lake district, 50 miles N. W. of Yakima, Yakima county, said to show gold-copper-tungsten ore. Idle.

WASHOUGAL GOLD & COPPER MINING CO. **WASHINGTON**

Address: Washougal, Clarke county, Wash.

Officers: F. A. Mabee, pres.; John Scharboarer, v. p.; J. B. Jordan and T. A. Altman, secretaries; Dr. Otta Sutter, treas., at last accounts.

Inc. 1902, in South Dakota. **Cap.,** $1,000,000; shares $1 par.

Property: 560 acres, held on a 30-year lease, from the State, near Mt. St. Helens, in the Bald Mountain district, on the upper Washougal river. Said to show several vertical fissure veins in granite, one of which, averaging 6′ thick, is developed by an 1,800′ tunnel exposing ore, estimated to average 5% copper, 15% lead and zinc, 2 to 70 oz. silver and $1 to $15 gold per ton.

Equipment: includes gasoline hoists, 25-ton concentrating mill, and a 3-drill Sullivan air compressor. No recent information available. Described in Mining and Scientific Press, 1916, by F. Brinsmade.

WENATCHEE GOLD MINING CO. **WASHINGTON**

Officers: J. P. Bonar, pres.; W. H. Kneemyer, treas.; both of Waterville, Wash.; M. P. Spencer, sec., Wenatchee, Wash.

Cap., $1,000,000; shares $1 par.

Property: 80 acres of State land, held under 30-year lease, in Entiat valley, Chelan county, said to show free gold ore.

Development: over 500′ of tunnels and shafts.

Equipment: includes a 2-stamp mill. Total shipments reported to have yielded about $170,000. In 1918 mine was reported under a 2-year lease.

WESTERN COPPER MINING CO. **WASHINGTON**

Office: 1123 Broadway, New York. **Mine office:** Reiter, Wash.

Officers: C. G. Reiter, pres.; Leroy B. Sherman, v. p.; J. J. O'Brien, sec.; J. D. Campbell, treas., with W. D. Schwarzwaelder, E. J. Wright, E. T. Christensen, Manfred Rockfeller and T. A. Meed, directors. C. Hendricks, mgr.; V. V. Clark, cons. engr.

Inc. April 25, 1917, in Maine. **Cap.,** $2,000,000; $1 par; 1,125,000 issued. Annual meeting, first Tuesday in April.

On June 6, 1917, company purchased assets of the Bunker Hill Mining & Smelting Co. for a stock consideration and assumed B. H. debts of $84,973, consisting of bonds and notes.

Property: 20 claims, 15 patented and 1 millsite, patented, 371 acres at Reiter, 5 miles W. of Index, Snohomish county, Wash. Examined by Cory Wright, T. E. Brown, E. M. Simonds and V. V. Clark. Claims said to show fissures in granite, syenite and diorite, dipping 45°, with N. 46° E. course.

Ore: is mainly chalcopyrite, associated with magnetite. On account of this latter mineral, the consulting engineer considered that prospecting with

a dipping needle should find additional copper deposits. The Bell shoot has been followed to 500′ depth and the Jumbo to 100′.

Development: by incline shafts, 86 and 500′ deep and tunnels, the longest 2,700′. To depth of 1,200′ workings total 6,100′. Diamond drilling cut a parallel body to the Bell at 497 to 526′, assaying 6.99% copper. This hole is to be followed by a shaft. Exploration cost $112,927 to the end of 1916.

Equipment: to December, 1916, cost $72,195, covering 300-h. p. hydro-electric plant, 100-ton obsolete concentrator, 50-ton smelter, compressor, tramway, diamond drill, steam engine, hoist, etc.

Property is well equipped for production if ore is developed and has a large asset in over 50,000,000′ of standing timber. In December, 1919, work was to be resumed after several years of idleness.

WEST HILL MINING CO. **WASHINGTON**

Out of business. Fully described in Vol. XIII.

WEST VIRGINIA

CLARKESBURG CLINKERING CO. **WEST VIRGINIA**

Subsidiary of American Metal Co., Ltd.

Office: 61 Broadway, New York.

Works: a sintering or clinker plant at Bridgeport, W. Va., for treatment of metal-bearing residues, such as those carrying silver from zinc smelters.

WISCONSIN

Wisconsin produces over 50,000 tons of zinc per annum from the treatment of over 2,000,000 tons of 2.5% ore. Most of this ore is concentrated and the mill product reduced to metal at Illinois smelters. The production centers named in their order of importance are: New Diggings, Benton, Mifflin-Livingston, Galena, Linden, Hazel Green, Shullsburg, and Highland. The output during the past two years follows:*

	1917	1918
Crude ore tons	3,014,800	2,377,300
Zinc content, per cent	2.44	2.61
Lead content, per cent	0.13	0.19
Zinc concentrates produced, tons	226,216	180,554
Lead " " "	5,544	6,210
Total value of all products	$12,899,276	$9,746,234

The output of concentrates in 1919 was 158,871 tons from mills and 97,105 tons from roasting and separating plants (refineries).

*U. S. Geol. Survey figures. The Wisconsin zinc district is described by Boericke and Garnett in Bull. 152, August, 1919, of the Am. Inst. M. & E., p. 1213.

Since the year 1862, the fields have produced approximately 2,083,000 tons of zinc. Practically all the ore of this district occurs in solution openings, whose position is largely controlled by joints and crevices.

In Bull. XIV (1906) of the Wisconsin Geological and Natural History Survey, U. S. Grant, describes the lead and zinc deposits of this State. Bull. XLIV (1915) of the State Survey, also describes the mineral lands of various counties, including those with iron-ore deposits. Little information concerning production could be obtained from mine-owners in the State, despite our frequent requests for same.

The mining companies operating in the State are arranged alphabetically.

AMERICAN ZINC ORE SEPARATING CO. **WISCONSIN**

Address: Platteville, Wis.

Company owns and operates a plant using the Huff electrostatic process to remove iron from mill concentrates carrying 16 to 40% zinc and pyrite.

BARABA MINING CO. **WISCONSIN**

Office and mine: Mellen, Ashland county, Wis. Nelson Baraba, Sr., pres.; Nelson Baraba, Jr., sec.

Inc. 1906. **Cap.,** $1,000,000; shares $1 par. Has a shallow shaft showing ore assaying 2.8% copper, with traces of gold and silver.

Idle since 1917.

BIG BEND MINING CO. **WISCONSIN**

Address: Cuba City, Wis.

Inc. in September, 1919. **Cap.,** $60,000; shares $1 par. Will develop and operate leases in the Cuba district.

BLOCKHOUSE MINING CO. **WISCONSIN**

Address: Kistler & Stephens, Platteville, Wis.

In March, 1919, this property was the only active producer in Platteville district. The mine is extensively developed and actively worked, having an average weekly output of 40 tons of 40% blende. In 1917 company realized $500,000 from concentrate sold, and in 1918 was the largest producer in the district. Operations were curtailed in 1919 owing to low price and lack of demand for zinc ore.

B. M. & B. MINING CO. **WISCONSIN**

Address: Jos. Wilson, supt., Mifflin, Wis. Company owns various zinc mines in the Mifflin district.

CAHOON MINE **WISCONSIN**

Address: A. W. Rohn, mgr., Baraboo, Wis.

Property: a tract of 140 acres, one mile S. W. of Baraboo, underlain by iron ore, opened and mined by shafts and extensive workings.

CLEVELAND MINING CO. **WISCONSIN**

Office: 625 Bank & Insurance Bldg., Dubuque, Iowa. S. W. Burford, mgr.; H. L. Jones, supt.

Property: 40 acres, includes the Cleveland and Hazel Green mines at Hazel Green, Grant county. Lead-zinc ore occurs in flats and pitches in limestone.

Development: several 150′ shafts with 1,500′ of workings said to block out 100,000 tons of ore.

Equipment: includes a 75-h. p. electric hoist, a 6-drill air-compressor a 250-ton concentrating plant. Concentrate is sold to Mineral Zinc Co. under contract; employs normally 160 men on double shift.

COMMONWEALTH IRON CO. **WISCONSIN**

Address: E. W. Hopkins, mgr., Ironwood, Mich. **Property:** a well-known iron mine.

CONNECTING LINK MINING CO. **WISCONSIN**

Office: Theo. A. Waech, mgr., Cuba City, Wis.

Officers: Anton Zwack, pres.; B. H. Hoeper, v. p.; Curt M. Treat, sec.; Theo. E. Buechele, treas., with M. A. Barr and W. H. Hennigu, directors.

Inc. 1917, in Wisconsin. **Cap.,** $100,000; $1 par; 90,000 issued.

Dividends: two, equal to 20%, were paid in 1918.

Property: 220 acres in Cuba City district, Lafayette county. Deposit carries lead and zinc.

Equipment: includes electric hoist, a 150-ton mill, on the Dall land, and a new concentrator on the Coulthard land. Company was the largest producer in the Cuba district in 1918.

CONSOLIDATED LEAD & ZINC CO. **WISCONSIN**

Address: Charles Lawyer, mgr., Benton, Wis. Company has a lease on the Charles Smith tract, a mile S. of Benton. Drilling was completed and shaft sunk late in 1918.

FEARLESS MINING CO. **WISCONSIN**

Address: Frank Harker, Platteville, Wis.

Inc. 1919. **Cap.**, $100,000.

Property: in the Linden district has an orebody 60′ wide and 9′ thick, carrying high-grade jack.

Equipment: includes a 100-ton mill, making 55% zinc concentrate by jigging.

FIELD MINING & MILLING CO. **WISCONSIN**

Office: 2200 Insurance Exchange, Chicago, Ill. **Supt.'s address:** R. F. D. No. 7, Scales Mound, Ill.

Officers: Robt. W. Hunt, pres.; Jas. C. Halsted, v. p., with L. V. Rice, gen. mgr.; C. C. Whittier, directors. F. W. Guthrie, sec.-treas.

Inc. 1908, in Illinois. **Cap.**, $100,000; shares $100 par. $65,000 outstanding. Annual meeting 1st Tuesday in May.

Property: the Thompson mine near New Diggings, Wis., an important lead-zinc producer, developed to depth of 225′ by vertical shaft. Ore occurs in fissure veins and disseminations traversing dolomite. Management estimated ore reserves at 350,000 tons in May, 1917.

Equipment: includes electric power, 50-h. p. hoist, 600′ elec. compressor, centrifugal pump, 800-ton mill, equipped with jigs and tables.

Produced zinc, lead, and pyrite averaging 45% zinc, 75% lead, 31% sulphur, 16% iron, respectively. Operations suspended in December, 1918.

FLINT MILL & FURNACE CO. **WISCONSIN**

Company operates a 20-ton Fink furnace at Wauwatosa, treating lead concentrates from the Wisconsin fields.

FLORENCE IRON CO., THE **WISCONSIN**

Address: E. H. Thiemann, asst. mgr., Florence, Wis.

FRONTIER MINING CO. **WISCONSIN**

Office: 413 Fletcher Trust Bldg., Indianapolis, and Galena, Ill.

Officers: J. H. Billingsby, pres.; D. C. Ellison, v. p.; W. C. Haneisen, sec.-treas.; preceding with C. W. Craig, C. R. Hinkle, Carl L. Rost, S. O. Deschler, directors.

Cap., $125,000; shares $100 par.

Dividends: begun April, 1916, are 2% the first of each month, and 10% on the 15th.

Property: the Frontier and Grotkin mines at Benton, and the Optimo No. 1 and 2 at Linden, also the Bearcat, Bull Moose, Hird and Middle mines at Benton, Wis. Ore is zinc sulphide in pitches and flats in limestone. Stopes are 120′ wide and 35′ high.

Development: 3 shafts, average depth of 150′. Room and pillar mining system is used. Extensive exploration on adjoining land was done in 1918.

Equipment: includes one 50-h. p. and one 75-h. p. electric hoists, air-compressor and drilling machines. There are also 3 concentrators with daily capacity of 600 tons in 10 hours.

Production: the mines when in full operation average about 800 tons of 36 to 42% zinc concentrate weekly. Shipments are made under contract to the Grasselli Chemical Co.

GRUNOW MINING CO. **WISCONSIN**

Address: Herman Grunow, supt., Mifflin, Wis.

Company operates zinc mines in the Mifflin district.

HARVEY LEASE **WISCONSIN**

Address: Charles Wolfe, Cuba City, Wis.

Property: a tract N. of the Connecting Link mine, which after being proven by drilling, was opened up by a shaft and equipped with the Lawrence mill, removed from Hazel Green to this mine.

HAYES MINING CO. **WISCONSIN**

Address: Ironwood, Mich.

HERCULES MINING CO. **WISCONSIN**

Address: Cuba City, Wis.

Officers: H. H. Busch, pres., Dubuque, Iowa; Harry Seemiller, mgr.; Robert Fox, mine supt.

Cap., $100,000.

Property: leases 400 acres of farms, 2 miles E. of Cuba City, on which drilling revealed rich zinc and lead ore. A 100-ton mill was to be erected at last accounts

HOLMES MINING & MILLING CO. **WISCONSIN**

Idle. Mellen, Ashland county, Wis.

Officers: John Holmes, pres.-mgr.; A. D. Barnes, v. p.; Thos. A. Humphrey, sec.; F. P. Simmonds, treas., with Edw. Bekken, A. D. Wilson and A. D. Hill, directors.

Inc. Jan. 9, 1902, in Wisconsin. **Cap.,** $150,000; shares 25c par.

Property: 160 acres in the Penokee iron range, about 1 mile N. of Bad river, shows fissure veins in greenstone, diorite and slate with E.-W. strike and dip of 70°. Three orebodies are claimed of which one, said to be 40′ wide and traceable one-half mile by a strong gossan, with slate footwall and diorite hanging, is reported to have chalcopyrite in a quartz gangue. Ores give assays up to 9 oz. silver and $3 gold per ton.

Development: by 150′ and 188′ shafts.

Equipment: includes a 16-h. p. hoist.

INDIAN MOUND MINING CO. **WISCONSIN**

Mine controlled by Lawrence Mines Co., which see.

KLAR PIQUETTE MINING CO. **WISCONSIN**

Address: W. H. Doyle, sec., Platteville, Wis.

Company operates zinc mines in the Platteville district.

LAWRENCE MINES CO. **WISCONSIN**

Address: Dubuque, Iowa; or New Diggings, Wis.

Property: the Indian Mound mine at Benton and leases in New Diggings district. The Lawrence mine at Hazel Green was abandoned in 1918. The Indian Mound was a regular producer in 1918-19.

LITTLE PLATTE MINING CO. **WISCONSIN**

Address: Raymond Piquette, mgr., Platteville, Wis. Owns a lease on James Tracey land, 6 miles W. of Platteville. A 50-ton mill was erected in September, 1918, and shipments made.

LUCKY FIVE MINING CO. **WISCONSIN**

Address: Mr. McKinley, supt., Dodgeville, Wis.

Property: a lease on Davis and Thomas lands, in Dodgeville district, near Cuba City, Grant county, Wis. A small producer of high-grade lead-zinc concentrates. Developed by 100′ shaft.

Equipment: includes steam plant and 50-ton concentrator. Shipments made to the Collinsville smelter, under lease to the Eagle Picher Lead Co.

LUCKY SIX MINING CO. **WISCONSIN**

J. N. Vail, supt., R. R. No. 2, Livingston, Wis.; or Mifflin, Wis.

Property: in Mifflin district, Iowa county, developed by two shafts, and equipped with a 150-ton mill.

LUCKY TWELVE MINING CO. **WISCONSIN**

Address: L. N. Dana, mgr., Benton, Wis.

Company operates zinc mines in the Benton district.

McMILLAN ZINC CO. **WISCONSIN**

Offices: Platteville and Hazel Green, Grant county, Wis.

Officers: A. C. McMillan, pres.; Henry Hornischfeger, v. p.; H. B. Morrow, sec.-treas., with L. C. Dagenhardt and C. M. Echols, directors; L. C. Dagenhardt, supt., Hazel Green.

Inc. August 3, 1914, in Wisconsin. **Cap.,** $100,000; $1 par. Annual meeting, August 14.

Property: 100-acre lease, at Hazel Green, said to show zinc and lead sulphides occurring in a disseminated deposit in the Galena limestone formation.

Development: 180′ vertical shaft.

Equipment: includes steam hoist, 300 cu. ft. air-compressor, pumps and a mill, capacity 400 tons per 20 hours.

In February, 1918, mine was closed temporarily, due to high costs and

heavy flow of water. Although fully equipped, more capital is needed to bring property to producing basis.

MACKAY MINING CO. **WISCONSIN**

Address: D. and W. Mackay, Platteville, Wis. Acquired property of the Ross Mining Co. in Linden district, in October, 1919, and resumed mining and drilling in November.

MIDLAND MINING CO. **WISCONSIN**

Dead.

MINERAL POINT ZINC CO. **WISCONSIN**

(Subsidiary of the New Jersey Zinc Co.)

Address: B. A. Hoskins, supt., Galena, Ill. W. F. Boericke and T. H. Garnett, engineers.

Properties: the Black Jack mine at Galena, Ill.; Coker mine at Livingston, Wis.; Highland mine at Highland, Kennedy at Hazel Green, and the Penna and Hoskins mines at New Diggings, Wis. The last named produced over 17,678 tons of green blende concentrate in 1919. The Coker had a record of over 15,000 tons in 1916.

Geology: in the Black Jack mine there are two "pitches" to the orebody; one contains heavy black jack, and has a smooth hanging wall; the other "pitch" contains ore heavy in marcasite and without any definite wall. In the Coker mines the orebodies are of great length and determined by drill holes for a length of 6,900′. No. 1 orebody is 7,500′ long, if the mines of the Vinegar Hill Zinc Co. be included. The Kennedy orebody including the Mills and Winnebago mines, which are on an integral part of the Kennedy, is the largest deposit of ore yet found in the district. Since 1860, these three mines have yielded about 2,500,000 tons of ore, producing 150,000 tons of 35% zinc concentrates.

Equipment: includes concentrating plants, zinc oxide works, and acid plant. At Mineral Point company has a separating plant, including a multihearth roaster of 150 to 200 tons daily capacity and magnetic separators to remove pyrite from jig concentrates, whose zinc content is raised from 37 to 59%. Recovery is about 90% at cost of $2 per ton.

Production: in November, 1919, the mines were producting 25 to 30 cars of zinc ore per week.

MONMOUTH ZINC MINING CO. **WISCONSIN**

Office: Hazel Green, Wis.

Officers: J. L. Noble, pres.; J. W. Houston, v. p.; C. G. Norton, sec.-treas., with J. A. Allen, A. G. Patton and Jos. Harvey, directors. H. L. Williams, mgr.; Jack Rogers, supt.

Cap., $150,000; $10 par; $110,000 issued. Annual meeting first Tuesday after first Monday in September.

Property: 200 acres at Hazel Green, Lafayette county, Wis. Deposit is a fissure or "pitch" in "blue" rock, with "horseshoe" course, characteristic of the district. Ore assays 40% zinc, 15% iron, and 2.5% lime.

Development: by 209′ shaft and 260′ tunnel. **Equipment:** 75-h. p. motor-driven hoist, 2-drill compressor, pumps (one deep-well of 2,500, one sinker of 800, and one station of 800 g. p. m.), 400′ tram from shaft to mill, and 150-ton mill employing 3 jigs of 7 cells each, in operation since Aug., 1918.

MONTREAL MINING CO. **WISCONSIN**

Address: F. B. Goodman, supt., Hurley, Wis.

NATIONAL ZINC SEPARATING CO. **WISCONSIN**

Address: W. N. Smith, gen. mgr., Platteville, Wis.

Works: company operates a roasting and magnetic-separating plant, capacity 275 tons of crude zinc concentrate in 24 hours, at Cuba City, Grant county, Wis. A Cottrell precipitator was installed in the works in 1918. The sulphuric acid plant can make 100 tons daily. Most of the supply comes from mines operated by the Vinegar Hill Zinc Co. The raw concentrate carries 23 to 46% zinc, and the final product 60%. This is sold to the Illinois Zinc Co., Grasselli Chemical Co., and the American Zinc Co., of Hillsboro, Ill.

NORTHWESTERN IRON CO. **WISCONSIN**

Described in Vol. XIII. Mine now owned by the Steel & Tube Co. of America, which see.

ODANAH IRON CO. **WISCONSIN**

Address: L. M. Hardenburgh, supt., Ironwood, Mich.; or J. M. Davis, Hurley, Wis.

Property: the Cary and Windsor mines, on Gogebic range, Wisconsin. Employed 275 men in 1919. For production, see Pickands, Mather & Co., under Minnesota, in this volume.

OLIVER IRON MINING CO. **WISCONSIN**

Office: Duluth, Minn. Operates lead-zinc mine and separator at Shullsburg, Wis.

OPTIMO MINING CO. **WISCONSIN**

Office: 1127 State Life Bldg., Indianapolis, Ind.

Property: at Linden, Iowa county, Wis., was the main producer of lead-zinc concentrates in the Linden district in 1917-'18. Subleased to Vinegar Hill Zinc Co.

Equipment: includes electric power, drills, pump, and 100-ton mill. Concentrates carry 30 to 40% zinc.

PEACOCK MINING CO. **WISCONSIN**

Address: Henry Ovitz, supt., Mifflin, Wis.

Company operates zinc mines in the Mifflin district.

PENI MINING CO. **WISCONSIN**

Address: H. C. Holtz, supt., Mifflin, Wis. Owns a zinc mine in the Mifflin district.

ROSS MINING CO. **WISCONSIN**

Property acquired October, 1919, by the Mackay Mining Co., which see.

RUDOLPH LAND CO. **WISCONSIN**

Idle. Mine near Gordon, Douglas county, Wis.

Inc. 1905, as successor of Minong Range Copper Co.

Property: 12 miles from Gordon, on the southern fold of the Keweenawan syncline.

Development: by two shafts, deepest 350′, sunk at an angle of 36°, on a dark amygdaloidal trap bed carrying small quantities of native copper.

Equipment: includes a 6-stamp mill. Property fully described under title of Minong Range Copper Co., Vol. XIII, Copper Handbook.

ST. CROIX CONSOLIDATED COPPER CO. **WISCONSIN**

(For description see Vol. XII.)

Successor St. Croix Consol. Mines. M. J. O'Brien, pres., 223 Fargusson Bldg., Duluth.

SHAMROCK MINING CO. **WISCONSIN**

Address: J. Maloney, mgr., Mifflin, Wis.

Officers: H. F. Cochenus, pres., 1536 First Nat'l Bank Bldg., Milwaukee, Wis. P. C. Kolinski, gen. mgr.

Property: 37 acres in Mifflin, said to show a 32′ vein, running N. W.-S. E., carrying a 10 to 12″ streak of lead-zinc sulphides, averaging 35% zinc, 25% lead. Mine is the old Shamrock & Peni mine on the so-called old 80 tract, mined 100 years ago for lead, recently quarried for glass rock and now for its 10″ to 12″ of coal black "jack" ore.

Development: by 340′ tunnel, and opened to 28′ depth, by quarry, stripping off the "glass rocks." About 800 tons shipped in 1915, that averaged 30% zinc and 10 tons of lead concentrate.

Ore is treated in 50-ton mill and concentrate goes to DePue smelter. Company took over the Sunset mine, July, 1916. No recent returns.

STEEL & TUBE CO. OF AMERICA, THE **WISCONSIN**

Address: First Wisconsin National Bank, Milwaukee, Wis. J. H. Means and E. S. O'Connor, local operators.

Property: the Mayville mine formerly owned by the Northwestern Iron Co., at Mayville, Dodge county, developed to depth of 125′.

Ore: is a soft, red non-Bessemer hematite, containing 41.80% iron,

1.09% phosphoruus, 4.11% silica, 3.80% alumina, 6.50% lime, 4.50% magnesia, and 11.04% moisture.

Production: 88,710 tons in 1918, and about 1,300,000 tons to date.

SUPERIOR COPPER MINES CO. **WISCONSIN**

Address: Superior, Wis.

Officers: J. B. Arnold, pres.; T. A. Merritt, v. p.; F. L. Bernard, sec.; and H. M. DeLanoie, treas.

Inc. Nov. 14, 1916, in Wisconsin. **Cap.**, $1,000,000; all outstanding. Listed on New York Curb.

Property: in Douglas county, Wisconsin. Ore carries native copper.

THOMAS FURNACE CO., THE **WISCONSIN**

Address: John M. Thomas, pres., Milwaukee, Wis.

Company is a manufacturer of pig-iron, low in phosphorus. A little ore is mined for reduction in the works.

TIFFANY MINING CO. **WISCONSIN**

Letters returned from former address, 925 Postal Telegraph Bldg., Chicago, Ill., and company probably dead.

Inc. 1916. **Cap.**, $50,000.

Property: 160 acres, leasehold, east of the Wilson Mining Co. land, known as the Tiffany mine, formerly owned by W. N. Tiffany, of Platteville, Wis.

VINEGAR HILL ZINC CO. **WISCONSIN**

(Owned by Mark Manufacturing Co., of Chicago, Ill.)

Office: Platteville, Wis. W. N. Smith, mgr.; J. A. MacCulloch, supt.

Property: the Ellsworth and Rundell mines at Livingston, the Martin at Benton, the Wilkinson at Cuba City, the Vinegar Hill at Days Siding, and others.

The orebodies are of extraordinary length and persistence; that of No. 2 mine of the Mineral Point Zinc Co., which is part of the ore deposit mined in the Vinegar Hill property, is continuous for 7,500′.

The Vinegar Hill company put up a 200-ton mill on the Edward Meloy 80 in 1916 to handle the output of a tract on which drilling proved up an orebody 60′ thick. At the Martin mine a Whaley electric shovel was put in, doing the work of 20 shovelers. In February, 1918, a 600-ton mining and milling plant was completed at the Jefferson mine in Hazel Green district. During 1918 the Calvert farm on the Swindler range was drilled and shafts sunk and the Franklin Rundell mine developed and worked, the ore being treated at the Yewdall mill at Mifflin. Late in the year the Kittoe mill was moved from Platteville to the Dale Rundell mine. Several of the mines were closed early in 1919 on account of the metal markets, but were re-opened in August. An extension of the Hoskins range has been proved by drilling for 550′ and a shaft will be sunk to open the orebody, whose output will be treated in the Meloy mill.

Company has a new shaft on Jas. Copeland tract at Shullsburg, has proven a new run at Heughlett mine at Days Siding, and the Dale mine is now operating.

WEST HILL MINING CO. **WISCONSIN**

Address: W. Brown, supt., Platteville, Wis.

Cap., $20,000. In last eight months of 1915, reported to have made 150% profit on capital stock.

Operates zinc lands in Platteville, Grant county, and was an important shipper of zinc concentrates. Paid a 10% dividend in March and another in June, 1916. No new data available. Probably dead.

WHITE ROSE MINE **WISCONSIN**

Address: Gus. E. Brown, Platteville, Wis. Mill was burned in March, 1918, but has been rebuilt.

WISCONSIN ZINC CO. **WISCONSIN**

Subsidiary of the American Zinc, Lead & Smelting Co., which see.

Address: A. M. Plumb, gen. mgr., Platteville, Wis.

Inc. in Maine. **Cap.**, $1,000,000; $1 par; 925,000 shares issued; 649,774 owned by A. Z. L. & S. Co.

Dividends: 2% quarterly; No. 6 paid April 1, 1919.

Property: the Champion, Longhorn and Thompson mines at New Diggings, Wis. Crude ore averages 6% zinc. In 1919 company opened up an ore range and new shaft on the Booty lease, a half mile west of the Winskell. C.A.T. No. 2, was developed and connected by drift with C.A.T. No. 1—both at New Diggings.

Equipment: in 1917, a 200-ton mill was erected on the Copeland lease, near Shullsburg. There is also a roasting plant at New Diggings, containing 7 Skinner hearth furnaces, 20′ diam., preparing ore for magnetic separation of marcasite from zinc blende.

Production: the Champion in 1917 yielded 15,727 tons of blende, and 17,004 tons green blende concentrate in 1919.

General: Company is one of the largest zinc-ore producers of this country, operating a number of mines as well as one of the Skinner zinc-ore separators, and an industrial railway that connects its several properties with the main line of the Galena division of the Chicago & Northwestern railroad. Three mines in the New Diggings district—the C.A.T., Champion, and Longhorn—are producing from 800 to 1,000 tons of zinc concentrate per week. A new mine recently developed and equipped is on the Copeland estate in the Shullsburg district. It made its initial ore deliveries during the third week of March. One of the most consistent producers of the field, from 1912-1918—the Winskill—also at Shullsburg, was exhausted and abandoned on March 16. The equipment will be dismantled and moved. Half a mile west a 170′ shaft was being sunk in the Booty land late in 1919. Drills are engaged by the company on various tracts in the Benton, Hazel Green, Shullsburg, Galena, and New Diggings districts. The Wisconsin Zinc, Vinegar Hill Zinc, and New Jersey Zinc companies combined to construct and operate at their own expense an industrial spur that is of great benefit to all.

Sales of dressed ore are made in open market to the highest bidder, although the Wisconsin Zinc Co. is a subsidiary of the American Zinc, Lead & Smelting Co., and is in this manner affilated with the American Zinc Co. smelters, at Hillsboro, Ill., to which point much of the finished ore finds its way. Heavy shipments are made at intervals of pyrite saved as by-product in the separation of zinc ore. The pyrite carries 30 to 35% sulphur. The Skinner roasters were completed in 1916 at a cost of $100,000. They are capable of treating 1,000 tons of raw zinc concentrate weekly. From this is recovered 500 tons of 59 to 61% blende. Cleveland-Knowles and Dings separators are largely employed in this plant, also the McDougall furnace. Fifty men can operate the plant per 24 hours. A wet mill was erected during the summer of 1917 to wash out fine and slime. The Overstrom sludge-table is mostly used. The ordinary method of wet concentration employed in the Wisconsin field is regarded efficient enough to eliminate the necessity of saving the small amount of mineral lost in slime.

Mill feed is handled on the can-contract system. Shovelers earn from $3 to $5 each per shift. Power supplied the company by the Inter-State Light & Power Co. of Galena, Ill. is steady and good. A telephone system connects the general manager's office with mine foremen underground.

Between 500 and 600 men are employed by the Wisconsin Zinc Co. Sociological conditions of the workers are given plenty of attention, and wages paid are good.

ZINC HILL MINING CO. WISCONSIN

Address: Charles Wolf, mgr., Platteville, Wis.

Property: formerly known as the Little Dick and Big Dick. Drilling exposed good ore, and a 50 to 100-ton mill was erected in June, 1918. Operations were suspended in March, 1919, on account of market conditions, but were resumed in September, and $100,000 was to be spent in further exploration and erection of an electrostatic separating plant.

WYOMING

The mountainous regions of Wyoming contain numerous widely scattered mineral deposits, as yet but slightly developed, and the short-lived "boom" of the Encampment district, on the Colorado border, bred so many wild cats that the State has suffered ever since from the frauds of that period.

The metal output is relatively small, that of 1918 being but 7 oz. of gold, 253 oz. of silver, 754,324 lb. of copper, and a considerable tonnage of chromite. The 1919 output was still smaller.

The mines are arranged alphabetically, as the State has no great mining center.

ACME CONS. GOLD & COPPER MINING CO. **WYOMING**

Inactive. See Copper Handbook, Vol. XI.

AETNA MINING CO. **WYOMING**

Idle. **Office:** Merrill, Wis. Mine near Riverside, Carbon county, Wyo. See Copper Handbook, Vol. XI.

AMERICAN FIREPROOFING & MINING CO. **WYOMING**

Address: Investment Clearing House, Fin. Agts., 513 Denham Bldg., Denver, Colo. A. E. Minium, pres.; S. E. Coyler, mgr.

Inc. 1913. **Cap.,** $10,000,000; shares 10c par. Stock was offered at 2c with a guarantee of refund attached should the company's statement not be verified.

Property: 8 and a fraction claims, 200 acres, in the South Pass mining district, 35 miles from Lander, Fremont county, Wyo., the nearest railroad, comprising the Jerry Dain and Hidden Hand Fraction group, a bond and lease on the Bobtail, Denver and Bluebird claims, near Lewiston, and control of 120 acres of partially developed mineralized land.

Ore: quartz, with gold in fissure veins, 15-24″ wide; said to average better than $100 per ton in gold.

Development: includes shafts 40-70′ deep, including 500′ of underground workings on the Bobtail claim.

Equipment: shaft-house, blacksmith shop, pumping station, engine, boiler, crusher, electric plant, and other machinery. A new mill was ready for operation in May, 1919.

ANCHORIA COPPER MINING CO. **WYOMING**

Idle several years.

Office: Room 3 Algoma Bldg., Oshkosh, Wis. **Mine office:** Copperton, Carbon county, Wyo. H. O. Granberg, sec.-treas.

Inc. April, 1901, in Wyoming. **Cap.,** $1,000,000; shares $1 par.

Lands: 4 claims, 80 acres, patented, in the Battle Lake district, developed by a 200′ shaft and tunnels of 45′ and 60′, showing an orebody estimated at 45′ width, giving specimen assays of 17% copper, and from a trace to $5 gold per ton. Has a 40-h. p. steam plant, with hoist good for 500′, three power drills and four substantial mine buildings of logs.

ANNIE MINING CO. **WYOMING**

Mine office: Jelm, Albany county, Wyo. L. A. Hancock, sec.

Inc. 1903, in Wyoming. **Cap.,** $250,000; shares $1 par.

Property: 100 acres, near Jelm, said to show two 4′ contact veins between granite and schist, opened by a 140′ shaft and a 138′ tunnel, showing copper carbonates and bornite, assaying up to 20% copper and $10 gold per ton. Idle since 1907, except for assessment work performed each year.

ATLAS COPPER MINING CO. **WYOMING**

Address: Tie Siding, Albany county, Wyo.

Development work was carried on in 1918-'19, a few hundred tons of ore being shipped to the Omaha smelter in 1918.

AZURITE MINING CO. **WYOMING**

Idle. **Office:** Room 3 Algomah Bldg., Oshkosh, Wis. Arthur Bishop, v. p.; H. O. Granberg, sec.-treas. and gen. mgr.

Inc. Dec. 17, 1904, in Wyoming. **Cap.**, $1,000,000; shares $1 par; issued, $624,650.

Lands: 5 claims, 63 acres, in the Battle Lake district, near Dillon, in Carbon county, showing 3 fissure veins, in gabbro, of 15 to 20′ estimated width, opened by 305′ of work, including a 65′ shaft and 70′ tunnel.

BIG FIVE COPPER CO. **WYOMING**

Company dissolved. Fully described in Vol. XIII.

BOSTON & WYOMING COPPER MINING CO. **WYOMING**

Idle. **Office:** care Jas. A. Shinn, Leadville, Colo. **Mine office:** Esterbrook, Albany county, Wyo.

Inc. January, 1903. **Cap.**, $500,000.

Property: the oldest in the district, includes 120 acres mineral lands and 120 acres miscellaneous lands, taken over from Esterbrook Mining Co. The Esterbrook mine has a 4′ fissure vein, traversing diorite, schist and granite, carrying cuprite, chalcopyrite, cerussite and galena, estimated by former owner to average 2 to 4% copper, 25 to 30% lead, 2 to 4 oz. silver and $1 to $2 gold per ton, developed by 2 short tunnels and 5 shafts, deepest 335′.

COMMERCIAL GOLD MINING CO. **WYOMING**

Office: Centennial, Wyo.

Officers: P. A. Peterson, pres., Canon Falls, Minn.; P. L. Holtum, sec.; B. Holtum, mgr., Centennial, Wyo.

Transfer office: Centennial. Annual meeting, second Tuesday in August.

Inc. 1909, in Wyoming. **Cap.**, $1,000,000; $1 par; 350,000 outstanding.

Property: 2 patented claims of 96 acres in Centennial mining district. The formation is similar to that of the district, granite, schist, porphyry, quartzite, etc., with N. E.-S. W. trend.

Idle since 1918.

CONGO MINING CO. **WYOMING**

Address: Rawlins, Wyo.

Owns property in Battle Lake district; idle for several years on account of lack of transportation. No recent information.

CONTINENTAL-MORRIS COPPER MNG. CO. **WYOMING**

Office: Morris, Ill. Mine near Encampment, Carbon county, Wyo.

Officers: J. H. Rogers, v. p.; Dr. G. A. Leach, sec.-treas., with I. F. Hatcher, U. C. Davis, W. A. Thomas, E. R. Joyce, B. C. Hitchcock, directors.

Inc. March 31, 1908, in Wyoming, as a merger of the Continental Copper Mining Co. and Morris Mining Co. **Cap.**, $2,250,000, increased later to $5,000,000; $1 par; issued, $1,750,000. Annual meeting, first Tuesday in February.

Property: 7 claims, patented, 120 acres, in the Battle Lake district, carrying about 50 acres of good pine timber. Claims show schist, with 4 veins, of 31 to 40′ estimated average width, traceable 1,500 to 3,000′, carrying carbonate and sulphide ore, estimated to average 1 to 8% copper, with small gold and silver values.

Development: includes several shafts and 1,400′ of tunnels. **Equipment:** includes a steam hoist, good for 500′, and 2 buildings. Idle, but resumption planned as soon as property can be refinanced.

COPPER BOTTOM MINING & MILLING CO. **WYOMING**

Address: Inez, Converse, Wyo. Henry Metz, Sr., pres.; Fred Metz, sec.-treas.

Property: the Green Hope mine, in the Hartville district, Laramie county, has produced about 125 tons of ore. Company also owns a few copper claims in the region at the head of Broom creek, 15 miles north of Sunrise, on which annual assessment work has been done.

ELECTROLYTIC COPPER CO. **WYOMING**

Offices: 342 Securities Bldg., Omaha, Neb.; and Foxpark, Wyo.

Officers: E. J. Stoll, pres.; W. C. Metzger, sec. and gen. mgr.; Frank Vierling, treas., with Q. P. Wyland, directors. Wm. Benton, supt.

Inc. November, 1918, in Wyoming. **Cap.**, $1,500,000; $1 par; 700,000 issued.

Property: 8 claims, 150 acres, includes the Mountain Rest, Iron Blossom, and Jitney copper mines, 4 miles N. and N. W. of Foxpark, Albany county, Wyo. In first-named claim, ore is said to carry gold, silver, copper, lead, zinc, vanadium, and nickel. The Iron Blossom claim was acquired from the Iron Blossom Mining Co., which see.

Development: by 128′ shaft and 350′ of workings. Equipped with double-drum hoist; a 100-ton concentrating plant is planned.

ELENOR MINES CO. **WYOMING**

Address: O. M. Beck, Atlantic, Wyo.

Officers: O. M. Beck, pres.; Nate Wilson, v. p.; F. V. Marsh, sec.-treas.

Inc. 1917, in Wyoming. **Cap.**, $150,000; shares 50c par.

Property: 12 claims about 4 miles N. W. of South Pass and 28 miles south of Lander, show a well-defined vein carrying copper, gold, and silver values.

ELKHORN COPPER MINING CO. **WYOMING**

Property: the Elkhorn mine in the Elkhorn Mountain district, near Overland, Carbon county, said to carry a 7′ vein of sulphide ore, averaging 7 to 8% copper, with considerable ore in sight. Mine has a shaft and a 460′ tunnel, with about 1,000′ of drifts. Development work was carried on in 1918, and the ore mined was stored until the 400-ton concentrating mill begun 1918, was finished.

EMERALD MINING CO. **WYOMING**

Idle. Wheatland, Laramie county, Wyo.

Property: the Cooney Hill mine, formerly owned by the Cooney Hill Gold & Copper M. & M. Co., and the Emerald mine, on Slate creek, showing a prominent gossan outcrop in schist. The Emerald has a 60′ shaft in ore, and a 100′ shaft bottomed in a gossan showing traces of copper sulphides. No recent report received.

FERRIS-HAGGARTY COPPER MINING CO. **WYOMING**

Inactive. Owns, or did own, the copper mine of this name at Rudefeha, Carbon county, Wyo. Company also owned $375,000 of the Penn Wyoming bonds, but as its stock is practically all owned by the Penn Wyoming, its corporate officers and affairs are of no public interest, save as the only valuable mining asset of the chain of bankrupt corporations, controlled by the Penn Wyoming and its alleged and equally rotten successor, the United Smelters, Railway & Copper Co. See under Penn Wyoming Co., in Vol. XIV, also Vol. X, Copper Handbook.

GOULD MILLING AND LEASING CO. **WYOMING**

B. A. Lathrop, mgr., Centennial, Wyo. Company had a lease on the property of the Utopia M. & M. Co. (which see) in the Centennial district.

HAGGARTY COPPER MINING CO. **WYOMING**

Probably dead. Mine at Rudefeha, Carbon county, Wyo. L. N. Pennock, former pres.

Cap., $10,000, increased Nov. 9, 1908, to $1,500,000; shares $1 par. Controlled and owned by the United Smelters, Railway & Copper Co. Is a companion of the Ferris Haggarty Co., but like all its sister companies owned by the U. S. R. & C. Co. Only a lawyer can tell which of the two owned the copper mine that has been the bait for so many "investors."

See Vol. XIV, also Vol. X of "Copper Handbook," under Penn-Wyoming Copper Co.

HECLA CONSOLIDATED MINES CO. **WYOMING**

Office: at last reports, care Henry Schwartz, pres., 308 Masonic Bldg., Denver, Colo. Mine at Hecla, Laramie county, Wyo.

Inc. 1909, in Wyoming, as a merger of the Hecla Mining Co., Amalgamated Copper Mining & Extraction Co. and Kopper Krown Mining Co. **Cap.**, $5,000,000; shares $1 par.

Property: 610 acres, including the Hecla group, 13 claims, 2 patented, and a 35-acre townsite, in the Silver Crown district, 4 miles from Granite Canyon, on the Union Pacific railroad and 7 miles from the Cheyenne Northern line. The Hecla is claimed to show 16 fissure veins, of 8′ average width, in schist and granite, of which 3, of 7′ average claimed width, carry oxidized and sulphide ores, said to give average assays of 3.4% copper, 3 oz. silver and several dollars in gold per ton, besides nickel, platinum and uranium.

Development: includes a 40′ tunnel and 14 pits and shafts of 10 to 140′ depth.

The Hecla mill has 15 stamps, a 50-ton concentrating plant and a leaching plant. Ore is mainly low in grade, and only in part adapted to concentration, and the mill requires overhauling, and flotation equipment. The history and financial methods of this company and its predecessor are described in Vol. X.

Same management as the Henley Cons. Copper Mines, Wyo. Letters returned unclaimed 1919. Probably dead.

HENLEY CONSOLIDATED COPPER MINES **WYOMING**

Address: at last accounts, Henry Schwartz, 308 Masonic Temple, Denver, Colo., chief owner.

Property: 25 claims, 500 acres, 25 miles S. W. of Cheyenne, Laramie county, Wyo.

Same management as the Hecla Cons. Mines Co., which see.

HOME RUN COPPER MINING CO. **WYOMING**

Office: Rooms 17-18 Postoffice Bldg., Colorado Springs, Colo. Mine near Rudefeha, Carbon county, Wyo.

Officers: A. L. Bohrer, pres.; J. F. Humphrey, v. p.; Adolph Fehringer, treas.; Wm. C. Robinson, sec., at last accounts.

Cap., $1,500,000; shares $1 par.

Property: 180 acres, partly patented, known as the Copper Bell group, near the Ferris-Haggarty mine, having a 350′ tunnel showing a vein with copper, gold, and silver values. Idle many years.

IMPERIAL COPPER & GOLD MINING CO. **WYOMING**

Office: 423 Caswell Block, Milwaukee, Wis. Jacob Best, sec.-treas.

Property: 6 claims, 113 acres, patented, near the Penn-Wyoming mine, on Upper Cow creek, 12 miles west of Encampment, said to show 2 veins, 1 of 26 to 32′ estimated width, being a schist dike. Mine has about 500′ of tunnels, developing ore giving assays of 6 to 14% copper, with small gold and silver values. Idle since 1915.

INDEPENDENCE MINING CO. **WYOMING**

Successor of Leighton-Gentry Mining Co.

Idle. **Office:** Algoma Bldg., Oshkosh, Wis.

Officers: E. E. Meeleus, pres.; Henry L. Larsen, v. p.; H. O. Granberg, sec.-treas. and gen. mgr.

Inc. June 28, 1904, in Wyoming. **Cap.,** $1,000,000; $1 par.

Property: 6 claims, patented, 120 acres, 2 miles north of Dillon in the Battle Lake district, shows eruptive metamorphic country rocks, carrying an 11′ contact vein between quartzite and diorite.

Development: by 200′ incline shaft and 250′ tunnel, showing occasional stringers of 3 to 12″ width, carrying a little chalcopyrite assaying 12% copper, with small quantities of nickel and cobalt and traces of silver and gold. Has steam power, a hoist and several small mine buildings.

IRON BLOSSOM MINING CO. **WYOMING**

Office: Laramie, Wyo. **Mine office:** Foxpark, Wyo.

Officers and directors: Grant Thomas, pres.; E. J. Stoll, v. p.; Wm. Benton, sec.-treas. and mgr.

Inc. August, 1914, in Wyoming. **Cap.,** $100,000; 10c par; $75,000 issued; 250,000 shares in treasury. Paid dividends of 40% during 1918.

Balance sheet of August 3, 1918, showed cash, Liberty bonds and securities worth $15,400; and bills and taxes of $240.

Property: 5 claims, 100 acres, in Albany county, includes the Amazon, Great Rambler, and Beulah mines, 5 miles W. of the C. W. & E. R. R. at Foxpark.

The Amazon mine whose claims cover 40 acres, has a 1,000′ tunnel giving a back of 200′. Ore was encountered in fissure veins in diorite at 200′ and 600′ from portal. Two lots of ore shipped to the Grant smelter, Denver, gave returns (1) 11% copper, $6.40 gold and silver; (2) 15.40% copper, $12.60 gold and silver.

The Beulah property has a 65′ shaft with a 30′ crosscut from which ore was mined that yielded 11.20-15.6% copper, $3.40 and $5.60 gold and silver. Ore carries 40% iron making it a good flux. A 2,200′ tunnel is being driven on vein through Amazon property towards Beulah shaft to drain ground and allow larger production at lower cost. Tunnel 965′ long, December, 1919.

Company intends to sell 50,000 shares at 30c. to complete work planned. In January, 1920, it was decided to erect a power plant, hoist, pumps, and a mill.

ITMAY COPPER MINING CO. **WYOMING**

Idle. **Office:** Rawlins, Wyo. Mine near Rambler, Carbon county, Wyo. I. C. Miller, mgr.; Albert Bryle, supt.,, at last accounts.

Property: 4 miles S. of Rambler, is said to have a 20′ vein, carrying a paystreak of high-grade ore, apparently undeveloped, and another vein up to 8′ in width carrying sulphide ore.

Development: by a 300′ shaft. Mine has been a complete failure to date.

JACK POT MINING & MILLING CO. **WYOMING**

Idle. **Office:** Room 3 Algoma Bldg., Oshkosh, Wis.

Officers: H. Thorsgaard, v. p.; H. O. Granberg, sec.-treas.

Inc. Dec. 23, 1903, in Wyoming. **Cap.,** $1,000,000; shares $1 par.

Property: 9 patented claims, 180 acres, in the Battle Lake district, showing fissure veins in diorite and chlorite schist, and 2 contact veins, between diorite and porphyry, carrying carbonate and sulphide ores. Two veins, slightly developed, are said to average 14′ to 60′ in width. The smaller vein has averaged 8% copper and $3 to $12 gold per ton, the larger vein showing very low-grade copper ore.

Development: 75′ tunnel, 100′ shaft and 8 pits of 20 to 36′ depth, with 411′ of workings. Though inactive for many years, company is still in existence and all taxes have been paid to date.

KIMBALL MINING CO. **WYOMING**

Idle. **Address:** Kimball, Neb. B. A. Lathrop, pres. and supt., Centennial, Carbon county, Wyo. G. W. Forsling, v. p.; A. J. Hull, sec.-treas.

Property: 19 unpatented claims, near Centennial, developed by 800′ of tunnels opening a quartz vein with gold and silver-bearing copper ore. No recent returns.

LEIGHTON-WYOMING MINING CO. **WYOMING**

Idle. Letters returned from 417 Seventh St., Milwaukee, Wis.

Officers: M. H. Yewdale, pres.; Herman Pereles, v. p.; H. E. Dankoler, sec.; Spencer C. Yewdale, treas.; with A. G. Weissert, S. P. Bjorklund and C. W. Hendricks, directors, at last accounts.

Inc. 1906. **Cap.,** $1,000,000; shares $1 par; issued, $810,000.

Property: 2 patented claims, about 1 mile north of the Ferris-Haggarty mine in the Battle Lake district.

Development: by a 186′ tunnel and a 65′ shaft.

Equipment: includes a sawmill and a small machinery plant, bought 1909, from the Haskins mine.

LORIMER MINERALS CO. **WYOMING**

Address: M. Lorimer, Lusk, Wyo.

In November, 1919, machinery had been erected to make a trial run, "preparing rich uranium ore for shipment to the extracting plants in the East." It was expected that radium would be extracted locally from the ore, and a sanitarium erected.

LOST CABIN MINING CO. **WYOMING**

Address: A. O. Heger, sec., Shoshoni, Fremont county, Wyo.

Cap., $150,000.

Property: the Lost Cabin group, in the Boyeson section, said to carry the Summit vein. Gold, silver and copper ore occurs in quartz veins. Since 1909 assessment work only has been done.

MAGGIE MURPHY COPPER CO. **WYOMING**

Office: care Chas. S. Ashley, pres., New Bedford, Mass. Mine near Douglas, Converse county, Wyo.

Inc. August, 1904, in Wyoming. **Cap.,** $1,000,000; shares $1 par.

Property: 12 claims, 180 acres, and a 60-acre millsite in Horseshoe canyon, in the Laramie Peak district. Claims show granite, with gneiss and schists, carrying 7 veins between gneiss and mica-schist, one of which ranges 30 to 60′ in width and shows covellite, bornite and chalcopyrite, with pyrrhotite ores assaying 1 to 6% copper, 2 to 9 oz. silver and 40 cts. to $4.50 gold per ton.

Development: includes 114′ shaft and various shallow workings. Company has kept up necessary annual assessment work, but has done no development, as far as can be ascertained.

NORTH LARAMIE PEAK COPPER MINING CO. **WYOMING**

Office: care L. V. Saul, sec., Esterbrook, Wyo. **Mine office:** Douglas, Converse county, Wyo.

Officers: H. C. Saul, pres.; W. A. Saul, treas.

Inc. 1908, in Wyoming. **Cap.,** $2,000,000; shares $1 par; fully paid and non-assessable; 500,000 shares in treasury.

Property: 29 claims, 440 acres, patented, in the North Laramie Peak district, show pre-Cambrian schists bordering granite contacts, on which 1,000′ of diamond-drill work has proven existence of a flat body of disseminated chalcopyrite ore 40′ wide. A shaft has been sunk 100′ on a chimney of chalcopyrite ore said to assay 27% copper, 6 oz. silver and $2 gold, for a total width of 5′.

Equipment: includes 80-h. p. boiler with hoist, pump, steam power and a 3-drill compressor. Is a close corporation, entirely owned and financed by Messrs. Saul. No recent returns.

OCCIDENTAL GOLD MNG. & MLLG. CO. **WYOMING**

Address: Beulah, Crook county, Wyo.

Property: 12 miles from Beulah, was not operated in 1918-19, though roads were built, and flumes and pipe laid as part of assessment work.

OSHKOSH-WYOMING MINING CO. **WYOMING**

Idle. **Office:** 3 Algoma Bldg., Oshkosh, Wis. Mine near Dillon, Carbon county, Wyo.

Officers: O. A. Koch, pres.; E. E. Mecleus, v. p.; H. O. Granberg, sec.-treas. and gen mgr.

Inc. June 20, 1904, in Wyoming. **Cap.,** $1,000,000; shares $1 par.

Property: 11 claims, 220 acres, in the Battle Lake district, is said to carry fissure veins in gabbro, of 22′ estimated average width, opened by shafts of 32′ and 72′ and a 22′ tunnel, showing chalcopyrite and oxide ores of copper.

OTEGO MINING CO. **WYOMING**

Hecla, Wyo. **Officers:** Horace E. Adams, pres.; L. M. Porter, v. p.; Fred McTygue, sec.-treas.

Inc. in Wyoming. **Cap.,** $5,000,000; shares $1 par.

Property: 3 claims, about 60 acres, in the Silver Crown mining district near Hecla, Laramie county. The Arizona mine is said to show granite and schist cut by an extensively fractured dike of diorite, about 200′ wide and 2,000′ long, outcropping at surface over a considerable distance. Ore, at surface is oxidized and carries principally malachite, succeeded at depth by copper sulphides and native copper. Gold occurs disseminated throughout the orebody.

Development: by 160′ shaft with 102′ crosscut at the 80′ level, 260′ of

crosscuts and drifts on the 130′ level, and a 100′ tunnel. Mine reported on by C. E. Jamison and H. C. Beeler (1907).

PARK GOLD MINING CO. **WYOMING**

Office: Mining Exchange Bldg., Colorado Springs, Colo. **Mine office:** Centennial, Wyo.

Officers: Henry Sachs, pres.; G. Y. Kittle, v. p.; C. B. Garnett, sec.-treas.; P. J. Winters, mgr., with E. H. Joslyn, directors.

Inc. 1916, in Wyoming. **Cap.,** $700,000; shares $1 par; non-assessable; 333,250 shares outstanding.

Property: 10 claims, 100 acres, 40 acres being placer ground, in Centennial mining district, Albany county, 3½ miles by road to Centennial, at an elevation of 9,294′. Also has a bond and lease on 200 acres adjoining ground, developed by a main tunnel expected to cut the veins of the mineralized zone at 500′ from portal.

Development: work was started in January, 1917, and consists of two tunnels, longest 335′ and a shallow shaft.

Equipment: includes gasoline engine and 3-drill compressor.

The lode claims have been favorably compared by the two engineers who have reported on the properties at different times "to the Homestake mine in South Dakota."

Funds for development being raised by sale of notes convertible into stock at 10c per share.

PENN-WYOMING COPPER CO. **WYOMING**

For detailed history, see Vol. X of "Copper Handbook."

In January, 1919, it was announced that Morse Bros. Machinery & Supply Co. of Denver had purchased from the Bondholders Protective Committee, the entire assets of the Penn-Wyoming, including all the assets of the various subsidiary companies whose bond issues totaled $3,600,000. Production from properties totals 6,414,011 lb. of copper recovered from 59,000 tons of ore equivalent to 5.4% copper.

The aerial tram connecting the Ferris-Haggerty mine with the smelter at Encampment is 16 2/3 miles long, and was a costly attempt to solve the transportation problem. An honest effort will be made by the new owners to prove the value of the mines, and to operate them if investigation proves them worthy of the necessary expenditure. The smelter and concentrators at Encampment will be dismantled and sold.

The geologic features of the district are described by A. C. Spencer, in Professional Paper No. 25, of the U. S. Geological Survey, 1904.

PLATINUM MINING & MILLING CO. **WYOMING**

Merged with Rambler Copper & Platinum Co. into Rambler Consolidated Mines Corporation, which see. Fully described in Vol. XIII.

PLUTO GOLD & COPPER MINING CO. **WYOMING**

Idle. **Office:** 3 Algoma Bldg., Oshkosh, Wis. Mine near Dillon, Carbon county, Wyo. H. Thorsgaard, v. p.; H. O. Granberg, sec.-treas.

Inc. Dec. 15, 1902, in Wyoming. **Cap.,** $1,000,000; shares $1 par.

Property: 11 claims, patented, 220 acres, and a 40-acre millsite, in the Battle Lake district, near the Ferris-Haggerty mine, said to show both fissure veins in quartzite and contact deposits between diorite and quartzite, ranging from 2 to 30′ in width, and carrying copper ore, with average assays of 1% copper, a trace of silver and $3 gold per ton.

Development: by numerous pits of 10 to 20′ depth, 5 shafts of 55 to 100′ depth, and a tunnel of 1,004′ with about 2,000′ of underground workings.

Equipment: includes a 40-h. p. steam plant and 3-drill air compressor. Inactive since 1908.

PORTLAND CONSOLIDATED COPPER CO. **WYOMING**

Office: 20 Broad St., New York.

Officers: Herbert Frankenberger, pres.; Myer Newberger, v. p.; J. N. Blye, sec.-treas.; with David Sherman, T. C. Delany and W. H. D'Esterre, directors.

Inc. 1916, in Wyoming. **Cap.,** $2,000,000; shares $1 par; 1.571,216 shares

outstanding. Security Transfer & Registrar Co., New York, registrar; Company office, transfer office. Stock listed on New York Curb.

Property: formerly owned by the West Virginia Wyoming Copper Mining Co. and the Portland Copper Mining Co., comprises 203½ acres, 153¾ acres patented, at Encampment, Carbon county, said to cover over a mile along a mineralized zone of diorite and limestone. The Portland group is reported to be traversed for 1,800′ by a system of veins, which runs westerly into and through the West Virginia Wyoming for 1,800′, veins said to vary from 12″ to 40′ in width, and to average 5% copper and some gold. Minerals are chiefly pyrite, chalcocite, bornite and malachite.

Development: 2,600′ of workings, of which 1,650′ are on the Portland, consisting of an 1,150′ tunnel, drifts and 610′ main shaft. Management estimates ore reserves at 300,000 tons of probable mill ore, containing 2 to 3% copper and 40c gold; and 50,000 tons probable smelting ore, containing 10 to 25% copper and $1 to $6 gold per ton. Further development necessary to prove value of the property.

RAMBLER CONSOLIDATED MINES CORPORATION WYOMING

A merger of the Rambler Copper & Platinum Co. and Platinum Mining & Milling Co.

Office: 912 Otis Bldg., Chicago, Ill.

Officers: A. A. McKinley, pres.; R. M. Ayres, v. p.; J. W. Runkin, treas., with F. S. Sheldon, J. K. Blist, and J. M. Stager, directors.

Cap., $2,500,000; $1 par; 1,275,000 issued. Bonds authorized, $500,000; entire issue placed in 1919.

Property: 12 claims, 240 acres, includes the Rambler mine, near Holmes, Albany county, Wyo. Ore assays well in platinum, palladium and copper.

Geology: the platinum occurs as tiny crystals of sperrylite (arsenide of platinum) in basic dikes, which cut a granite-gneiss complex with quartzite and massive granite. The associated minerals include covellite, chalcocite and chalcopyrite. Recent work at depth is said to have disclosed a workable orebody. In 1918, the ore mined and put through the mill, yielded 350 tons of concentrate containing platinum and palladium, besides gold, silver, and copper.

Mine operated for first half of 1918. Plan erecting a smelter and operations expected to be resumed early in 1920. See U. S. G. S. Bull. 213, p. 914.

RAMBLER COPPER & PLATINUM CO. WYOMING

Merged with Platinum M. & M. Co. into Rambler Consolidated Mines Corporation, which see. Fully described in Vol. XIII.

RICH CHARTER OAK COPPER CO. WYOMING

Address: G. P. Elmen, sec., Lincoln, Neb.

Property: formerly owned by a British corporation, is situated 7 miles N. W. of Encampment, the nearest rail point.

Development: by 7 shafts, deepest 425′, and 2,000′ of lateral work, said to have exposed copper-gold-silver ore. Main vein has been traced for 2 miles. About 15,000 tons of ore is on dumps, samples giving from 10 to 40% copper and $10 in gold and silver. Main shaft is to be sunk to 1,000′.

Equipment: includes hoist, compressor, assay office, camp buildings, and 60-ton mill installed in July, 1919.

SHAWNEE COPPER MINING CO. WYOMING

Address: J. M. Bovee, mgr., Shawnee, Okla. **Owners:** J. M. Bovee, and A. H. Ikenberry.

Property: 5 claims, unpatented, in Medicine Bow Mts., French Creek district, Carbon county, Wyo., near New Rambler mine, shows granite and schist cut by a fissure zone 200′ wide, carrying $4.10 gold ore.

Development: by 160′ and 210′ shafts. Examinations have been made by H C Beeler, J. J. Hinton, and other engineers. Ample assessment work is done each year.

SNAKE RIVER CONSOLIDATED MINING CO. WYOMING

Offices: 426 Century Bldg., Denver; and Columbine, Routt county, Colo.

Officers: L. A. Pease, pres., treas. and gen. mgr.; A. L. Arnold, sec.

Inc. July, 1906, in Wyoming. **Cap.,** $5,000,000; $1 par; fully issued, with $2,500,000 stock assigned to a trustee, for the benefit of the treasury. Annual meeting, second Wednesday in July.

Property: 9 lode claims, 2 patented, 180 acres, and 520 acres of placer claims, unpatented, in Three Forks district, 26 miles S. W. of Encampment, the nearest rail point.

Geology: claims show granite and diorite, reported by management to have veins carrying auriferous galena, with strike of N. 25° W., and cross veins carrying copper striking at nearly right angles, the galena vein system having an extreme width of 120′, with length of 4,500′, the paystreak varying from 10″ to 54″ in width. The galena ore is said to average 10 to 20% lead, free from zinc, with silver and gold values. The copper veins are undeveloped, but show a variety of oxidized ores, at surface.

Development: by pits and shafts, and numerous short tunnels, from 30 to 500′ in length, nearly all openings showing ore. The management estimates 5,000 tons of ore blocked out for stoping. Plan raising necessary funds for proper equipment and small concentrating plant.

UNITED SMELTERS, RAILWAY & COPPER CO. WYOMING

Dead. The property claimed by company is described under the title of the Penn-Wyoming Copper Co., which apparently was the legal owner, and full particulars regarding the entire chain of rotten promotions, including this company, are given in Vol. X, Copper Handbook, under Penn-Wyoming Copper Co.

Judgment against company for $2,500,000 was secured by Continental & Commercial Trust & Savings Bank, Chicago, December, 1913. Bank had loaned money to company taking a mortgage on the property. Several years of litigation were thus ended and the properties of the United Sm., R'y. & C. Co. and its subsidiaries were sold at forced sale, being bought in by the bank.

On January 1, 1919, the property was purchased by the Morse Bros. Machinery Co. of Denver, who will build a mill for the treatment of the old smelter slag dump.

UTOPIA MINING & MILLING CO. WYOMING

Address: Centennial, Albany county, Wyo.

Officers: Lee Van Voorhis, pres.; Jas. McCune, v. p.; P. L. Loltum, sec.; Bernards Loltum, gen. mgr.

Inc. 1898, in Wyoming. **Cap.,** $1,000,000; shares $1 par; non-assessable; issued, $875,000. Annual meeting, third Tuesday in August.

Property: 2 claims, 30 acres, unpatented, in the Centennial district, said to show 2 contact veins between diorite and schist, of which 1 averaging 5′ in width, is reported to have given assays of 3% copper, 4 to 20% zinc, up to 63 oz. silver and $44 gold per ton. Minerals are mainly chalcopyrite, sphalerite, and pyrite. Ore averages $15 per ton.

Development: by tunnels of 250′, 600′, 175′, 300′, and 1,200′, with about 2,600′ of workings, all in ore.

Equipment: includes a small electric installation, with electric drill, and 6 buildings. Reopened in 1913 and leased in 1915 to the Gould Milling & Leasing Co. A 50-ton mill costing $20,000 was erected, but was closed during the war. It was to be remodeled, and mine and mill operated by lessees in 1919-'20.

VINDICATOR CONSOLIDATED GOLD MINING CO. WYOMING

Office: 603 Symes Bldg., Denver, Colo., and Glenrock, Wyo.

Officers: see same company under Colorado.

Property: 3 patented chromite claims, 23 miles S. E. of Glenrock, Converse county, Wyo., purchased in October, 1918, for $8,750 cash, plus 12½% royalty on ore on board cars.

Development: not enough work has been done to prove limits of 4 lenses

of 40% chromic oxide ore whose croppings are scattered over an area of 400′ across. Exploration work and stoping have produced 610 tons and developed indicated ore amounting to 2,000 tons, with faces still in ore. This ore is from 4 to 22′ wide, and is found but 10′ below the surface. One lens yielded 50 tons of 34% ore, with enough indicated ore to show that it would take 5 months' work to extract it and would give a profit after paying for purchase price and all improvements, including much road construction.

Financial: chromite mined on the Pacific Coast when shipped to Denver, takes a freight rate of $8.70 per ton higher than ore from Glenrock, to the Vindicator company's Denver plant, where two 1,500 kva. electric furnaces reduce the ore to ferro-chrome with output of 200 tons per month. This freight charge gives the Vindicator Company a big advantage over other chromite producers. The total outlay at the mine up to February, 1919, was $55,273, less $21,671 for ore sold.

WESTERN SULPHUR CO. **WYOMING**

Address: Douglas, Wyo.

Officers: W. F. Cox, pres.; G. W. Metcalf, v. p.; C. D. Zimmerman, sec.-treas.; with P. I. Rothwell, directors. H. C. Austin, supt.

Inc. in Wyoming. **Cap.,** $15,000,000.

Property: 430 acres at Thermopolis, Hot Springs county, Wyo. Examined by Chauvenet of St. Louis and McClave of Denver.

Sulphur deposit is a dissemination in limestone, assaying from 60 to 99.7% S. Mining is to be by steam shovels. Diamond-drilling under way in 1919. A spur line is contemplated, also a refinery.

WILLIAMS LUMAN MINING CO. **WYOMING**

Address: care W. J. Thom, cashier First Nat'l Bank, Buffalo, Wyo. **Mine office:** Depass, Fremont county, Wyo. L. R. Vanhouten, pres.

Inc. May 2, 1908, in Wyoming. **Cap.,** $2,500,000; $1 par; issued 2,385,000 shares.

Property: 9 claims, patented, 130 acres, 16 miles from a railway, in the Copper Mountain district, shows 8 fissure veins in granite, diorite, and altered schist. The main vein zone, 50 to 60′ wide, traceable 3,400′, in much altered, crushed and fissured diorite, has a 2′ paystreak carrying free gold, copper ore, and native copper in thin sheets and nuggets, ore minerals being cuprite, melaconite, malachite and chalcocite. Ore is reported to assay 10% copper, 5 to 10 oz. silver, and $2 to $8 gold per ton.

In April, 1918, company bonded the McGrath claims from D. I. Darr, of Basin, Wyo.

The G. & M. Copper Mining Co. operated a lease on the main property and was reported shipping ore. Company resumed operations in 1918.

Development: by an 820′ shaft, showing sulphides on the 800′ level, with 2,000′ of workings. There also are tunnels of 513′ and 300′.

Equipment: includes an 80-h. p. gasoline plant, with a 15-h. p. hoist and a 2-drill compressor. A concentrator was erected in April, 1918.

The company is operated as a close corporation, money for development having been furnished by about 10 shareholders only. Property favorably regarded, but needs railroad transportation.

WINONA GOLD-COPPER MINING & MILLING CO. **WYOMING**

Office: 111 Market Ave., S. Canton, Ohio. **Mine office:** Painter, Big Horn county, Wyo.

Officers: L. Cavanah, pres. and gen. mgr.; Geo. House, v. p.; Dr. J. H. East, 2nd v. p.; Wm. H. McAloney, sec.-treas., at last accounts.

Inc. 1903, in Wyoming. **Cap,** $5,000,000; shares $1 par; fully paid. Management was changed and company practically reorganized December 12, 1905.

Property: 25 claims, unpatented, 440 acres, in the Sunlight basin, on Silver creek, in Bear Tooth and Sulphur mountains, in the N. W. corner of Big Horn county, about 12 miles E. of the Yellowstone National Park. Claims show granite, porphyry and andesitic breccia, carrying 6 fissure veins with shoots of low-grade copper ore. The ores carry chalcopyrite and chal-

cccite and are reported to average 7 to 8% copper with about $3 gold per ton. The principal veins in andesite are known as the Bluff, Malachite and Greenhorn. The Bluff vein is said to be 25′ wide with a 12′ paystreak of copper ore. The Malachite vein, 10 to 25′ wide, has a paystreak of high-grade copper ore, 1½′ wide at surface, increasing to 5′ at depth.

Development: by 2 tunnels, the lower or main working tunnel, 804′ long. Total workings, 1,032′. **Equipment:** includes steam and electric power plants and 10 buildings. No recent returns; presumably inactive.

WYOMING COPPER & GOLD MINING CO. **WYOMING**

Office: Alma, Kan. C. B. Henderson, pres.; Al Rohr, v. p.; J. R. Henderson, sec.-treas.

Inc. Sept. 3, 1903, in Arizona. **Cap.,** $1,500,000; shares $1 par; non-assessable.

Property: 9 claims, known as the Metal Chief and Jessie group, in Hog Park, in the upper Platte district, 12 miles from a railway, show granite and gneiss, cut by 2 fissure veins with S.-E strike, reported by management to average 28 to 35′ in width, and to carry copper oxide and carbonate ores, with average assay of 3 to 15% copper, a little silver and $1.63 to $3.29 gold per ton.

Development: the Metal Chief vein has a 105′ shaft and the vein is reported to widen at depth. The Jessie vein has a 175′ shaft showing ore of 5 to 10% copper tenor with small gold and silver values.

Equipment: includes a small steam plant with a hoist, steam pump, and 3 buildings.

No recent returns; presumably idle.

WYOMING COPPER MINING CO. **WYOMING**

Idle. **Office:** 303 Detroit Free Press Bldg., Detroit, Mich. **Mine office:** South Pass City, Fremont county, Wyo.

Officers: Charles K. Skinner, pres.; C. F. Remington, treas.; Jas. MacFarlane, v. p. and supt.; C. A. Spalding, sec., with Chas. E. Murphy, and Chas. D. Ridgway, directors.

Inc. 1905, in Wyoming. **Cap.,** $2,000,000; $1 par; issued 1,375,000.

Property: 12 quartz claims, 240 acres, and a 30-acre placer claim, in the South Pass district of the Wind River mountains, reported to show a contact zone between granite and metamorphic rock, proven for one-half mile in length by prospect pits.

Development: includes a 500′ incline shaft, and several hundred feet of crosscutting. The vein is reported by the former management to show sulphide ore at depth of 72′, ore giving assays of 2 to 6% copper, with an average of 1 to 2 oz., and maximum of 20 oz. silver, and $3 to $4 gold per ton.

Equipment: includes an 80-h. p. boiler and a 40-h. p. hoist, with several buildings.

CANADA

The mining companies of Canada are grouped by provinces and by districts, and arranged alphabetically under these names—Cobalt, Porcupine, etc., are therefore, described under Ontario. The Pas district, the new copper district of Canada is in Manitoba and the great number of mineral properties of the Pacific Coast region are described in the British Columbia section.

Newfoundland being an independent Crown Colony is in a separate section.

ALBERTA

ATHABASCA MINING CO.

Inc. in Alberta, Can., April, 1914. **Cap.**, $1,000,000. Hon. G. H. V. Bulyea, Gov. of Alberta, Hon. Chas. R. Mitchell, E. J. Taylor and C. L. Freemann, directors, all of Edmonton.

Property: assets and properties of the Athabasca Mng. Syn. consisting of 800 acres of nickel claims, 160 acres iron claims, on and near Lake Athabasca, near Edmonton, Alberta, Canada. Assays of surface samples showed 1½ to 5% nickel, iron samples ran 66.7% iron, 2.12% silica, .014% phosphorous and .013% sulphur. Copper occurs as bornite.

BRITISH COLUMBIA

The mining companies of this province are arranged alphabetically. Readers interested in British Columbia mines should consult the yearly reports of the Provincial Mineralogist, issued as Annual Report of the Minister of Mines, obtainable free from the Minister of Mines, Victoria, B. C.

A. B. C. METALS CO. **BRITISH COLUMBIA**

See Alaska British Columbia Metals Co.

ALAMO CONCENTRATOR **BRITISH COLUMBIA**

Located at Alamo, on the Kaslo-Nakusp Ry. Owned by Clarence Cunningham, and built by General Engineering Co., of Salt Lake City. Mill has a daily capacity of 150 tons and was built to treat ore from the Queen Bess, Wonderful, Sovereign, and Idaho and Alamo mines, operated by Cunningham. Power is obtained from a 225 h. p. Pelton wheel. Mill started operating about August, 1, 1919.

ALASKA BRITISH COLUMBIA METALS CO. **BRITISH COLUMBIA**

Office: S. I. Silverman, 1 Wall St., New York.

Officers: S. I. Silverman, pres.-mgr.; C. S. Cohen, v. p.; H. H. Hanson, sec.-treas., with H. M. Keith and H. L. Dudley, directors.

Inc. December, 1915, in Washington. **Cap.**, $2,000,000; $1 par; increased from $1,000,000. Metropolitan Trust Co., New York, transfer agents and registrars. Listed on New York Curb.

Company is a holding concern whose principal interests are in the Dewdney or Indian Chief mine of the Dewdney Canadian Syndicate, and in the Forty Nine Mining Co., Ltd., which see. Also controls the Tidewater Copper Co., which see.

AMARGOSA COPPER CO. **BRITISH COLUMBIA**

Office: 823 Old National Bank Bldg., Spokane, Wash.

Officers: E. P. Spalding, pres.-mgr.; C. D. Muxen, v. p.; Oscar Cain, sec.-treas., with A. M. Premo and G. A. Henkel, trustees.

Inc. 1916, in Washington. **Cap.,** $1,000,000; $1 par; assessable.

Property: 7 claims, 300 acres, 5 miles from Hazelton, claimed to cover 3,000′ on the strike of a series of veins, from 4-10′ wide, carrying copper-silver-gold ore.

Development: by 300′ crosscut tunnel. Idle since June, 1917.

PROPERTIES OF THE NEW BOUNDARY DISTRICT. THE DOLLY VARDEN MINE IS EAST OF STEWART.

AMERICAN BOY MINING CO. BRITISH COLUMBIA

Stockholders, 1918, Maurice Oppenheimer, A. W. Siegel, Sam Hanauer, and N. E. McCall, of Spokane, and C. D. Bibbins, Oakland, Calif. Reported in 1918 that Chas. F. Caldwell and Eastern associates had taken a 3-year lease and bond on property of the company for $100,000. Mine has been idle for 10 years.

Cap., $1,500,000; par $1.

Property: 4 claims, adjoining the Last Chance, on Reco Mountain, near Sandon, Slocan district, said to show silver-lead ore. There are several

thousand feet of workings; considerable ore was shipped when the property was operating.

ARGO MINING & TUNNEL CO., LTD. BRITISH COLUMBIA

Office and mine: Greenwood, Yale district, B. C.

Officers: Ole Lofstad, pres. and gen. mgr.; A. S. Black, sec.-treas.; with John Williamson, Jerome McConnell and Oscar Hartman, directors.

Inc. June 10, 1909, in British Columbia. **Cap.,** $125,000; shares 25c par.

Property: the Argo mine, near the Greenwood smelter, developed by 1,150′ tunnel, at a vertical depth of 500′, with portal about 500′ from track of the Canadian P. Ry. A vein of milling quartz, 10′ wide, contains a 4′ band of concentrating ore. No recent information; probably idle.

ASPEN GROVE AMAL. MINES, LTD. BRITISH COLUMBIA

Address: Merritt, B. C.

Officers: J. E. Bate, pres.; M. L. Grimmett, v. p.; M. R. Durland, sec.-treas., with Jos. Walters, and J. J. Gillis, directors.

Inc. in British Columbia. **Cap.,** $1,000,000; par $1.

Property: 75 claims, in Aspen Grove district, Nicola mining division, which show low-grade copper ore. At last report property was under bond and lease to Jas. Errington and associates and was to be explored by drilling.

AUFEAS MINES, LTD. BRITISH COLUMBIA

Dead. Formerly at Hope, B. C. See Vol. XII.

BABINE BONANZA M. & M. CO. BRITISH COLUMBIA

Officers: Jas. Cronin, pres., 924 S. Maple St., Spokane; Chas. Theis, v. p., with Wm. Huntley, J. F. Cronin, all of Spokane, Wash., and A. H. MacNeal, Vancouver, directors.

Property: a group of claims, 300 acres, at the head of the Tuchi river in the Babine range, Skeena district, 22 miles by trail from Smithers, on the Grand Trunk Pac. R. R. Orebodies occur on contact of granite porphyry and altered sediments, and in fissure veins, 1 to 3′ wide, in the porphyry. Values are in the silver-lead-zinc contents. Average assays show 20 to 60 oz. silver, 11 to 56% lead, 10 to 34% zinc.

Development: several tunnels, longest 400′, and shafts, deepest 105′. A promising prospect, but handicapped by its remoteness. Planning to continue development work, 1920.

BELMONT-CANADIAN MINES, LTD. BRITISH COLUMBIA

Described in Vol. XIII. Property taken over by Belmont Surf Inlet Mines, Ltd., which see.

BELMONT SURF INLET MINES, LTD. BRITISH COLUMBIA

Office: 500 Bullitt Bldg., Philadelphia, Pa.

Officers: C. A. Heller, pres.; W. M. Potts and S. D. Sinkler, v. p.; C. B. Taylor, gen. counsel., with E. A. Cleveland, M. B. Cutter, J. C. Fraley, R. G. Park and T. W. Synnot, directors. J. K. Kitto, sec.-treas.; B. G. Hawkins, R. G. Wilson, and A. S. Arnold, asst. sec.-treas.; C. Ducheneau, comptroller. Frederick Bradshaw, gen. mgr.; F. W. Holler, supt.; G. H. Garrey, cons. geologist; H. J. O'Connell, mine supt.; F. H. Penn, mill supt.; E. W. Hawkins, auditor.

Inc. in British Columbia. **Cap.,** $2,500,000; shares, $1 par. Inc. by the Tonopah Belmont Development Co., of Nevada, to take over property of Belmont-Canadian Mines, Ltd., and Surf Inlet Power Co., two British Columbian corporations, owned by the Tonopah Belmont, which controlled the mine during the construction period. The mother company owns 80% of the total capital and 20% is held by the Surf Inlet Mines. Up to the end of 1918, the Tonopah Belmont Co. had spent $1,294,706 on this property, a sum which has since been repaid by Belmont Surf Inlet.

Balance sheet for the year ended February 28, 1918, shows $325,792 receipts, of which $86,154 was net profit. Current assets were $326,258, and liabilities, $200,233. During the 10 months ended December 31, 1918, the income was $744,432, of which $274,169 was profit. Assets were $422,811, and liabilities $67,-107. Net earnings for the third quarter of 1919 were $67,484.

Dividends: initial, of 5 cents a share, equal to $125,000, was paid in April, 1919; total for 1919, $375,000. First quarter of 1920, $125,000.

Property: a gold-copper mine on Princess Royal Island, B. C.

Development: by the present company, total 16,000′ of work, all through tunnels. The cost per foot in 1918 was $15.116 for 1,887′. The winze below the main haulage-level (550′) is now a fully equipped three-compartment shaft with electric hoist, etc. Recent exploration has exposed orebodies of large size, and on January 1, 1919, reserves were reported as 422,761 tons, an increase of 153,790 tons since March 1, 1917. In 1918, 116,349 tons were mined.

Equipment: is very complete, including 750 k. w. hydro-electric plant, 5.65-mile transmission-line, compressors, machine-drills, conveyor-bridge, and 300-ton mill (started Sept., 1917), containing ball-mills, concentrators, and flotation machines. Concentrate is sent to smelter. A modern township has been provided and dwellings erected for employees.

Production:	Tons	Gold, oz.	Silver, oz.	Copper, %	Value per ton	Total realized	Recovery	Cost
1919.....	103,451	0.438	0.275	0.315	.....	.....	.....	.....
1918.....	83,142	0.481	0.311	0.261	$11.12	$740,090	93.13	$5,012
1917-18.....	33,207	0.501	0.354	0.199	11.11	325,549	92.30	7.131

The 1918 figures are for 10 months, and those for 1917-18 for 6 months, two broken periods. Net profit for last quarter in 1919, $88,181.

This mine is now a regular dividend-payer.

BIG MISSOURI MINE. **BRITISH COLUMBIA**

Address: Lindeborg Bros., Stewart, B. C. Mine worked under lease and bond by Sir Donald Mann, and Sandy Mann, of Montreal.

Property: 20 claims on Cascade creek, just N. of property of Premier Mining Co., 20 miles from Stewart, said to show an immense body of low-grade complex ore, opened by a series of open-cuts made in 1917, which prove the ore for a width of at least 1,000′. Hundreds of samples from these cuts average 60c in gold, $1.05 in silver, 2.16% lead, 0.5% copper, 5%zinc, 14.3% iron, 75% silica. Work in 1918 is said to have disclosed extensive bodies of high-grade silver ore that will assay, in places, over $100 per ton in a width of 20′. Diamond drilling, stopped during the winter, to be renewed in 1920. If further development shows continuation of such a large low-grade orebody experimental work will doubtless find a method to treat the complex ore. The high-grade ore is an additional asset.

BOWENA COPPER MINES, LTD. **BRITISH COLUMBIA**

Office: 420 Rogers Bldg., Vancouver.

Officers: L. A. Brown, pres.; T. W. Turner, v. p.; C. M. Oliver sec.-treas., with D. McCallum, and G. Armitage, directors.

Inc. May, 1913, in British Columbia. **Cap.,** $300,000; $1 par; outstanding, 287,020. Annual meeting, December 13. Spent $20,477 in development work to date.

Property: 3 claims, 150 acres, crown-granted, on the east side of Bowen Island, 12 miles west of Vancouver, said to show disseminated copper ore assaying 1.9% copper and containing gold and silver.

Development: 170′ tunnel, claimed to block out 10,000 tons ore. Trial shipments sent to Ladysmith smelter in 1917, ran 3.3% copper, $2.40 gold and 1.16 oz. silver per ton, netted $14.18 per ton.

Alexander Sharp, E. M., reported 8,000 tons of 1.8% ore and G. S. Eldridge, Provincial assayer, Vancouver, reported the 10 dumps ran 2.42% copper.

Property leased, July, 1918, to C. W. Tipping for 5 years, company to receive 40% of the net profits. Lessee has built a 100-ton mill. No record of output.

BRITISH-ALBERTA MINING CO. **BRITISH COLUMBIA**

Address: A. J. Flood, pres., Vulcan, Alberta; W. R. Allen, sec., Nelson, B. C.

Property: St. Patrick group, 4 claims, 6 miles N. of Argenta, at head

of Kootenay Lake, Ainsworth mining division. Said to show a 36′ vein with lead-silver-zinc ore in streaks 6 to 18″ in width. Developed by tunnel and a 90′ shaft. In 1918, a few men were employed and a little ore mined.

BRITISH-AMERICAN COPPER MNG. & SM. CO. B. C.

Office: 510 White Bldg., Seattle, Wash.

Incorporators: Arthur Bernstein, Norman Herman, Adam Beeler, J. J. Sullivan, and E. M. Kennard.

Inc. in 1917 in Washington. Cap., $2,000,000. Company planned to develop copper mines in British Columbia. No recent information.

BRITISH AMERICAN MNG. CO., LTD. BRITISH COLUMBIA

Office: Van Anda, Texada Island, B. C.

Officers: H. J. Peterson, pres.; E. E. Harnish, v. p.; O. L. Grondahl, sec.; preceding officers, J. D. Smith, Geo. King, R. C. Payne and A. G. Bylin, directors; L. M. Olson, treas.; John Minear, supt.

Inc. December 1906, in Arizona. **Cap.,** $1,000,000; $1 par; 591,000 outstanding.

Property: 3 patented claims on Texada Island, B. C., said to show copper, gold and silver ore in vein. Development is by 160′ incline shaft.

Equipment: hoist, 3-drill air compressor. Company does not reply to letters. A prospect.

BRITISH CANADIAN SILVER CORP'N BRITISH COLUMBIA

Address. R. E. Bayliss, 19 St. Swithin Lane, London, E. C. 4, England.

Organized February, 1920, as operating subsidiary of Selukwe Gold Mng. & Finance Co., to develop properties in Stewart district, B. C.

BRITISH COLUMBIA COPPER CO., LTD. BRITISH COLUMBIA

Fully described in Vol. XII. See Canada Copper Corporation.

BRITISH COLUMBIA IRON CO., LTD. BRITISH COLUMBIA

Address: E. C. Wragge, Nelson, B. C.

Organized in summer of 1919, to develop 40 claims located about 3 miles W. of Kitchener.

Management states that the holdings show a large body of hematite, running from 60 to 75% iron, and that diamond drilling will be done to ascertain its commercial possibilities.

BRITISH COLUMBIA MANGANESE CO. BRITISH COLUMBIA

Operates a manganese property at Hill 60, 12 miles W. of Duncan. Regular shipments are made to the Tacoma smelter.

BRITISH COLUMBIA PHOENIX CO., LTD. BRITISH COLUMBIA

Described in Vol. XIII. Presumably dead.

BRITISH COLUMBIA SILVER MINES, LTD. BRITISH COLUMBIA

Address: O. B. Bush, Stewart, B. C.

Inc. in 1919.

Property: the Lake and O'Leary claims between the Premier and Bush mines and the Mountain claims between the Premier and International, all a few miles north of Stewart.

BRITANNIA MNG. & SMELTING CO. BRITISH COLUMBIA

All stock acquired by the Howe Sound Co., which see.

BULLION MINING SYNDICATE BRITISH COLUMBIA

R. T. Ward, mgr., Bullion, B. C.

Property: over 1,200 acres, 600 held under a 25-year government lease,, 600 acres Crown-granted, in Caribou district, Quesnel mining division. The property was formerly the largest hydraulic gold mine in British Columbia, but has been tied up by litigation for several years. The Quesnel Forks Gold Mining Co. was formed to take it over, but according to report the property has been awarded by the Courts to R. T. Ward. A large amount of money has been spent on the mine, and over $1,500,000 of gold has been extracted.

BUCKEYE MINES CO. BRITISH COLUMBIA

Office: Geo. C. Mercer, pres., Lodi, N. J.; W. C. Dalglish, v. p.; E. L. Larkin, treas.; T. C. Larkin, sec., all of 291 Broadway, New York; J. J. Harris, H. G. Glennon, directors.

Inc. in Delaware. **Cap.,** $1,000,000; par $1.

Property: 67 acres in Ainsworth district, B. C., said to show several hundred feet of the Highland silver-lead-zinc vein, worked by Cons. M. & S. Co. through its Highland mine.

Development: two 40′ shafts and 200′ tunnel. Company has spent $35,000 in development.

In 1918, stock of this company was being sold by Winslow Taylor & Co., and Fox & Co., brokers, of Philadelphia. No recent information; probably idle.

BULLOCK MINING CO. **BRITISH COLUMBIA**

Organized September, 1919, by Groves Bros., of Bullock, Lardeau mining division, to develop a silver property near Bullock. Details of organization not available.

BURNIERE GOLD MINING CO. **BRITISH COLUMBIA**

Reported November, 1919, that this company, whose office is in Indianapolis, Ind., had acquired the Burniere and Nelson claims, 6 miles from Camborne, and 9 miles from property of New Era Mining Co. The company was to start development work and put up a mill.

BUSH MINE **BRITISH COLUMBIA**

See Premier Mining Co., Ltd.

BUSH MINES, LTD. **BRITISH COLUMBIA**

Address: O. B. Bush, pres. and H. Tanner, supt., Stewart, B. C.

Inc. in 1919.

Property: a group of claims just northeast of the Premier silver mine, north of Stewart. Encouraging conditions were reported late in 1919.

BUTTE & ROCHER DE BOULE COPPER CO. **BRITISH COLUMBIA**

Idle. **Office:** 49 East Broadway, Butte, Mont. **Branch office:** Hazelton, B. C.

Officers: Samuel McConnell, pres.; C. J. Stone, v. p.; J. W. McLane, sec.-treas., with Paul Ozanne and P. J. Jennings, directors.

Inc. 1912, in Arizona. **Cap.,** $1,000,000; $1 par; fully issued.

Property: the Highland Boy group adjoining, but 1,000′ above the Rocher de Boule mine and covering 400 acres on Juniper Basin, Rocher de Boule mountain, Omineca mining district, 3 miles from New Hazleton and 4 miles from the Grand Trunk railroad. Claims show the extension of the Rocher de Boule veins, 2 of which have been opened by tunnels and open cuts. Ore occurs in fissure veins following intrusive dikes of porphyry in granite. Samples from veins 18″ to 5′ wide, assayed from 1.5% to 5.7% copper; with 0.5 to 0.8 oz. silver and slight gold values.

Property considered promising and worthy of further development.

CALIFORNIA MINING CO. **BRITISH COLUMBIA**

Officers: J. R. Cassin, pres., E. 416 9th St., Spokane, Wash.; W. R. Orndorff, sec.-treas.; W. H. Turner, mgr.

Property: 5 claims, on Bird creek, near Nelson, B. C., shows a strong vein developed by tunnels; No. 3 tunnel, 1,200′ long, is 170′ vertically below No. 2, which is 627′ long. Ore is said to average $17 gold per ton.

The Athabasca 10-stamp mill, leased to test the ore, was enlarged to 25-ton capacity by adding a ball-mill, Senn table, and flotation unit. A recovery of 90% is expected.

CANADA COPPER CORPORATION, LTD. **BRITISH COLUMBIA**

Office: 42 Broadway, New York.

Officers: L. W. Mayer, pres.; A. J. Ronaghan, v. p.; with C. H. Burke, August Heckscher, Allen H. Rogers, C. I. Stralem, E. L. Gruver, Newman Erb, Colgate Hoyt, directors. R. H. Eggleston, sec.-treas.; H. R. Van Wagenen, gen. mgr.; Allen H. Rogers, cons. engr.; and F. S. Norcross, Jr., supt. of mines, British Columbia.

Inc. March, 1914, in Virginia. **Cap.,** $10,000,000; $5 par; increased August, 29, 1917, from $5,000,000; outstanding 945,859 shares. Funded debt, $2,500,000 1st sinking fund convertible gold 6s dated January 1, 1918, due January 1, 1928. Convertible any time into stock at $3 a share. A sinking fund of 15c. per dry ton of ore, not less than $150,000 shall be paid each year.

Debentures: $710,000 five year 6% gold debentures issued October 1,

1919, subject to call at $105 and interest, and offered stockholders pro rata at par with a bonus of 100% par value of stock.

Equitable Trust Co., New York, transfer agent. Empire Trust Co., New York, registrar.

On March 20, 1917, company purchased the properties and assets of the British Columbia Copper Co., Ltd., the operating company, by exchange of one of its shares for two of the latter. In May, 1917, there was less than 3% of the capital stock of the B. C. company outstanding.

Comparative Balance Sheet, years ending December 31:

Assets.	1918	1917
Properties	$6,059,323	$5,461,201
Equipment for future delivery at contract prices	258,920	.....
Metal & Smel. Products, Supplies, etc	346,054	302,167
Copper on hand and in transit	106,309	256,488
Insurance, taxes, etc	22,098	14,958
Investments	211,539	103,456
Bonds, 10-yr., due in 1918	.....	1,247,440
Cash	542,966	109,609
Profit and loss	229,864	59,703
Total	$7,777,073	$7,555,022

Liabilities.	1918	1917
Capital stock	$4,729,295	$4,728,470
Bonds—10-yr., 6%	2,575,000	2,500,000
Liberty Bonds—deferred installments	45,361	.....
Equipment contracts	209,578	.....
Accounts payable	203,811	317,738
Reserve for sundry Liab	14,028	8,814
Total	$7,777,073	$7,555,022

From January 1, 1918, to November 26, 1918, operations of the old properties resulted in a deficit of $19,574, compared with net earnings of $152,690 the previous year.

The company smelter at Greenwood, B. C., was permanently shut down November 26, 1918, owing to depletion of ore reserves, and low grade of remaining ores. The Lone Star mine (Wash.), was also closed down, as its ores were for years mined for use as a flux for the B. C. ores. By itself it is too poor to pay mining costs. The Boundary creek properties are described in Vol. XIII.

Copper Mountain Properties:

The company's future depends on the newer and larger holdings of 3,006 acres of mineral and other land at or near Copper Mountain, British Columbia, 9.5 miles due south of Princeton, British Columbia, and 182 miles by rail east of Vancouver. A 13-mile branch of the Kettle Valley R. R. connects Princeton and Copper Mountain.

Geology: Copper mountain consists of monzonite-porphyry and granodiorite, intruded by a system of light-colored porphyry dikes.

The ore consists of primary chalcopyrite, bornite and pyrite finely disseminated in the porphyry and granodiorite, carrying recoverable values in gold and silver. The ore is found at or close to the surface, but oxide minerals are rare.

Development: property has been developed in a systematic manner by a large amount of diamond drilling and underground work. Over 118,500′ of diamond drilling, 31,738′ of surface trenching, 18,000′ of drifting, 15,000′ of raising, and 900′ of sinking has been done to block out ore. Ore is taken out through the 2,900′ main haulage tunnel. There is a difference in elevation of 800′ between this tunnel and the next nearest workings: a 2-compartment hoistway, and a zigzag ore pass connecting the tunnels.

All ore thus far developed occurs above the level of the Similkameen River, which passes along the base of Copper Mountain at an elevation of approximately 2,500′.

Ore reserves: estimated at 10,000,000 tons of developed ore and 2,000,000 tons of probable ore, having an assay value of 1.74% copper, and approximately 35c. per ton in gold and silver. Careful geological study suggests the possibility of eventually doubling the present tonnage of assured ore. Company in addition owns several other promising prospects in the locality.

The average grade of ore has been determined from bulk samples drawn from the underground workings, and these areas have been thoroughly checked both by drill and groove sampling.

Treatment of ore: a 40-ton flotation test mill erected at the property has given very satisfactory results. Since there is a marked absence of oxidized material in the ores, a recovery of 90% of the copper is expected in regular operations; actual savings very close to this figure on extended experimental runs have already been obtained. Concentrates assaying 25% copper were maintained with a concentration ratio of approximately 17 into 1.

For the purpose of estimating earnings, a recovery of 27.4 lb. of copper per ton of ore was assumed after allowing for a certain amount of dilution by waste rock. As the wall rock is generally light colored dike material, the ore admits of clean mining.

The cost of producing copper is estimated at 9½c. per lb. when operating on a basis of 3,000 tons per day. Approximately one-half of the present ore reserves will be extracted by open-cast mining methods, and all of the ore will be drawn from the mines by means of tunnels.

The millsite, called Allenby, is 9 miles from the mine and 4 miles from Princeton. The mill, almost completed by end of 1919, being delayed for 4 months by a labor strike, is rated at 2,000 tons per day. The ore as mined will drop through the ore-pass to pockets on the 3,170′, or main haulage level, where it is trammed in 10-ton cars hauled by electric locomotives to the crushing plant at the mouth of the tunnel. After crushing to 2½″ it will go into 3,000-ton bins, then by railway cars to the mill bins.

Concentrates from the mill are to be smelted by the Consolidated M. & S. Co. at Trail, and the converter copper refined electrolitically.

Power is furnished by the West Kootenay Power & Light Co., which constructed a 100-mile transmission-line under a contract to supply 5,000 h. p.

Production:

Year	Gold, Oz.	Silver, Oz.	Fine Copper, Lb.	Year	Gold, Oz.	Silver, Oz.	Fine Copper, Lb.
1905....	26,226	95,410	5,601,309	1912....	25,863	142,025	11,146,811
1906....	20,238	82,193	5,820,651	1913....	26,640	137,052	8,296,902
1907....	24,967	101,114	8,643,133	1914*...	14,442	63,501	4,116,190
1908....	13,597	58,204	5,567,355	1915....	5,417	23,002	1,734,385
1909....	18,244	64,234	6,325,000	1916....	12,366	49,928	5,196,239
1910....	24,962	84,180	7,143,456	1917....	9,592	46,356	4,247,316
1911....	31,144	134,266	9,944,987	1918....	12,663	60,495	2,813,993

* January 1 to August 23.

The following estimates of future operations and earnings have been made by the company's president: with the treatment of 1,000,000 tons of ore annually the production is estimated at 27,400,000 lb. of copper. The yearly earnings per share, assuming 1,778,787 shares outstanding (which allows for the conversion of the $2,500,000 of bonds), would be as follows on various prices for copper:

Price of Copper.....	15c	16c	17c	18c	20c
Estimated earnings.....	$1,507,000	$1,781,000	$2,055,000	$2,329,000	$2,877,000
Est'd earnings per share	$0.85	$1.00	$1.15	$1.31	$1.62

It will be seen from the foregoing that the estimated net operating profit of $1.50 per ton of ore is based on 15c. copper, which on the developed and probable ore would represent a total net profit of $18,000,000 not allowing for

amortization. The estimated life of the property based on present ore reserves is 12 years. With the development work now in progress it is expected that the present ore reserves will be substantially increased.

CASSIAR CROWN COPPER CO. **BRITISH COLUMBIA**

Office: 601 Empire State Bldg., Spokane, Wash.

Officers: A. C. Mason, pres.; W. C. Miller, v. p.; J. V. Pohlman, sec.-treas.

Inc. in 1916. **Cap.,** increased from $1,000,000 to $1,500,000; $1 par; 268,000 shares in treasury.

Property: five 50-acre mineral claims on Grouse mountain, 18 miles S. E. of Telkwa and Aldermere, B. C., and 260 miles from Prince Rupert on Grand Trunk Pac. R. R., said to show zinc-copper-silver ore. Reported in December, 1918, that 11′ of ore had been cut at 100′ depth, assaying 21% zinc, 2% copper, and 5 oz. silver.

Development is mainly by tunnels, longest in over 750′. Mineralized area as indicated by surface workings is a sheeted zone 10 to 12′ wide. There are several shallow shafts and pits all showing more or less copper. Average assay of all ore exposed in workings is claimed to exceed 7% copper and $3 gold.

For geology see Canadian Geological Survey of Cassiar Crown group for 1915, by J. D. McKenzie.

COAST COPPER CO., LTD. **BRITISH COLUMBIA**

Head office: Trail, B. C.

Officers: J. J. Warren, pres., Toronto, Ont.; T. W. Bingay, sec.-treas.; with S. G. Blaylock, W. M. Archibald, M. W. Bacon and W. E. Cullen, Jr., directors; W. M. Archibald, mgr.; Wm. Clancy, supt., Quatsino, B. C. Company is successor of Quatsino Copper Co. and is controlled by the Consolidated Mining & Smelting Co.

Inc. September 15, 1916, in British Columbia. **Cap.,** $1,000,000; $5 par. Operating expenses in 1917, reported as $48,600.

Property: at Elk mountain, near Elk lake, Quatsino mining division Vancouver Island, B. C. Ore shoots carry argentiferous chalcopyrite in magnetite in fissures with dip of 40° that cut through diorite.

Development: 1,000′ tunnel, a 250′ winze and 1,000′ of underground workings to depth of 500′. Work in 1918 was on a level at bottom of the winze, on which considerable amount of ore has been developed.

Equipment: 6x8′ single drum hoist, 300 cu. ft. compressor and water power.

COLONIAL GROUP **BRITISH COLUMBIA**

Address: A. D. Coplen, mgr., 2324 Allamont Blvd., Spokane, Wash.

Property: 1 claim, 43 acres, at Sandon, B. C., shows a fissure vein, containing silver-lead-zinc. Developed by 700′ tunnel, with 1,000 tons of ore blocked out. A prospect.

CONNERAPPE MINES, LTD. **BRITISH COLUMBIA**

Address: Calgary, Canada. S. Chapin, gen. mgr. W. O. Young, supt. Mine opens a replacement deposit in limestone, the ore assaying about 15% lead, and 3 oz. silver per ton, with a small percentage of zinc. Property has been operated about 4 years, the output being concentrated in the Monarch mill. In 1918, 776 tons ore were shipped to the Trail smelter.

CONSOLIDATED M. & S. CO. OF CANADA, LTD. **B. C.**

Office: Room 1202, Canadian Pacific R. R. Bldg., Toronto, Ontario. **Works office:** Trail, B. C.

Officers: J. J. Warren, pres.; Geo. Sumner, v. p.; with Sir Edmund Osler, Chas. R. Hosmer, H. S. Osler, W. L. Matthews, J. C. Hodgson, and Henry Joseph, and J. K. L. Ross, directors; J. Kitto, sec.

Operating officials: S. G. Blaylock, gen. mgr.; W. M. Archibald, mgr. of mines, and staff consisting of F. S. Peters at Rossland, E. G. Montgomery at Sullivan and St. Eugene; L. W. Oughtred at Highland, Number One, Molly Gibson and the Ivy Fern groups; Dan Matheson at Ottawa and Rock Candy; R. M. Macaulay, at Emma; D. M. Tattrie at Lucky Thought; W. Clancy with Coast Copper, and G. H. Kilburn at Blue Grouse; (field operations under direction

of M. E. Purcell, R. G. Mellin, J. K. Cram, and G. H. Kilburn); T. W. Bingay, comptroller; James Buchanan, smelter supt.; G. E. Murray, assistant; B. A. Stimmel, manager of zinc plant; F. E. Beasley, and J. J. Fingland, in charge of refineries; R. W. Diamond, supt. of concentration and testing; G. F. Chapman, construction eng.; W. E. Jones, mechanical eng.; A. L. MacCallum, supt. of acid plants; F. E. Lee, W. H. Hannay, H. R. Motherwell, research engrs.; G. Cruickshank, F. S. Willis, H. Woodburn, R. G. S. Anthony, department superintendents in zinc plant; D. G. Bissett, chief chemist; R. K. Blois, supt. Cottrell plant.

Inc. January 1, 1906, in Canada as Canadian Consolidated Mines, Ltd. **Cap.**, $15,000,000; $25 par; issued $10,477.450; increased from $5,500,000 in 1909 to $7,500,000, and again in December, 1915, to present amount. Company's fiscal year ends September 30. Annual meeting, third Tuesday in December. Listed on Toronto and Montreal Exchanges. Transfer agents: Toronto General Trusts Corporation, Toronto, and Royal Trust Co., Montreal.

Bonds: $3,000,000 7% debentures authorized December, 1918, and convertible after January 1, 1924, into stock at par.

Cons. M. & S. controls the West Kootenay Power & Light Co., Ltd., a dividend-payer that supplies electric current to mines in that region.

Financial Statement, years ending Sept. 30 to 1918, then Dec. 31:

Assets.

Year	Property and investments	Mining and reduct'n w'ks	Ore and products	Supplies	Accounts receivable	Cash and advances	Total
1919.....	$9,360,854	$5,289,740	$2,987,297	$1,251,842	$939,257	$9,195	$19,866,739
1918.....	$7,884,564	$4,589,608	$2,828,416	$1,183,183	$542,826	$71,325	$17,099,923
1917.....	7,303,443	4,867,505	2,615,664	970,954	1,152,801	83,199	16,994,569
1916.....	6,964,885	4,072,680	2,682,934	803,356	282,094	208,278	15,014,228

Liabilities.

Year	Capital Stock	Bonds	Bank Loans	Accounts payable	Dividend payable	Advance by Govt.	Profit and loss account	Total
1919..	$10,533,700	$3,000,000	$3,067,435	$1,288,503	$263,343	.....	$1,713,757	$19,866,739
1918..	$10,477,450	$.....	$2,809,071	$1,403,343	$261,936	.....	$2,148,123	$17,099,923
1917..	10,447,450	.....	2,081,806	1,113,101	261,936	$700,000	2,360,274	16,994,569
1916..	8,427,800	.....	2,288,253	1,209,021	210,695	600,000	2,278,459	15,014,228

Profit and loss account: Income.

Year	Sales of products	Ores, etc. on hand	Sundries	Dividends from Power Co.	Total
1919.....	$9,761,005	$2,987,297	$11,659	$242,537	$13,002,499
1918.....	$9,780,565	$2,828,416	$16,005	$160,444	$12,784,985
1917.....	12,700,971	2,615,664	66,441	150,000	15,533,076
1916.....	7,203,807	2,682,934	62,804	83,333	10,032,879

Expenditures.

	Ore at end previous year	Ore and metals purch'd	Freight on ore	Mining and reduction	Depreciation, etc.	Profit	Total
1919..	$2,848,416	$3,066,580	$358,376	$5,195,641	$577,420	$976,065	$13,002,499
1918..	2,615,674	4,120,244	190,637	4,487,412	421,773	949,245	12,784,985
1917..	2,682,933	5,899,082	286,973	4,910,670	676,588	1,076,829	15,523,076
1916..	1,146,313	2,913,426	204,546	4,479,870	292,127	996,496	10,032,879

Dividends: rate of 10% per year quarterly from May, 1906, to April, 1907; then 1¼% in November, 1907, 4% in October, 1912; 2% quarterly from July, 1913, to October, 1915; and 2½% quarterly from January, 1916, to March 31, 1920. Total, $6,567,211.

Property: company was formed to take over the following properties, either by direct ownership, or by stock control; War Eagle Consolidated Mining & Development Co., Ltd.; Centre Star Mining Co., St. Eugene Consolidated Mining Co., The Rossland Power Co., and the Trail smelter, formerly operated by the British Columbia Southern railroad. In 1907, the Iron Mask, Idaho and Enterprise mines at Rossland were purchased and the Phoenix Amalgamated Copper Mines, Ltd.; also the Keystone and Four Ace claims adjoining the Phoenix, located at Phoenix, B. C. In 1910 the company acquired the La Plata, or Molly Gibson group, near Nelson, and the No. 7 group in the Boundary district. In 1911, company purchased control of the Fort Steele Mining & Smelting Co., Ltd., owning the Sullivan silver-lead mine, near Fort Steele; Le Roi Mining Co. at Rossland; the Virginia and Abe Lincoln Mines. In 1915,

company purchased the Monte Christo, Paul Boy, Eddie J. and the Iron Horse mines, all at Rossland, and acquired a controlling interest in the Silver King Mines, Ltd., at Nelson. Also the No. 1 and the Highland groups in Ainsworth. In 1913, the Deer Park, Grand Prize and Mabel in Rossland were taken over and the Ottawa mine near Slocan City purchased. Control was purchased in the Quatsino Copper Co., operating on Vancouver Island. Late in 1917 company bought silicious flux properties in the Camp McKinney and Fairview districts, near Keremeos, B. C. The Voight copper mine near Princeton was acquired in 1918. To ensure a further supply of fluxing ore, the San Poil gold-silver mine at Republic, Wash., was bought in 1918 at a receiver's sale. The Blue Grouse copper mine on Cowichan lake was taken over in March, 1918, from the Gordon Bay Mines, Ltd., and was being drilled in 1919. In 1918 an option was taken on the Ivy Fern claims on W. side of Kootenay lake on which surface conditions indicate lead-silver ores in 2 veins. The Coast Copper Co. mine at Elk lake also owned by the company is opening fairly well. To ensure a cheaper supply of fluorspar, the Rock Candy claims on Kennedy creek, were acquired in 1918, and a 100-ton mill erected. In January, 1920, the Sunloch group on Vancouver Island were taken over. Over 1,000′ of crosscutting and 500′ of diamond-drilling has been done.

The *Le Roi-Centre Star* group, on the southern slope of Red mountain, at Rossland, is still the principal property. At this place the country rock is a complex of effusive and fragmentary volcanics of the Paleozoic age intruded by an elongated mass of monzonite-porphyry. This monzonitic mass, with its adjacent rocks, has been intruded by a large number of nearly vertical dikes, from a few feet to 250′ wide, with generally N.-S. trend, the dikes being basaltic, and occasionally slickensided, larger dikes cutting off the veins completely, with the more important orebodies occurring at the points of intersection, and having a series of faults, mainly parallel to the dikes. Ore occurs in shoots of 3 to 50′ width, and 50 to 600′ length, widening at intersection of veins with dikes. Ore is strongly auriferous and fairly argentiferous chalcopyrite, associated with pyrite and pyrrhotite with gangue of silicious altered country rock, ore ranging 0.5 to 2% copper, and $8 to $20, and occasionally up to $100 gold per ton. Pay shoots extend, in some cases, from wall to wall, and from local enrichments, the wall in some cases being very indistinct, and ore shading into the country rock. There are several veins, the more important being the Centre Star, Le Roi and War Eagle, on which the mines are opened, these being shear zones, carrying chalcopyrite disseminated mainly in pyrrhotite, with some pyrite and arseno-pyrite.

The Rossland group, which now has a total acreage of about 775 acres, includes the Le Roi, Centre Star, War Eagle and Iron Mask mines, which are practically one, all connected by drifts and crosscuts, with about 58 miles of workings. Mines are worked by overhand stoping, partly on the shrinkage system and partly timbered with square sets, cut from round timber. Electric haulage is used throughout, 13 electric locomotives hauling 2-ton side dumping cars to the underground ore pockets of the Centre Star shaft.

The Centre Star mine has a 2,200′ 68° inclined shaft, with 16 levels opened, at intervals of 125 to 175′. The shaft is concreted from the 12th level to the bottom. The mine has 8 or 10 different orebodies, but ore comes principally from the Centre Star vein, averaging 0.6% copper, 0.3 oz. silver, $8 to $10 gold per ton.

In the Centre Star-War Eagle-Iron Mask group, ore is mined from the 3 Centre Star veins, Main, North and South, as well as from the Iron Mask, War Eagle, Josie, Poorman and Mugwump veins.

The Le Roi group produces ore from the Le Roi main South, Intermediate, North Peyton and Hollywell veins.

Electric power for the complete operation ofthe mines is taken from the Bonnington Falls plant of the West Kootenay Power & Light Co., controlled by Cons. M. & S. Co., 35 miles distant, at 60,000 volts, stepped down at the mine to 2,000 volts for distribution and use. The compressor room has a 120-k. w. direct-current generator, driven by an alternating current motor, supplying current at 250 volts for electric motors on surface and underground, and for lighting. Air for drilling is furnished to all the mines through one system.

The mines are gold, rather than copper producers.

The **Richmond-Eureka** mine, at Sandon, has argentiferous lead and zinc ores, developed by tunnels aggregating 1¾ miles in length. Ore is transported to bin on C. P. R. R. tracks at Sandon by 4,000′ aerial tram.

The **Sullivan mine,** at Kimberly, is a lead-zinc producer, whose ore occurs in replacement deposit, in a fine grained argillaceous quartzite. Ore is a mixture of fine-grained galena, zinc blende, and iron sulphide. The ore-shoot shows a maximum stope width of 125′. Developments principally by tunnels and raises. Workings total 8 miles. A low-level tunnel, 2 miles long, equipped with double standard-gage tracks, has been driven to open up this property, which is one of the most important zinc mines developed in North America for many years. The ore is complex, but experimental work has proven that it can be satisfactorily milled. It will go to a 400-ton mill at company's smelter; the concentrate being shipped to Trail, B. C., for treatment by the electrolytic process.

The **Molly Gibson** mine, bought 1910, formerly owned by Molly Gibson Mining Co., Ltd., and later by La Plata Mines, Ltd., has a regular fissure vein in granite containing highly argentiferous lead-zinc ore. Developed by over two miles of tunnels. An aerial tram 2 miles long connects the mine and mill, while a second, five miles long, connects mill and loading bins, 5 miles from Kootenay lake. The mine is equipped with 100-ton mill, operated by water power, and two air-compressors.

The **St. Eugene mine,** at Moyie, has produced over 1,000,000 tons of silver-lead ore. The mine has about 20 miles of workings, is equipped with a 500-ton mill, but considerable of its equipment has been dismantled. Now being operated by a small force and shipments of crude ore are regularly made.

No. 1 Group, at Ainsworth, 400 acres, has a contact deposit between dolomite and a dark lime schist. The ore consists largely of oxides of iron, zinc and lead in a silicious lime gangue. Principal value is in silver. Development, by tunnel and winze, totals 1¾ miles. Equipment includes a 2-stage, 11x 16x18″ Jenckes air compressor, driven by belt from 150 h. p. 2,080-volt motor, power being supplied from a 350 k. w. generator at Highland Mill, Cedar creek, 9,000′ distant; and an aerial tram, connecting mine ore bins with loading bins, on shore of Kootenay lake. Storage capacity at mine and lake bins is about 700 tons.

Highland Group, 240 acres, has a series of fissure veins. Ores are silver-lead and development is by 3⅓ miles of tunnels. Equipment includes 6-drill air compressor, driven by water power, and a single rope aerial tram 4,000′ long, connecting mine ore bins with 150-ton mill at Kootenay lake. Power for mill is from a 350 k. w. generator, driven by a Pelton wheel under a head of 1,000′.

The Ottawa mine has a fissure vein in granite. Development by 2 miles of tunnels and winzes. Principal metal is silver, associated with copper, lead and zinc sulphides, some barite in gangue.

The **Silver King** mine on Toad mountain, back of Nelson, has mineralized fissure veins in granite, yielding high-grade silver-copper ores. Development by 4 miles of tunnels and winzes. Equipment includes single rope aerial tram 4½ miles long, connecting ore bins at mine with shipping bins on C. P. R. R. tracks at Nelson.

Details of all the mines are too lengthy for insertion, but the following table gives summary of the facts concerning the principal properties.

Name	Class of ore	Development in 1918 feet	Total in miles	Drilling in 1918 feet	Production in 1918 tons	Production to date tons
Centre Star, War Eagle	gold, copper	4,274	40.93	4,833	42,298	2,660,441
Le Roi	gold, copper	2,645	17.60	4,641	54,918	2,062,544
St. Eugene	lead	61	20.04	.....	1,191	1,022,127
Sullivan	zinc, lead, pyrite	2,539	7.65	1,775	104,758	595,559
Highland	lead, silver	2,426	3.23	.....	283	4,602
Molly Gibson	silver, lead	366	2.10	.....	1,320	.....
No. 1	silver	553	1.70	.....	5,185	23,312
Emma	copper	1,817	1.11	693	24,968	201,050
San Poil	silicious gold, copper	.....	.....	1,831	1,491	.....
Rock Candy	fluorspar	40	.....	492	.....	.....

Reduction works: the Trail smelter near the International boundary, treats all kinds of ores and does an extensive custom business, which will be mainly smelting concentrate and refining copper from the Canada Copper Corporation at Princeton.

There are two sampling mills, equipped with crushers and Vezin samplers; No. 1 mill, for copper ores, of 200 tons hourly capacity; No. 2, for lead ores, of 100 tons hourly capacity.

The smelter has a calcining department, and blast-furnaces for copper and lead. All the copper ores are bedded and hauled from the beds (of 21,000 sq. ft.) by electric locomotives to the charge bins, and from these to the furnaces. Lead ores for the roasting department are delivered to beds by a system of belt conveyors and drawn from these beds by a conveyor over an electric scale to the roasters.

The calcining department consists of three 22½′ 7-deck Wedge roasters, and five 26′ Godfrey furnaces. The roasted ore is sintered in 32 Huntington-Heberlein sintering pots and 3 Dwight-Lloyd sintering machines, fumes being passed through the Cottrell electric precipitator.

The 1,800-ton copper smelter has 4 blast furnaces, 2 of 35′ and 2 of 25′, taking a 32 oz. cold blast. Two 12′ Great Falls type converters are in operation making blister copper.

The 350-ton lead smelter has one 45x180″ and three 45x180″ blast furnaces, with mechanical feed, reducing mainly calcined ores. Crude lead ores are roasted in seven 26′ Godfrey furnaces, which reduce the sulphur from the original tenor of 16% to 8%, and these calcines are re-roasted in fifteen 9′ Huntington-Heberlein sintering pots, yielding a product carrying only 4½% sulphur. The sintered ore, carrying 30 to 50% lead, is smelted in the blast-furnaces, each making 50 to 85 tons of lead bullion daily, with about 4% matte fall. This matte is roasted and again put through the blast-furnaces, and slags are granulated. Blast-furnace gases are passed through a Cottrell precipitator.

An electrolytic lead refinery, handles anodes cast from the silver-lead bullion. This plant, of 100 tons daily capacity, was the first electrolytic lead refinery ever built, and uses the Betts process. The lead is of exceptional purity, with average assay of about 99.997%, which means that a short ton of lead carries only about 1 oz. of impurities, which is excellent work.

The silver refinery, taking silver sludge from the electrolytic lead tanks, has a water-jacketed reverberatory furnace for the production of dore bullion, and the necessary kettles, tanks, and bluestone plant for parting the precious metals with sulphuric acid; also furnaces for melting and casting the silver and gold bullion. The silver bullion is 999 fine and the gold bars are 995 fine.

The electrolytic copper refinery now handles 50 tons per day, having been enlarged in 1918 at a cost of $250,000. A wire-rod mill is also to be built costing $75,000.

Blast is supplied at 32 oz. for all furnaces, by one No. 9, and one No. 9 1/27, one No. 11, and one 400 cu. ft. Root blower, and one 200 cu. ft. Connersville blower.

An electrolytic zinc plant was erected in 1916. The process is similar to that used at Anaconda, Mont., but is the direct result of the operation of an experimental plant treating ore from the Sullivan mine and producing 1,000 lb. of zinc per day.

The plant contains two driers, three 18x5′ ball mills, thirteen 7-deck 25-ft. Wedge roasters, a large leaching building, where the ores are leached by countercurrent continuous process in Pachuca tanks and thickened in Dorr thickeners, purified in Pachuca tanks, and filtered with Kelly and Oliver filters, electrolyzing-tank rooms, where the solutions are electrolyzed in concrete electrolytic tanks; thirteen 1,000 k. w. motor-generator sets; the necessary transformer plant to reduce the 60,000 volt current with which the plant is supplied; and a melting plant with two reverberatory furnaces for melting the cathode zinc.

U. S. Patent No. 1,320,805, Nov. 4, 1919, was issued to R. H. Stewart, S. G. Blaylock, Robert Vaughan, and J. K. Batchelder, of this company, for hydro-

chemical extraction of zinc from ores or other zinc-containing material in which the zinc has been made soluble by roasting, the process above.

The zinc concentrator, with daily capacity of 400 tons, is equipped with a 6x6′ ball mill, a standard 24″ 17-cell Minerals Separation flotation machine, concentrating tables, filters, thickeners, and complementary appliances. This plant is to be increased to 2,500 tons capacity. Briefly, the method consists in removing a little of the heavy galena on tables, the middling is subjected to wet magnetic separation for removal of pyrrhotite, and finally to preferential flotation for separation of the blende from the galena. Concentrate from the mill goes to the electrolytic plant described above.

Other accessories to the Trail smelter are copper and zinc-casting departments, sulphuric-acid plant (2,879 tons in 1918), hydro-fluosilicic plant (196 tons in 1918), and bluestone plant, all recently overhauled and in good order.

Power for the reduction works is electric throughout, and brought from Bonnington falls, on the Kootenay river.

The works have a central heating station and well-equipped machine, carpenter, boiler, and electric shops. The assay-office, which handles an unusual variety of work, in great detail, is exceptionally commodious and well equipped.

Production, including custom ores:

	Ore Smelted, tons.	Gold, oz.	Silver, oz.	Lead, lb.	Copper, lb.	Zinc, lb.
1919	398,118	59,605	1,782,025	41,711,147	6,933,962	30,743,461
1918	374,889	52,917	1,708,692	38,844,946	7,982,903	21,800,932
1917	359,404	69,704	2,471,887	44,260,989	7,404,352	13,021,127
1916	447,017	98,314	2,285,631	39,974,411	4,446,080	3,088,199
1915	447,064	148,891	2,230,500	40,177,910	5,306,184	.....
1914	374,771	129,083	2,568,301	34,617,318	3,645,997	.....
1913	407,124	186,017	2,224,458	48,325,252	3,454,814	.....
1912	.....	129,789	1,765,992	26,072,074	2,914,181	.....
1911	.....	119,067	1,458,758	24,026,015	4,421,988	.....
1910	.....	137,614	1,162,406	42,368,816	5,974,959	.....
1909	.....	114,920	2,443,475	43,675,077	4,637,631	.....
1908	.....	121,380	2,224,888	32,157,139	4,004,468	.....
1907	.....	69,186	1,100,271	20,380,083	3,433,310	.....
Total 1894 to 1918..	5,554,196	1,831,838	28,714,042	497,171,470	83,030,313	44,857,928

Company at present is the only one in the world producing electrolytically refined copper, gold, lead, silver, and zinc at one plant; also making sulphuric acid, hydrofluosilicic acid, bluestone, and manganese dioxide. Trail is a metallurgical center using the latest processes, not following recent practice, but a leader in devising new methods.

While Cons. M. & S. has many mines, its future apparently depends on the large ones described, especially the Sullivan mine.

Its custom business is important and will expand. The management is enterprising, competent, and eminently fair in its dealings with the companies that ship ore to its smelter.

COPPER MOUNTAIN MG. & DEV. CO. **BRITISH COLUMBIA**

Office: 5406 Union Ave., South Tacoma, Wash. Mine near Quatsino, B. C., reported sold, 1917. Fully described Vol. XII.

CORK-PROVINCE MINES, LTD. **BRITISH-COLUMBIA**

Office: Kaslo, B. C. Mine at Zwicky, B. C.

Officers: W. E. Zwicky, pres.-gen. mgr.; Henry Giegerich, v. p.; W. H. Burgess, sec.-treas., with I. B. Sherwood and R. E. M. Strickland, directors. Transfer office: Kaslo. W. H. Burgess, registrar.

Inc. May, 1915, in British Columbia. **Cap.**, $1,000,000, 10c par, 8,500,000 issued; increased July 17, 1919, to $1,250,000; shares $1 par. Bonds issued, $16,500. Net indebtedness at end of 1919 was $4,000.

Property: 13 claims, 9 crown granted, containing about 580 acres on the S. Fork of Kaslo creek in the Slocan district. Company is a consolidation of the Cork and Province groups.

The ore occurs in fissure veins in slate, which have a N. E.-S. W. course and 68° dip. The shoots are 6′ to 30′ wide, containing silver-lead, and zinc ore.

Development: a 1,400′ crosscut tunnel, intersects the Black Fox and the Cork veins, at depth of 300′ and has 2,300′ of workings. The Black Fox vein cut at 700′ from the portal is 4′ to 6′ wide, but has no commercial ore at this point and will be explored. The Cork vein cut at 920′ is strong and wide and contains 4 productive ore shoots averaging 8′ wide for lengths of 50 to 325′. Ore reserves are said to be 10,000 tons.

Equipment: 100-ton concentrator, hydro-electric plant, sawmill, compressor and electric lighting system.

Production: mine yielded 1,206 tons previous to consolidation, and about 933 tons in 1915; 45 in 1916; 414 in 1917; 733 in 1918. Ore shipments averaged 35 oz. silver and 49% lead in 1918.

Operations were resumed in June, 1919, but suspended in October; 250 tons of lead concentrate, and some zinc was shipped. Management is optimistic for the future after re-financing.

DELLIE MINING & MILLING CO. **BRITISH COLUMBIA**

A reorganization, 1918, of the Silver Hoard Mining Co., described in Vol. XIII.

Officers: W. H. Carder, pres., Carder, Wash.; Dr. E. N. Northrop, v. p.; L. R. Hawley, sec.-treas., Spokane, Wash.

Inc. 1918, in Washington. In summer of 1919, company levied an assessment of 1c. per share in order to pay off its heavy indebtedness and resume operations.

Property: 5 claims, 202 acres, crown-granted, near Ainsworth, said to carry the same vein stoped in No. 1 mine of Cons. M. & S. Co., 2,400′ away. The vein is in limestone. Milling ore is said to assay 3% lead, 10% zinc, and 15 oz. silver per ton.

Development: 7,000′ of workings. Ore reserves are said to be 50,000 tons.

Equipment: includes hydro-electric power, compressor, hoist and a 75-ton flotation plant which started operations in July, 1917.

Production: from 1911 to 1916, reported as 43 cars of ore, assaying 46.9 oz. silver, 4% lead, and 15% zinc, with net smelter returns of $32,000.

Mine was idle in 1916, but worked in 1917 by lessees (W. S. Hawley Co.).

DELTA COPPER CO. **BRITISH COLUMBIA**

Address: 703 Tegler Block, Edmonton, Alberta.

Property: 25 claims, including the Delta, Chicago, Highland Bay, Hazelton, and Dyke group of claims, in the Hazelton district, adjoining the Rocher de Boule mine on the east.

DISCOVERY MINING & POWER CO. **BRITISH COLUMBIA**

Operates a placer property on Pine creek, Atlin mining division. Gold production for summer of 1919 was about $25,000. Said to be controlled by Frank H. Mobley, of Prince Rupert.

DOLLY VARDEN MINES CO. **BRITISH COLUMBIA**

Property near Alice Arm, taken over by Taylor Mining Co. (which see), in June, 1919, ending a protracted legal squabble that stopped development of this rich mine for a long time. The Taylor Mining Co. was organized by the Taylor Engineering Co., which met financial disaster when the D. V. M. Co. refused to make the payments due for constructing a railroad to the Dolly Varden mine. In December it was announced that the validity of legislation passed by the Provincial Government, whereby the Taylor Mining Co. became owner of the Dolly Varden, was to be contested in the Dominion courts.

DONOHUE MINES, LTD. **BRITISH COLUMBIA**

Address: F. M. Hawkes, Seattle, Wash., or James McKieran, Quilchena, Nicola district, B. C.; Jos. T. Knopp, supt.

Property: 8 claims, including the Tubal Cain, King William, and Joshua mines, near Stump lake, Nicola mining division. Ore contains copper, lead, zinc, silver, and gold. Development has followed veins to 400′ in depth. Equipment: includes a 30-ton mill.

The Joshua mine, idle for 30 years, has recently been unwatered, and work will start on the 300′ level.

DRUM LUMMON MINES, LTD. **BRITISH COLUMBIA**

Address: 1115 Dominion Bldg., Vancouver, B. C.

Directors: T. Pearse, W. Paterson, J. M. Robertson, J. Broatch, Capt. Kinnie, W. P. Sloan, and J. Maitland, all of Vancouver.

Property: 15 claims, at Tidewater, at Miskatlah bay, Douglas channel, halfway between Kitimat and Hartley bay.

A shear zone 75′ wide with granite walls carries copper glance in quartz gangue, the ore assaying 0.02 oz. gold, 3.2 oz. silver, and 5.26% copper.

Development: by 360′ crosscut tunnel, with depth of 200′.

Equipment: includes a 30-ton mill; heads average 5.9% copper and concentrate assays 63.5% copper, 1.12 oz. gold, and 30 oz. silver.

DUNDEE MINING CO. **BRITISH COLUMBIA**

Property: the Dundee mine, adjoining the Yankee Girl at Ymir. The property is reported to have very favorable indications of a large tonnage of commercial ore, having a tunnel 2,954′ long said to prove the ore to 1,100′ depth. Arthur Lakes, Jr., estimated 100,000 tons ore proven, with a gross value of $850,000, or $380,000 net.

Property has been idle, but work is planned for 1920.

ECHO SILVER-LEAD MINING CO. **BRITISH COLUMBIA**

Address: L. J. McAtee, sec.-treas., 104 8th St., Spokane, Wash., P. J. Bonner, supt., Silverton, B. C.

Inc. in Washington. **Cap.**, $150,000; par 10c.

Property: near Silverton, in Slocan mining district, adjoins Standard Silver Lead property.

Development: by tunnels. Main ore shoot said to be 8′ in width. Late in 1918, company is reported to have arranged for a lease of the Standard Silver Lead Co.'s mill during part of each month, and in May, 1919, the output was at the rate of 4 carloads silver-lead concentrates, and 3 carloads zinc concentrates monthly.

EDEN-CRESCENT MINING CO. **BRITISH COLUMBIA**

Address: W. Y. Williams, mgr., Coffee Creek Landing, near Ainsworth, B. C.

Officers: A. L. White, pres.; W. J. Nicholls, v. p.; E. B. McBride, sec.-treas., with W. Y. Williams, C. F. Caldwell and W. H. Button, directors, at last report.

Inc. January, 1917, in Washington. **Cap.**, $75,000; shares 5c par; 900,000 issued. **Property:** 8 claims, on Kootenay lake, near Ainsworth, B. C.

Development: by 2 shallow shafts and 800′ tunnel. In September, 1917, a crosscut had opened 6′ of ore assaying 30% lead and 6 oz. silver per ton. Development was continued in 1918.

Prospects reported by management to be favorable.

EFFANJAY GOLD MINING CO. **BRITISH COLUMBIA**

Address: A. J. Grover, sec.-treas., Hyde Bldg., Spokane, Wash.

Officers: J. A. Irvine, pres.; J. L. Goodwin, v. p.

Company organized in 1916 to take over the Fawn group of claims, under bond. Also leased a 4-stamp mill on adjoining Nugget claim.

The Fawn group is in Sheep Creek district, near Salmo, B. C., and is reported to show an orebody 14″ wide carrying from $21 to $65 gold per ton.

Development: by tunnel. No recent information, probably dead.

ELLIS SILVER MINING CO., LTD. **BRITISH COLUMBIA**

Office: 31 Wellington St., East Toronto, Ont.

Officers: in 1918.—P. W. Ellis, pres.; M. C. Ellis and R. V. Ellis, v. p.'s.

Inc. in Ontario.

Property: the Eastmont group, about 60 acres, on Ten-mile creek, Slocan mining division. Said to show silver-lead ore, developed by tunnels on 4 levels. In 1918, mine was under lease and bond to H. D. Lea & Co.

EMANCIPATION MINING CO., LTD. **BRITISH COLUMBIA**

Office: 502 Credit Foncier Bldg., Vancouver. Wm. Thompson, mgr., Hope, B. C.

Inc. 1917 in B. C. **Cap.**, $120,000; par $1.

Property: 15 claims in Coquahalla valley, about 15 miles from Hope, said to show quartz veins.

Development: by tunnels; recent work has been on a narrow, and in places, rich vein, from which small shipments have been made for several years; those in 1918 totaled 18½ tons; yielding 457.5 oz. gold and 79 oz. silver.

ENGINEER MINES **BRITISH COLUMBIA**

Owned by Capt. James Alexander, who was lost in the S. S. Princess Sophia disaster, October, 1918. No information regarding present owners.

Claiming a 20% interest and alleging that the mine is to be sold for $3,000,000, W. P. Grant started suit in the B. C. Supreme Court against Gold Commissioner and Mining Recorder at Atlin, B. C.

Property: 11 claims, on east side of Taku arm, and 25 miles from Atlin, show quartz veins with native gold and tellurides, in shales and greywackes. Deposits range from simple veins a few inches in thickness to compound veins over 200′ thick. Two large central veins of the latter type are "hubs" from which several veins radiate. "Hub A" is 200′ wide and over 300′ long; "Hub B" is 270′ in width.

Development: includes a great number of open-cuts, and several tunnels driven on the most promising-looking veins. Surface work has exposed about 25 veins, up to 4′ in width, a few containing shoots and pockets of bonanza ore; two of these are especially rich—the boulder vein and the shaft vein. Greater part of work has been on vein "E" on which a 275′ shaft has been sunk, with four levels, totalling about 1,100′ of workings. All this work has been in ore. Waste is broken about 10′ ahead of ore, which is afterward taken down with as little shooting as possible, and sorted into 3 grades. The first grade, showing visible gold, is treated in a 5-foot ball mill; the record run of this mill was 296 oz. of gold from 160 lb. of ore.

A Minister of Mines report for 1918, states "there is every reason to believe that it can be developed into one of the greatest gold-producers on the Continent."

ENTERPRISE MINING, DEV., & POWER CO. **BRITISH COLUMBIA**

Officers: in 1918—Chas. A. Coffin, pres.-gen. mgr.; W. V. Garrett, v. p.; N. L. Jackson, sec.-treas., all of Spokane.

Inc. in Washington. **Cap.**, $250,000; par, 10c.

Property: 7 claims, 2 crown-granted, at Paulson, Trail Creek mining division, said to show three gold veins, two silver veins, and a large lead-zinc vein.

Development: by several tunnels, one 300′ long.

EUREKA COPPER MINES, LTD. **BRITISH COLUMBIA**

Address: Nelson, B. C.

Officers: J. J. Malone, pres.; J. G. Bunyan, sec.-treas.; with J. A. Gibson, L. K. Larson, and J. J. Bunyan, of Nelson, and S. G. Campbell, Vancouver, directors.

Property: acquired October, 1918, by Inland Mining Co., which is operating it under lease and bond, and has so far made two payments.

EVA MINING CO. **BRITISH COLUMBIA**

At last accounts, W. C. Bailey, sec., Nelson, B. C.

Inc. in British Columbia. **Cap.**, $1,500,000; par $1.

Property: at Camborne, on Poole creek, Lardeau mining district. Although the mine is one of the most extensively developed properties in the district, it has been idle for several years. Developed by over 5,500′ of workings, with 200,000 tons of ore blocked out; the 30,500 tons already milled showed a gross value of $5.69 per ton.

Equipment: includes a 10-stamp mill and a compressor.

EXPANSION GOLD MINING & MILLING CO. **BRITISH COLUMBIA**

Officers: in 1918—Ed. Richter, pres., Keremeos, B. C.; R. G. Sidley, sec., Bridesville, B. C.

Inc. in British Columbia. **Cap.**, $1,000,000; par $1.

Property: 2 claims, 90 acres, at Camp McKinney, Osoyoos mining di-

vision, said to show gold-silver ore, assaying $4-$5 per ton in three veins, 5′ wide and traceable for 600′.

Development: by 400′ tunnel and several shallow shafts.

FALLS CREEK COPPER MINING CO. **BRITISH COLUMBIA**

Officers: in 1918: L. H. Snyder, pres.; R. H. Finley, sec., 63 Ziegler Bldg., Spokane, Wash.

Inc. in Washington. **Cap.,** $1,500,000; par $1; assessable.

Property: 6 claims, 2 crown granted, 300 acres, 8 miles from Nelson, said to show 2½% copper ore. Has a 1,500′ tunnel, reaching a depth of 500′.

FERGUSON MINES CO., LTD. **BRITISH COLUMBIA**

Controlled by Geo. Alexander, of London, Eng., represented by Jas. Anderson, Kaslo, B. C. Company is in hands of receiver and mine leased for company's account.

Property: the Ajax, Nettie L., and Silver Cup groups in Trout Lake mining division, with over 2 miles of workings. Considerable ore was shipped 15 to 20 years ago; 550 tons ore shipped in 1912, assaying 40 oz. silver and 60% lead.

FIFE MINES, LTD. **BRITISH COLUMBIA**

Address: Rossland, B. C. Chas. Dempster, gen. mgr.

Property: the Hattie Brown claim at Rossland and the Dykehead, Ben Hur, Three Bells, and Fife claims at Fife, near Christina lake, 12 miles E. of Grand Forks, Boundary district, B. C. Claims show a vein up to 30′ in width, carrying about 6′ of smelting ore, with balance of concentrating grade, developed by a glory hole, an 80′ shaft and a main tunnel having a 235′ winze.

Ore: contains chalcopyrite, carrying gold and silver values, claimed to average 3 to 6% copper and $4 to $8 gold per ton.

Equipment: includes necessary mine buildings and a 5-drill air compressor. Property considered promising. Idle.

FIRE VALLEY GOLD MINING CO. **BRITISH COLUMBIA**

Office (in 1918)—404 Brokerage Bldg., St. Paul, Minn.

Officers: H. G. MacRae, pres.; C. P. Nash, v. p.-treas.; with Geo. R. Slocum, Geo. W. Markham, all of St. Paul; A. O. Cochrane, sec., Vernon, B. C.; and C. A. Carnes, Chicago, Ill.

Inc. in British Columbia. **Cap.,** $1,000,000; par $1.

Property: 3 crown-granted claims, 135 acres, 47 miles E. of Vernon, said to show gold-silver ore assaying about $7 per ton.

Development: 1,700′ of workings. Idle.

FISHER MAIDEN MINING CO. **BRITISH COLUMBIA**

Officers: J. L. Prickett, pres.; Wm. Huntley, v. p.; H. S. Stoolfire, sec.-treas., Sherwood Bldg., Spokane, Wash., with John O'Connor, directors.

Cap., 1,500,000 shares, 10c par; 1,000,000 issued.

Property: the Fisher Maiden group, 7 miles from Silverton, Slocan district, B. C., reported sold to Barney Crilley and J. J. Malone, on a 3-year bond and lease, 1917. Claims said to carry silver, lead, and zinc.

No recent information, probably idle.

FLORENCE SILVER MINING CO., LTD. **BRITISH COLUMBIA**

Offices: Hutton Bldg., Spokane, Wash., and Ainsworth, B. C.

Officers: F. R. Wolfle, pres. and gen. mgr.; A. F. Kelly, v. p.; D. E. Sanders, sec.-treas., with J. A. Lavender, J. H. Noble, and J. E. Blazier, directors. R. H. Hewer, gen. supt.; J. H. Noble, mill supt.

Inc. July 1, 1911, in Washington, and in November, 1917, in British Columbia. **Cap.,** $1,250,000; $1,175,000 outstanding; $1 par. Stock transferred at company office, Spokane. Annual meeting, May 15.

Dividends: in March, 1919, initial dividend of $17,650, 1½c a share, in April a second dividend was paid; later payments to be made quarterly.

Property: 8 claims, crown granted, 370 acres, 3 miles N. of Ainsworth. Claims on the west side of Lake Kootenay, extend west from shore about 2 miles.

Ore: lead, zinc and silver in E. W. fissure veins in quartzite and slate. Three ore-shoots have been developed, one said to have over 400′ of commercial

ore. Milling ore said to contain 10 to 20% lead, 8 to 15% zinc, and 6 oz. silver per ton.

Development: the main working tunnel (N.-S.) is 3,600′ long. It is connected by raises with No. 2 tunnel, 360′ above; the latter is 2,400′ long and has over 10,000′ of workings at average depth of 700′. No. 3 and 4 levels have about 700′ of workings. Company states that it has 600,000 tons of ore blocked out that averages 14% lead, 10% zinc, and 4 oz. silver.

Equipment: includes 250-h. p. compressor, 350-h. p. hydro-electric plant, and 1,800′ aerial tram from No. 3 tunnel to the mill. The 300-ton concentrating mill on the shore of Kootenay lake was completed May 1, 1917. Water power is developed at Woodberry creek, under 350′ head. Total cost of improvements to January 1, 1919, is $225,000. A 500′ surface tram runs from tunnel portal to terminus of an 1,800′ aerial tram that runs to the mill. A 40-h. p. gasoline motor hauls ore in 10 car trains.

Production: 1,850 tons of concentrate in 1919, valued at about $70 per ton net at smelter.

FORTY-NINE MINING CO., LTD. (THE) BRITISH COLUMBIA

A subsidiary of the Alaska-British Columbia Metals Co., which see.

Offices: 701 Rogers Bldg., Vancouver, B. C., and 1 Wall St., New York.

Officers: S. I. Silverman, pres.; H. B. Price, v. p., 227 Pemberton Block, Victoria, B. C.; Silas P. Silverman, sec.-treas., 701 Rogers Bldg., Vancouver, B. C., with C. F. Caldwell and O. B. Bush, directors.

Inc. 1918, in British Columbia. **Cap.**, $1,500,000; par $1; outstanding 100,000 shares. Registrar and transfer agents, U. S. Corporation Co., New York City. Listed on New York Curb. Sales $5 high, $1 low, 1919.

Property: 5 claims and 2 fractions, 200 acres, on W. slope of Mt. Dillworth, in Salmon River district, 20 miles N. E. of Stewart, B. C., or Hyder, Alaska. There are 2 parallel veins, the larger of which is 40′ wide and exposed for 700′ in length. The second vein, 50′ from the other is 8′ wide.

Development: on the Forty-Nine claim there is 20′ of ore in the center of the vein, averaging $40 per ton in silver and gold. One 12″ streak assays 987 oz. silver and 1 oz. gold per ton. A moiled sample in a 20′ trench averaged 50 oz. silver per ton. A tunnel is being driven on this shoot at depth of 100′, and in January, 1920, width and value persisted for 25′, also in a raise above the tunnel.

On the Occidental claim there is a 10′ vein of high grade ore. The tunnel is in 25′, and ore has been averaging $100 per ton. In February, 1920, 2′ of ore assayed $400 per ton in silver and gold, the remainder $100 per ton.

On the Dumas claim there is said to be a large showing of high-grade ore, 1′ of the same averaging 300 oz. silver and ½ oz. gold per ton.

On the Yellowstone fraction claim, an opencut has struck high grade ore, some of it running from $200 to $300 per ton in silver.

On the Chicago claim an orebody from 100 to 200′ in width, of milling grade, has been opened. This orebody is said to be the largest in the district.

GALENA MINING & MILLING CO. BRITISH COLUMBIA

Company was formed to take over the Galena Farm silver-lead-zinc mine in the Silverton district, B. C. The estate of the late Patrick Clark of Spokane holds 75% of the stock, and the A. W. McCune interests of Salt Lake City hold the remainder. P. W. Clark is manager, and A. King in charge of the mill.

Development: exploration has been kept well ahead of milling capacity, the last orebody opened up said to be 11 to 14′ wide, as disclosed in raises 150′ apart on the intermediate level. Ore said to be worth about $20 a ton.

Equipment: includes a 100-ton concentrator, erected early in 1916. Daily output of concentrate is 35 tons. Additional tables and flotation machines installed during 1917 raised the capacity to 150 tons of ore daily. Recovery is 90% lead on tables and 80% zinc by flotation. Rolls and Huntington mills do the crushing.

GENERAL MINING, MILLING & LEASING CO. B. C.

Officers: W. H. Honefenger, pres., Hyde Bldg., Spokane, Wash. W.

A. Kelly, sec.; Chas. V. Bobb, mgr., with W. T. McCurry, directors, at last accounts.

Has a lease on the Lucky Strike and Wisconsin mines, on a tributary of Midge Creek, 7 miles W. of Kootenay landing, said to show a 30′ vein in Nelson granite, traceable for 3,000′. Ore in pits along vein reported to assay $25 to $40 gold and 3 to 7 oz. silver per ton.

Development: 2 tunnels claimed to open up ore valued at $1,000,000, which is doubtful. No recent information; probably idle.

GEORGIA RIVER MINING CO., LTD. **BRITISH COLUMBIA**

C. H. Dickie, Duncan, B. C., chief owner.

Cap., $25,000; par $25.

Property: 8 claims on George River, 20 miles from Stewart, shows free milling gold ore, worked during the summer of 1918; but a mill is needed to treat the ore before property can make a profit.

GIBSON MINING CO. **BRITISH COLUMBIA**

Officers: D. K. May, pres., Rookery Bldg., Spokane, Wash.; Robt. Gunning, v. p.; E. H. Latham, sec.-treas., Kaslo, B. C., with Jos. Daschbach, and F. E. Archer, directors.

Cap., $2,000,000; par $1; outstanding July 1, 1919; 1,421,963 shares issued.

Annual report, year ended July 1, 1919, shows: receipts from stock sales, $82,152; from ore sales, $803; accounts payable, $16,930; total expenditures, $112,092.

Property: 12 miles W. of Kaslo, has silver-lead-zinc ore. Several hundred feet of tunnelling was done about 20 years ago by former owners. In 1918, as much more underground work was done and company installed water power equipment and a compressor. Mine idle in 1919, though some milling ore has been found.

The title is in litigation, as J. M. Wolbert and J. Chassy of Spokane claim a half interest in the mine.

GLACIER CREEK MINING CO., LTD. **BRITISH COLUMBIA**

Officers: in 1918, R. T. Elliott, pres.; R. M. Stewart, v. p.; with H. Puckle, H. A. Munn, and J. A. Mora, directors, all of Victoria, B. C.

Inc. in British Columbia. **Cap.**, $500,000; par 50c.

Property: 7 claims, crown-granted, 250 acres, on N. bank of Glacier creek, in Portland Canal mining division, said to show a vein 4 to 10′ wide with lead ore.

Development: by tunnels, with several hundred feet of workings.

GOLD CURE MINING CO. **BRITISH COLUMBIA**

Officers: Chas. F. Caldwell, pres., Kaslo, B. C.; J. F. Blake, v. p.; Clarence Marsh, sec.-treas., 314 Dalton St., Spokane, Wash., with A. G. Copeland, directors.

Inc. in 1917, in British Columbia.

Property: 7 claims on south fork of Kaslo creek, Slocan, said to show several veins of silver-lead ore from which high grade ore was shipped in the early days.

Development: by tunnels. Reported that operations were resumed July 1, 1919.

GOLDEN CANYON GOLD & SILVER MNG. CO., LTD. **B. C.**

Officers: W. J. McMillan, pres.; Peter Hamilton, v. p.; with R. J. McMillan, all of Vancouver.

Property: in Slocan region, said to show ore assaying as high as 60% antimony.

Development: several hundred feet of tunnels. Shipments total 100 tons. No recent information; probably idle.

GOLDEN WONDER GROUP **BRITISH COLUMBIA**

Owned by W. S. Harris and Dennis Comeau of Hazleton and operated under bond by M. W. Sutherland, 1917.

Property: 3 claims on Rocher de Boule Mt., about 1 mile from Hazelton, said to show a 2½′ vein of chalcopyrite ore assaying 8% copper. No recent information.

GORDON BAY MINES, LTD. **BRITISH COLUMBIA**

Address: Consolidated Mining & Smelting Co., Trail, B. C.

Property: on Cowichan lake, is being operated by Cons. M. & S. Co. Some 4 to 5% ore was mined in 1918, and diamond-drilling was being done at last accounts.

GRANBY CONS. M. S. & P. CO. **BRITISH COLUMBIA**

Offices: 718 Granville St., Vancouver, B. C., and 52 Broadway, New York. Mines at Phoenix and Hidden Creek, B. C., and Valdez, Alaska; and other places in B. C. and Alaska. Smelters at Grand Forks and Anyox, B. C.

Officers: W. H. Nichols, pres.; E. P. Earle, W. H. Robinson, Edwin Thorne and F. M. Sylvester (mg. dir.), v. p.'s.; Henry Bruere, B. Hochschild, W. A. Paine, J. B. P. Herreshoff, S. H. Steele, and Chas. Hayden, directors; Edward Everett, sec.; H. Harvey, asst. sec.; G. W. Wooster, treas.; H. T. Mahan, asst. sec.; O. B. Smith, supt. of mines; C. M. Campbell, supt. at Phoenix mines; E. E. Campbell, supt. at Anyox mine; W. A. Williams, supt. at smelters; A. J. Bone, supt. Anyox smelter.

Inc. March 29, 1901, by special act of the British Columbia Parliament. **Cap.,** originally $15,000,000; shares $10 par; changed, 1906, to $100 par, increased to $20,000,000 in February, 1914, to provide for conversion of bonds; $15,000,420 outstanding. **Bonds:** authorized February 25, 1913, $5,000,000, first mortgage, 6%, 15-year, convertible at par; June 30, 1919, $1,799,800; series A, of which $931,900 are stamped bonds; dated May 1, 1913. Series A bonds are convertible until May 1, 1923, at holders' option, into stock at par with cash adjustment of accrued interest and current dividend. Bonds of general issue redeemable at 105 plus interest after 10 years, 4% to be retired by purchase at $110, annually.

Capital increased to $25,000,000 in February, 1920; also bonds increased by $2,500,000, 8%, underwritten by Hayden, Stone & Co. Capital expenditures during the past 2 years approximate $11,500,000. Shares listed on Boston Stock Exchange.

Boston Safe Deposit & Trust Co., and Lincoln Trust Co., New York, registrars; American Trust Co., Boston, and Title Guarantee & Trust Co., New York, transfer agents; registrar of bonds, Title Guarantee & Trust Co., New York; trustee of bonds, Columbia Trust Co., New York. Annual meeting, first Tuesday in October.

Company was organized to purchase the property and assets of the Old Ironsides Mining Co., Knob Hill Gold Mining Co., Ltd., Gray Eagle Gold Mining Co., Ltd., Granby Consolidated Mining & Smelting Co., Ltd., and the Grand Forks Water & Light Co., at an aggregate cost of $12,097,030. Stock to the amount of $1,402,970 was issued for cash and services rendered.

Comparative General Balance Sheet, years ending June 30:

Assets.

Year	Prop. and Equipment	Investments	Supplies Accts. Rec.	Cash, Ore and Metals	Total
1919.....	$17,597,917	$743,370	$5,608,312	$83,774*	$24,033,374
1918.....	15,220,344	630,412	7,920,190	66,897*	23,837,843
1917.....	22,315,637	683,230	6,448,063	.....	29,447,931
1916.....	20,366,316	575,644	1,041,012	2,927,317	24,910,288
1915.....	19,965,755	430,517	568,465	1,756,543	22,721,281
1914.....	19,630,026	514,809	525,097	1,375,794	22,045,726

* Cash only.

Liabilities.

	Capital Stock	Bonds	Loans Unsecured	Loans Current	P. & L. Surplus	Total
1919..	$15,000,420	$1,799,800	.....	$6,108,744	$1,124,409	*$24,033,374
1918..	15,000,420	2,039,800	.....	3,368,206	3,429,418	*23,837,843
1917..	15,000,420	2,514,000	.....	1,242,806	9,434,038	29,447,931
1916..	14,998,520	3,042,300	.....	281,997	6,587,471	24,910,288
1915..	14,998,520	3,390,000	.....	664,680	3,668,087	22,721,281
1914..	14,998,515	2,290,000	$960,000	1,057,296	2,739,914	22,045,726

* Includes $1,256,267 reserve for depletion of ore and plant.

Comparative Income Account, years ending June 30:

	Gross Sales	Operating Expenses	Int. Deprec.	Net Income	Div. Paid	Prev. Surplus	P. & L. Surplus
1919.....	$6,455,000	$6,660,054	$120.884*	$219,839†	$1,312,539	$3,421,355	$1,124,409
1918.....	11,522,472	7,519,492	131,325*	3,542,624	1,500,042	3,402,327	3,429,418
1917.....	12,259,185	7,022,402	211,532*	5,025,251	1,349,962	6,587,471	12,040,267
1916.....	11,370,500	7,262,879	288,325	3,819,295	899,911	3,668,088	6,587,471
1915.....	5,053,886	3,713,329	411,393	929,164	.....	2,738,922	3,668,086
1914.....	4,504,766	3,882,695	182,520	439,551	899,901	3,199,272	2,738,922

* Bond interest paid. † Loss.

Dividends for years ended June 30:

$133,630.....	1903	$270,000.....	1909	$899,911.....	1916
339,991.....	1905	248,481.....	1910	1,349,962.....	1917
1,620,000.....	1906	449,955.....	1913	1,500,042.....	1918
1,215,000.....	1907	899,900.....	1914	1,312,537.....	1919
540,000.....	1908	.....	1915		

Property: includes original Granby group at Phoenix in the Boundary district, B. C.; the Hidden Creek mine on Granby bay, Observatory inlet, B. C.; Copper Key and Belcher groups at Belcher mountain, Wash.; the Oversight group; the Bonanza Creek mine; 30 quartz claims on Granby Peninsula; Mamie and Dean mines on the Kasaan Peninsula; the Midas mine at Valdez, and the It mine adjoining the Dean on Prince of Wales island.

Company has carried on exploratory work for 2 years on a property on the Ecstall river where results are said to be satisfactory. Also owns a large interest in a coal mine and coking plant at Crows Nest Pass, and a 100,000-h. p. water-power plant at Kettle Falls. The smelter at Grand Forks, operated since 1901, was closed down June 20, 1919. Company also owns the Cassidy coal mine of over 800 acres at Nanaimo, on Vancouver island, 70 miles N. of Victoria.

The Phoenix Mines.

The Granby or Knob Hill properties at Phoenix, B. C., 43 claims and fractions, 1,050 acres. The property had 2 distinct sets of orebodies. The largest and longest worked were those of the Knob Hill-Ironsides mines; the other one, one-half mile east, was the Gold Drop. Mining operations were stopped June 14, 1919, though the mines still show 2,513,636 tons of low-grade ore, of which amount about 500,000 tons is available. The geology and development are described in Vol. XIII.

During 1918 shipments from all sources totaled 310,943 tons. Mining, crushing, and loading Victoria ore was $1.25, and development 33c. per ton. Recovery reported from the smelter for Phoenix ore amounted to 19.58 lb. copper, 0.239 oz. silver, and 0.447 oz. gold per ton, the best recovery obtained since 1909.

Mining operations ceased at these mines on June 14, 1919. The shutdown which was rapidly approaching on account of exhaustion of orebodies was hastened somewhat by a shortage of coke, due to labor trouble at the local mines.

Grand Forks Smelter: blown out, June 20, 1919. Plant is described in Vol. XIII; mines and smelter in B. C. are well described in "Min. & Sci. Press" of February 24, 1917. During the year tonnage treated in the Grand Forks smelter totaled 313,133 tons of Granby ore, 7,200 tons of foreign ore, 16,168 tons of converter slag and matte, and 187 tons of flue dust.

Hidden Creek or Anyox Mines.

Address: E. E. Campbell, supt., Hidden Creek, B. C.

The Hidden Creek mine is located on Granby (formerly Goose) bay, Observatory inlet, south of and parallel to Portland canal. It is probably the largest copper mine of British Columbia. The 9 claims cover the top and sides of a hill 920′ high, enclosed by 2 branches of Hidden creek and 2 miles from Anyox, the smelter site and seaport town of the company.

Geology: the ore occurs as a mass of solid sulphides, pyrite and chalcopyrite, or mixed with country rock in shear zones, in crushed and schistose argillite. The rocks are folded and mashed but are part of the cover of the

great granite mass forming the Coast range. There are 2 deposits, one 25 to 40′ wide, traced 1,400′ said to average 6%, the other estimated to be 100′ wide and of unknown length. Development by diamond drill holes shows the ore to extend 300′ below sea-level, a vertical distance of 1,250′ below outcrop.

Development: by tunnels, with principal workings on the 750′ crosscut main tunnel, which is about 450′ from the surface. New work for the last year totaled 3,185′ at a cost of $26.16 per foot, making a total of 34,000′. Diamond-drilling amounted to 11,972′ at a cost of $2.71 per foot; total drilling amounts to 99.152 feet.

Cost of ore delivered on cars was $1.38 per ton, an increase of 18.2 cents. The mine was operated 312 days, with an average number of 243 men, and produced 683,889 tons of ore, a decrease of 205,719 tons from the previous year. Average grade mined was 1.88% copper, compared with 2.14% in 1918, and 2.08% in 1917. During the year, new ore amounting to 1,321,250 tons was added to reserves.

Anyox Smelter: this is the company's headquarters and chief plant. There are 4 furnaces, 52″ wide and 30′ long, making it the largest pyritic smelter in the world, as it treats from 2,000 to 2,500 tons daily. Company has laid out a town, installed water works, electric plant, graded streets, built stores, hospitals, etc. To supply fuel for the smelter, coal is brought from Vancouver Island and made into coke at Anyox, in a plant completed in 1919. By-products are saved. The works were described in "The Canadian Mining Journal" of November 26, 1919.

Company also owns the Bonanza group, adjacent to the Hidden Creek mine. The original estimate of ore reserves (including Bonanza) was 14,516,700 tons. June 30, 1919, the reserve was 11,222,702 tons, averaging 2.24% copper. The low grade ore, averaging 0.65% copper, amounts to 11,504,850 tons (including Bonanza), most of it, amenable to flotation concentration.

Alaskan Mines.

The Midas mine at Valdez, shipped 3,459 tons during early part of 1918 and was then closed, owing to cost of transportation. The year previous 25,350 tons were shipped, assaying 3.24% copper, 0.476 oz. gold, and 0.32 oz. silver. Ore reserves amount to about 136,000 tons, grade not given.

The Mamie mine was closed in July, 1918, as the compressor house was burned down. Very little, if any, ore of commercial value remains in the mine. The year previous 3,102 tons ore of 1.90% copper was shipped.

The It mine shipped 1,560 tons of ore during first half of 1918 and then was abandoned after doing considerable development. The year previous there was shipped 11,776 tons ore of 4.89% copper.

Production: for years ending June 30, except 1916, which is for nine months ending March 31:

	Ore Tons (a)	Cost M'ng	Per ton Sm.	Total	Lb. Cu. per ton	Copper lb.	Silver	Gold, Oz.	Cost Cu. cents(b)
1919(d)	.....	.....	.....	.....	.....	11,100,000	.....	.....	.....
1919	986,959	.....	.....	.....	27.97	28,213,552	567,425	23,303	23.00(c)
1918	1,475,637	.....	.....	.....	.....	44,685,001	550,163	30,730	15.00(c)
1917	1,490,804	$1.348	$1.926	$3.274	25.27	37,676,368	406,302	25,123	13.70
1916	1,929,205	0.990	1.300	2.290	22.36	42,198,083	487,845	44,848	12.30
1915	1,098,020	0.850	1.190	3.180	23.99	26,638,912	377,881	31,388	10.66
1914	1,289,000	0.800	1.220	2.730	16.89	23,320,097	435,275	43,882	11.50
1913	1,279,869	0.750	1.210	2.650	17.68	22,688,614	324,336	47,266	10.60
1912	739,519	0.770	1.260	2.900	18.01	13,231,121	225,305	33,305	11.10

Custom ore is not included in the figures for 1917, 1918 or 1919.
(a) In 1916 custom ore amounted to 1½% of total ore treated.
(b) After crediting gold and silver. (c) Estimated.
(d) July to December, inclusive.

The Anyox mines in 1919 yielded 11,100 oz. gold, 425,111 oz. silver, and 20,000,000 lb. copper from 655,427 tons of ore.

Reserves: present ore reserves exceed 11,000,000 tons developed and 10,000,000 tons of probable ore.

Granby is a great and well managed company, but its large construction expenses have used up its surplus, hampering its expansion. New financing in 1920 includes $2,500,000 of convertible debentures. Expenditures on the new

coal mine, coke plant, and smelter recently amounted to about $5,000,000, financed from treasury and temporary loans.

GREAT OHIO COPPER MINE **BRITISH COLUMBIA**

Sargent & Munro, owners, New Hazleton, B. C.

Property: adjoins the Butte Rocher de Boule mine and is operated by Jennings and Trimble, under lease and bond. A well defined fissure vein in granodorite, traceable at surface for 700', carries an orebody 4' wide, giving assays of 22.5% lead, 9.5% copper, 134 oz. silver, 8.6% zinc and 0.04 oz. gold.

Developed by 355' tunnel, open cuts and drifts. Ore occurence and conditions are similar to those in the Rocher de Boule, but further development necessary to determine value of mine. No recent information.

GREAT LAKE MINING & MILLING CO. **BRITISH COLUMBIA**

Owns a property on Thurlow Island, which was reported November, 1919, under lease to the Ladysmith Smelting Corporation.

GRIBBELL ISLAND COPPER CO. **BRITISH COLUMBIA**

Office: 203 First National Bank Bldg., Bellingham, Wash. Mine at Gribbell Island, Skeena River division, Cassiar district, B. C. Idle since 1906, owing to lack of funds. Fully described, Vol. XI, Copper Handbook.

HEDLEY GOLD MINING CO., LTD. **BRITISH COLUMBIA**

A Canadian re-incorporation, 1918, of the Hedley Gold Mng. Co.

Offices: 42 Broadway, New York; and Hedley, B. C.

Officers: I. L. Merrill, pres.; W. B. Dickson, v. p.; J. D. Clarke, sec.-treas., with W. D. Thornton, E. C. Congdon, G. E. Tener, G. P. Jones, Veryl Preston, Marcus Daly, and W. E. Corey, directors. W. S. Harper, asst. sec.-treas.; G. P. Jones, gen. supt., Hedley, B. C.

Inc. 1913, in British Columbia, as successor to the Yale Mining Co. **Cap.**, $2,400,000; shares $10 par; all issued. Guaranty Trust Co., New York, transfer agent; Mechanics & Metals Nat. Bank, New York, registrar. Annual meeting, second Wednesday in April, at Hedley, B. C. Listed on New York Curb.

Comparative Statements of Income Account:

Year	Rec. at Mill	Expenditures	Profits(a)	Dividends	Surplus	Erngs. on Cap. Stock
1918....	$690,711	.....	$132,578	$108,000	$24,578	$0.55
1917....	737,840	$499,745	238,095	240,000	441,783	1.98
1916....	711,997	463,380	248,617	240,000	443,688	2.07
1915....	796,591	421,846	374,745	300,000	74,745	3.12
1914....	797,341	409,112	388,229	300,000	88,229	3.23
1913....	802,330	397,075	405,255	360,000	45,255	3.38
1912....	748,133	362,253	385,880	360,000	25,880	3.22
1911....	.....	.....	318,152	300,000	18,152	2.65

(a) Includes interest earned.

Comparative General Balance Sheet, December 31:

	Assets:				Liabilities:		
Year	Property Account	Current Assets	Total	Year	Capital Stock	Undivided Profits	Total
1918..	$2,222,548	$217,516*	$2,440,064	1918..	$2,400,000	$24,578	$2,440,064
1917..	1,494,364	147,418	1,641,783	1917..	1,200,000	441,783	1,641,783
1916..	1,487,018	156,670	1,643,688	1916..	1,200,000	443,688	1,643,688
1915..	1,439,542	195,528	1,635,070	1915..	1,200,000	435,070	1,635,070
1914..	1,394,275	166,049	1,560,324	1914..	1,200,000	360,325	1,560,325

* Includes supplies, etc., $189,585.

Dividends:	Amount	Rate %		Amount	Rate %
1909.....	$0.30	3	1915.....	$2.50	25
1910.....	1.40	14	1916.....	2.00	20
1911.....	2.50	25	1917.....	2.00	20
1912.....	3.00	30	1918 old Co.....	0.30	3
1913.....	3.00	30	1918 new Co.....	0.45	4½
1914.....	2.50	25			

In September, 1919, quarterly dividend was passed to conserve surplus for development.

Property: the Nickel Plate and Sunnyside mines, 31 claims, crown-granted, and a mill site, 1,370 acres in all, on Nickel Plate Mountain, and in Similkameen Valley, Osoyoos mining division, Boundary district, Hedley, B. C. Also owns the Copper Flat property near Silver City, N. M.

Geology: the Hedley ore deposits are of contact metamphoric origin, and occur at contact of dikes and sheets of gabbro in altered limestones; they are irregular in outline, usually have a well-defined boundary on the side of the gabbro, and dip about 24°. Ore occurs in shoots. Nickel Plate shoot is 150′ wide, 40′ thick, and 1,500′ long. Principal ore mineral is arsenopyrite, with which occurs chalcopyrite, pyrrhotite, sphalerite, pyrite, gold and sometimes tetradymite; the valuable content of the ore is gold alone. In the association of gold with arsenopyrite in deposits of this origin the Nickel Plate ore deposits are unique and have no known counterpart in North America, excepting perhaps the White Caps at Manhattan, Nevada.

Development: 2 tunnels, 900′ and 1,160′ long and a 35° incline shaft, 970′ deep. Greatest depth of workings are at 5,200′ elevation, 670′ below the outcrop. Company plans sinking to 1,000′ level. Shrinkage stoping is used, and no timbering required. New work in 1918 totaled 490′, compared with 1,030′ in 1917, in addition to 3,766′ of diamond-drilling.

Reserves: Jan. 1, 1919, were 263,000 tons of $9.40 ore, 87,650 tons of $6 ore. The 900′ level has the highest grade ore, and which is said to extend lower so that deeper development will give increased reserves. On account of high prices the mill was closed during winter (1919-'20); and development work only carried on.

Ore is transported from the mines to the mill at Hedley by means of electric and gravity tramways. The former is 1 mile long, while the 45° gravity tram is 10,000′ long, with a 4,000′ drop.

Equipment: includes an air hoist, two compressors, each of 2,000 cu. ft. capacity and driven by 440 h. p. motors; also a 200-ton 40-stamp mill equipped with 24 Frue vanners and 12 Deister tables.

Electric power supplied by company's hydro-electric plant on the Similkameen river, with 2,100 h. p. twin turbines. Powerhouse has a 1,250 k. v. a. alternating current generator. Total cost of plant, $192,009, charged to capital account.

Recent production:	Ore Tons	Ave. Assay	Gold Rec.	% Rec.
1919	60,000	$8.00	$497,000*	.....
1918	67,313	10.34	690,711*	90.00
1917	71,207	11.29	737,840*	90.00
1916	73,491	10.65	711,997	.....
1915	74,625	11.65	796,592	.....
1914	78,494	10.80	797,340	94.09
1913	70,796	12.03	802,330	94.14
1912	70,455	11.19	748,133	.....

* Including sale of arsenic to Tacoma Smelting Co., recovered in concentrates.

Conditions in the lower levels of the mine have changed considerably during the past four years. While the orebodies are larger and stronger and maintain practically the same grade, the specific gravity has increased due to an increase in arsenopyrite, which adds to the cost per ton of ore milled. Concentrate tonnage rose from 3,831 tons in 1913 to 6,218 tons in 1915, and to offset this increase in costs the company installed a cyanide plant. War conditions during 1918 prevented extensive development and not enough new ore was opened to replace the amount milled. The president says, "The mine still looks fairly well, and if prices for labor and supplies come down to near pre-war-time levels, we expect to earn a fair rate of interest on our stock; with more development we hope to get the mine back into better shape." Hedley is a good property well managed.

HERCULES MINING CO. **BRITISH COLUMBIA**

Idle. Nearest P. O.: Jedway, Queen Charlotte island, B. C. Claims are near the Ikeda mine, on Moresby island. Apparently has little or no development.

HEWITT-LORNA DOONE MINES **BRITISH COLUMBIA**

Operated by Clarence Cunningham, Sandon, B. C., under lease and bond from Silver Tip Mining & Power Co.

Property: 12 crown-granted claims, 1,200 acres timber, and a 125-ton flotation mill, located at Silverton, in Slocan mining district. Ore is lead-zinc.

Development: by tunnels to depth of 1,200′; lowest level, No. 8, provides most of output.

Production in 1918, reported as 19,400 tons ore, grade not given.

HIGHLAND VALLEY MINING & DEVELOPMENT CO. **B. C.**

Office: 610 Hutton Block, Spokane, Wash. **Mine address:** Ashcroft, British Columbia.

Officers: Frederic Keffer, pres. and gen. mgr.; Sigmund Dilsheimer, v. p.; Chas. G. Hall, sec.-treas., with H. C. Haas, Jos. McCarthy, C. L. Baker, S. S. McClintock, and E. H. Knight, directors.

Inc. 1915, in Washington. **Cap.,** $1,500,000; shares $1 par, non-assessable; 1,219,712 outstanding. Bonds outstanding, March, 1919, $25,000 at 7%.

Total receipts from ore shipments and concentrates in 1917 reported as $106,584.

Property: the Chataway and Sanson or Tamarac groups, 15 claims, about 600 acres, 28 miles S. E. from Ashcroft, a station on the C. P. R. Company paid $50,000 for the Chataway group and has the Sanson group of 11 claims under bond.

Copper ore with small silver and gold values occurs in a contact vein between granite and quartz-feldspar porphyry. Vein is from 3 to 17′ in width, and an orebody has been opened by a drift for 400′. Ore carries chalcopyrite in a micaceous gangue. Average assays are 5% copper, with about 25c. in gold and silver.

Development: by 500′ tunnel and shaft to depth of 130′. Total work amounts to 1,500′ of drifts and tunnels, with 300′ raises and stopes. Reserves comprise about 8,000 tons above the lower level, where 100′ of drifting is said to be in 6% ore.

Equipment: includes 1,000′ tramway and 50-ton mill using flotation and making a 90% extraction.

Producton: in 1917, 48 carloads of concentrate and 4 of crude ore netting $106,584 at smelter.

The mine was idle during the greater part of 1919, pending financing. If deeper development proves satisfactory the mill will be enlarged and better transportation provided. Reported November, 1919, that creditors had agreed to accept 1/10 in cash and 1/10 in one, two, three and four months, and the balance in 7% preferred shares.

Is a clean cut and creditable mining promotion.

HOBSON SILVER LEAD CO. **BRITISH COLUMBIA**

Address: Box 1123, Spokane, Wash., and Ymir, B. C.

Officers: George T. Reynolds, pres.; W. L. McEachren, v. p.; W. B. Ward, Jr., sec.-treas., Ymir, B. C.; C. H. Harvey, asst. sec. and treas.; preceding with J. C. Buchanan, F. R. Monfort and W. A. Buchanan, directors. W. T. McDowell, mgr.

Inc. 1911, in Washington. **Cap.,** $1,500,000; shares $1 par; outstanding 1,286,571. Stock transferred at company's office. Annual meeting in January. Operating expenses in 1915, $30,977.

Property: Yankee Girl mine, 3 claims, patented, 126 acres, at Ymir, Nelson mining district, B. C., said to show lead-zinc ore in contact deposits between granite, slate and schist; strike N. E.-S. W.; dip 60°. One orebody is said to be 90′ long, another 400′ long. Ore is said to assay $20 gold, 6.5 oz. silver and 5.5% lead per ton. The main vein, the Yankee Girl, drifted on 300′ in No. 4 tunnel; is 5′ to 7′ wide and averages $7.24 gold and 0.77 oz. silver per ton. The Yukon vein is also ore bearing.

Development: 4 tunnels. No. 1, 1,600′ long; No. 2, 2,100′ long and 400′ below the surface; No. 3, 400′ long and 175′ below No. 2; No. 4, 2,100′ long and 600′ below No. 2, is driven in the footwall and for the first 1,160′ nearly parallels the vein. At No. 4 tunnel level the Yukon vein is estimated to lie 100′ N. E. of the tunnel. Company claimed to have 400,000 tons ore blocked out. Total underground workings over 6,000′.

Equipment: includes 2 air compressors and a 6,000′ tramway.

In 1918, shipments amounted to 8,847 tons ore, most of it going to the Canada Copper Corp. Company ignores requests for information.

HOWE SOUND CO. **BRITISH COLUMBIA**

New York office: 734 Fifth Ave. **Mine office:** Britannia Beach, B. C.

Officers: Evander B. Schley, pres.; W. H. Gelshenen, v. p.; Wm. J. Walworth, v. p. and sec.; K. B. Schley, treas., with exception of Wm. J. Walworth, H. M. Hanna, Jr., G. H. Howard, C. E. Dunlap, Reeve Schley, Chas. G. Raynor, and G. B. Schley, directors. Emil Richter, asst. sec.-treas.; E. B. Schley, chairman executive committee; C. P. Browning, mine supt.

Inc. Aug. 22, 1903, in Maine. **Cap.,** $3,000,000; shares $1 par; 1,984,150 issued. Bankers Trust Co., New York, transfer agent. Chase National Bank, New York, registrar. Listed on New York Curb. Bonds: $4,573,000 20-year, 6%. Shares sold, 1918, $6⅞ high, 2⅞ low; in 1919, 5⅞ high, 3⅛ low.

Comparative Balance Sheet:

Assets.

	1918	1917	1916
Mining property	$7,739,915	$7,176,792	$6,797,604
Plant, buildings, machinery	4,023,834	3,582,442	3,328,077
Investments	871,545	1,068,989	821,488
Inventory	622,974	602,583	819,649
Accounts rec	451,529	*779,010	194,366
Bonds—U. S., Canada, etc	1,316,414	458,000	.....
Cash	319,116	188,835	734,580
Other	10,086	7,812	7,069
Total	$15,355,404	$13,864,463	$12,702,833

* Includes production in transit, $766,397.

Liabilities.

	1918	1917	1916
Capital stock	$1,984,150	$1,984,150	$1,984,150
Bonds—20-year, 6%	4,573,000	4,842,000	5,111,000
Reserves	4,690,823	3,026,207	1,627,853
Profit and loss	3,597,848	3,554,655	3,018,689
Current	509,583	457,451	961,141
Total	$15,355,404	$13,864,463	$12,702,833

Comparative Profit and Loss Statement:

	1918	1917	1916
Smelter returns	$7,846,423	$7,019,815	$6,042,538
Miscellaneous income	179,571	94,617	78,246
Total income	$8,025,994	$7,114,432	$6,120,784
Mining, Transp., Mlg., Sm., & Mktg.	5,380,073	4,504,258	3,258,917
Taxes	242,367	.....	.....
Admin. and extraordinary	102,753	*70,047	59,100
Depreciation and depletion	1,606,827	1,430,678	876,311
Interest	253,951	290,824	351,595
Balance	440,023	818,625	1,574,860

* Includes corporate taxes.

Dividends: 15c in 1918, 20c in 1919, and 5c in January, 1920. The total is $793,656.

Company owns the entire stock issue of the Britannia Mining and Smelting Co., Ltd., which in turn owns the Britannia Power Co. and the Howe Sound Power Co. Howe Sound also owns 53,800 shares of the total issue of the El Potosi Mining Co., which, in turn, owns a large majority of the stock of the Chihuahua Mining Co.

Britannia Mining & Smelting Co., Ltd.

Property: holdings at end of 1918, were 317 crown-granted mineral claims and 17 beach lots of 14,822 acres, 212 mineral claims of 8,800 acres; 8 timber licenses of 4,366 acres; a total of 23,622 acres. During the year 1918, $113,605 was spent for new property in prospecting, surveying, crown granting, etc.

Geology: the orebodies consist of a series of roughly parallel lenses of chalcopyrite and pyrite in schist, and large masses of silicious material through which chalcopyrite and pyrite are irregularly disseminated. All the orebodies developed thus far are confined to about 100 acres, the remainder of the company's holdings being undeveloped.

Development: by a main working tunnel and various large glory holes connecting with tunnels 500, 600, 700, 850 and 1,050′ below the outcrop the latter being known as the 1,000′ level. The working tunnel or 2,200′ level is 2,200′ below the outcrop and 1,200′ below the old workings. At 3,922′ from the portal a shaft connects with the 1,050′ level. Work on the Daisy Armour crosscut, the 3,100 crosscut and the 4,100′ tunnels was continued during 1918, at a cost of $168,097. These tunnels open up the orebody so that in future all the ore will be dropped to the lowest or 4,100′ tunnel which runs to the orebins at the top of the mill. Four levels have portals on each side of Britannia mountain. Two other levels, the 1,200′ and 1,600 are now being driven through the mountain. In 1918 the Bluff mine on the west, and the Empress mine on the east, were extensively developed and stoping started. Underground work in 1918 totaled 25,432′.

Ore reserves: Jan. 1, 1918, in Britannia mine, broken ore in stopes has been increased 312,487 tons, increasing the total stored to 1,581,641 tons of 3% copper. Reserves in place amounted to 8,205,755 tons, averaging 2% copper.

Equipment of the shaft includes a double-drum electric hoist on the 1,050′ level and a Gates crusher in the rock-raise between the 1,050′ and 2,200′ levels, placed on the 1,800′ level and run by a 75-h. p. motor. This raise, 200′ east of and connected with the shaft, serves as a storage bin for ore, with capacity of 4,000 tons above the 1,800′ level and 2,000 tons below the 1,800′ level. The raise is lined with 12″ by 12″ timbers. Electric motors haul the ore from the chute to the portal of the tunnel. From the portal the ore is hauled 3 miles by electric railway to head of a 33% incline, 5,500′ long, vertical drop of 1,450′, which leads to the bins of the concentrator at the water's edge. Other similar raises, equipped with crushers, are driven in different localities to give flexibility to the operation.

By system of dams, intakes and pipe lines, Britannia creek has been harnessed to produce over 8,000-h. p. during most of the year. Work done in 1917, to develop Furry creek produces over 2,500-h. p., which will be increased by additional installations in the future. As reserve power, there is a steam turbine plant of over 3,000 h. p. capacity located at the beach.

Equipment: includes 8 compressors, some driven by water wheels, some by steam, and some by either steam or water-generated electricity, with total capacity of nearly 20,000 cubic feet of free air per minute.

The four units of the new mill are in operation, and although originally designed to handle 2,000 tons daily, are enabled by improvements and additional machinery to care for 2,500 tons. The old mill, originally capable of treating 800 tons daily, will be dismantled and all available units trans-

ferred to the new mill. This will bring the capacity of the new mill to approximately 3,000 tons.

In general the system of milling consists of coarse crushing, jigging by Hancock jigs, fine crushing in tube mills and Hardinge mills, and flotation in Minerals Separation machines, Shipments of concentrates to the smelter, resulting from treating 730,303 tons in the mill amounted to 63,055 dry tons and assayed per ton, 0.048 oz. gold; 1.56 oz. silver; 14.53% copper; 3.32% zinc.

There are 2 townsites in connection with the company's operations, one at Britannia Beach, on the shore of Howe Sound, and the other, known as the Mine Townsite, laid out at the portal of the new tunnel. It has all necessary buildings for equipment and men, the mine buildings being the best and most comfortably equipped in British Columbia. There is a large company store at Britannia Beach.

Total tonnage milled in 1918, 730,300 tons; cost per ton, $0.693; mining costs, including development and crushing, $1.77 per ton.

Production is as follows:

Year	Copper Lb.	Gold Oz.	Silver Oz.	Total Value
1918	18,322,482	3,045	98,131	.....
1917	16,357,329	992	91,504	.....
1916	16,288,835	791	91,905	(a)$6,042,538
1915	9,058,045	397	50,306	1,616,133
1914	11,841,232	213	68,515	1,640,379
1913	13,167,000	89	72,300	2,052,188
1912	14,300,000	...	76,500	2,383,285
1911	8,685,000	...	46,000	1,074,334
1910	520,000	1,000	7,500	64,000

(a) includes lead and zinc values.

The Britannia proved a hard problem to handle for years, but has made money under the present management, which is thoroughly capable. A successful future seems certain, and the results are a tribute to the far-seeing judgment and persistency of Mr. G. B. Schley.

Mexican Properties.

The **El Potosi and Chihuahua** mining companies comprise 415 acres in the Santa Eulalia mining district, eighteen miles from Chihuahua City, where the company's narrow gauge railroad connects with the National Lines of Mexico. The Santo Domingo, the producing claim of the Chihuahua Mining Co., adjoins the 200 acre claim of the Potosi Company. Other claims are within a two mile radius of the Santo Domingo.

Development work in 1918, showed that previous ore estimates were conservative, and a new deposit of galena found in the large iron-sulphide body, has added greatly to reserves. During 1918, shipments were 141,958 tons of ore classified as follows:

	Tons	Aver. Oz. silver	Average % lead
Lead carbonate	73,883	14.92	4.44
Lead sulphide	20,014	21.49	8.65
Iron sulphide	48,061	36.31	1.88

The ore mined was shipped to the A. S. & R. Co.'s plant. Several shipments were maintained steadily throughout, almost the entire year. The mine workings and development for several years were in charge of Mexican foremen; the American staff, etc., being held in El Paso under pay, until 1918, when they returned. W. J. Quigley is manager in charge of operations.

HUDSON BAY ZINC CO., LTD. **BRITISH COLUMBIA**

Operations carried on by Maurice W. Bacon, of Spokane, apparently without profit to company. Requests for information not replied to.

IDAHO-ALAMO MINE **BRITISH COLUMBIA**

Owned by Clarence Cunningham, Sandon, B. C. Said to show a considerable tonnage of milling ore which is shipped to the Alamo concentrator at Alamo.

IKEDA MINES, LTD. **BRITISH COLUMBIA**

Ikeda Bay, Queen Charlotte Island, B. C. At last accounts, R. R. McDennan pres.; S. J. Castleman sec.-treas., both of Spokane. Property was under management of Mr. Ikeda in 1918.

Inc. Sept., 1910, in British Columbia. **Cap.**, $850,000; shares $1 par.

Property: the former holdings of the Awaya-Ikeda Co., Ltd., taken over for $200,000, include 42 claims, 2,100 acres in several groups on Ikeda bay, at the southern end of Moresby island, 3 miles from Jedway, and connected therewith by government rail and telephone. Steamer connection is had with Vancouver, 450 miles distant. The Lily group, 8 claims, 400 acres, crown patented in 1912, on the southwestern side of Ikeda bay, discovered May, 1898, by Arichka Ikeda, and developed by him until taken over by the present company, September, 1910.

Geology: the group shows limestone and slate cut by dikes of greenstone and diorite, having well defined flat fissures at right angles to and between the vertical main fissures. Ore occurs in a series of veins of 2 to 8′ width, the largest orebodies lying along the horizontal main fissure. The vein principally developed is of 5 to 30′ width, proven for 1,000′ in length and about 300′ in depth. The ore shoot, up to 20′ in width, carries lenses of chalcopyrite, averaging, as mined, about 2.5% copper, with a gangue of silicious country rock and occasional stringers of quartzite and limestone. The ore mined by the former owners averaged about 4% copper, 2.2 oz. silver and $2.25 gold per ton.

Development: the Lily mine has 4 tunnels connected by winzes. No. 3 tunnel, 940′ long, driven on the vein for 660′, has about 5′ of chalcopyrite of good average tenor and ends in a 40x50′ chamber from which considerable ore has been stoped, the ore in the chamber apparently being not the same as that followed in the tunnel, lying about 45′ to the N. and found by crosscutting.

Production: smelter returns in 1918 totaled 358 tons of ore, yielding 83,384 lb. copper, 77 oz. gold, and 987 oz. silver. The property has reached the stage where it requires a 50-ton mill to treat the 2nd class ore, of which there is 7,000 to 8,000 tons in sight.

The output in 1919 was 165 tons of ore yielding 54 oz. gold, 800 oz. silver and 43,700 lb. copper.

INDEX MINING CO. **BRITISH COLUMBIA**

Address: F. J. Edwards, mgr., Slocan, B. C.

Property: the Index mine on south fork of Kaslo creek, near Slocan, containing veins of silver-lead ore. A long crosscut tunnel is being driven to cut No. 2 vein and a drift is being run on No. 1 vein. A new compressor has recently been added to the equipment. The Flint claim, also a silver-lead property, was acquired in December, 1919, at a cost of $22,500.

INDIAN MINES CO., LTD. **BRITISH COLUMBIA**

Property is in Salmon River district, N. E. of Stewart. By February, 1920, a vein from 12 to 20′ wide had been opened for a length of 2,000′, the shoot assaying from $40 to $120 per ton.

INLAND MINING CO., LTD. **BRITISH COLUMBIA**

Address: Walla Walla, Wash., and Nelson, B. C.

Officers: Albert Niebergal, pres.; J. F. Talabere, v. p.; Alfred Bachtold, sec.-treas.; with C. E. Nye, D. Donovan, H. Ibberson, and G. Magallon, directors W. M. Myers, mgr.

Inc. in Washington. **Cap.**, $1,500,000; shares $1 par; non-assessable.

Property: all near Nelson in the Grand Forks Mining Division, B. C.,

consists of the Inland gold mine, closed as being unprofitable; the Berlin gold-silver-copper mine, under lease since October, 1918, to the Griswold-Billingsley Co.; the Eureka copper mine acquired from the Eureka Copper Mines, Ltd., in October, 1918; and the Granite-Poorman gold mine, acquired July, 1919, from the Kootenay Gold Exploration Co.

Development: the Eureka and Granite-Poorman have been extensively opened by tunnels and shafts, exposing a considerable quantity of ore.

Equipment: steam and electric power, compressors, hoists, pumps, aerial trams and 10 and 20-stamp concentrating plants with ball-mill.

Production: definite figures are not yet obtainable, but the Eureka has shipped several thousand tons of smelting ore, and the Granite-Poorman has been operating on and off for 30 years. Ore and concentrates are sent to the Granby smelter.

INTERNATIONAL EXPLORATION & DEV. CO. **B. C.**

Mail returned, 1919, from former address, James McIntire, 525 Rookery Bldg., Spokane, Wash.

Officers: T. A. Farrell, pres.; S. A. Haynes, sec.-treas., with E. T. Smith, R. L. Smith and J. W. Osborne, directors. Leroy Way, Old National Bank Bldg., Spokane, agt.

Cap., $500,000; shares $1 par.

Organized to locate, acquire and develop prospects, eventually disposing of them to operating companies. A 3-year option for $60,000 was taken on 7 claims near Paulsen, 17 miles from Grand Forks, B. C., and several claims were exploited 12 miles from Grand Forks. Company probably idle.

IRON MASK MINE **BRITISH COLUMBIA**

Owned by Kamloops Copper Co., at Kamloops, Yale district, B. C.

Shaft is down 780′ and diamond-drilling under way. Has 300-ton mill, with flotation unit.

IRON MOUNTAIN, LTD. **BRITISH COLUMBIA**

Address: R. W. Mifflin, treas.-supt.; D. E. McLaughlin, sec.

Property: the Jersey and Emerald mines in Sheep Creek camp, Nelson mining division. The Emerald is the largest producer of lead-silver ore in the district, and employs about 20 men. In 1918 ore shipments totaled 3,176 tons. A concentrator, built in the fall of 1919, handles 30 tons daily, running two shifts.

JACKSON BASIN ZINC CO. **BRITISH COLUMBIA**

Probably liquidated as property was acquired by Utica Mines, Ltd., 1919.

JEWEL-DENERO MINES, LTD. **BRITISH COLUMBIA**

Secretary's office: W. Robertson, 71 George St., Edinburgh, Scotland. **Mine office:** Greenwood, B. C.

Directors: J. Galloway, chairman; J. E. Rogerson and W. W. Slater. **Inc.** Nov. 22, 1912, in Edinburgh.

Cap., £70,000; shares 5s each; 279,400 shares issued. Authorized bond issue, £12,500, 8%; £11,202 issued.

Property: the Jewel gold mine at Greenwood and the Idaho Alamo mine in the Slocan district, B. C. The Jewel mine is developed to depth of 500′ by shafts and crosscuts and started production in 1911. Produced 16,525 tons of ore in 1914, yielding £31,360. In 1915 only development work was done and in 1916 the mine was being operated by lessees. **Equipment:** includes a 15-stamp cyanide mill.

KAMLOOPS COPPER CO. **BRITISH COLUMBIA**

General office: 609 First National Bank Bldg., Duluth, Minn. **Mine address:** Kamloops, Yale district, B. C.

Officers: at last accounts, E. G. Wallinder, pres.-mgr.; W. H. Eaton, v. p., with G. Carlson, S. H. Hudson, F. M. Needham, J. J. Eklund, Reiner Hoch, Theodore Michel, Otto Johnson, directors; W. W. Blackshaw, sec., 1412 Tower Ave., Superior, Wis.; Otto Johnson, treas.; John Jenswold, atty.; A. E. Wallinder, supt.

Inc. Sept. 7, 1909, in Arizona. **Cap.,** $3,000,000; shares $10 par, part paid; 128,561 issued, none preferred. First-mortgage bonds on Iron Mask mine amount to $210,000; and convertible 6% notes, $128,500.

Accounts for period of 2 years show revenue of $337,454 of which ore sales netted $109,330. Balance at end of September, 1916, was $77,572. Excess of current assets over liabilities was $33,840. No statement since.

Property: 10 claims, 2,041 acres, 228 acres mineral land, including the Iron Mask mine, 7 miles S. W. of Kamloops.

Geology: the Iron Mask shaft is sunk on a shear zone, mineralized for 20 to 30′ in width, with segregations of better grade ore forming a pay-streak of variable width, carrying chalcopyrite, associated with magnetite in a chloritic gangue, containing orthoclase intercrystallized with copper sulphide. The country rock is a diorite with smeary basic patches of gabbroic material. The Iron Mask orebody averaged 28′ in thickness, and was lenticular in shape above the 690′ level; here it was cut off by a horizontal fault. It has been found below this level by diamond-drilling from the 750′ level and is being opened up. The ore is troublesome to concentrate by ordinary methods owing to its chlorite and quartz-orthoclase gangue.

The mine shows several orebodies besides the Iron Mask, all of them due to "igneous after effects," and occurring in fresh diorite, filling fissures as replacements along fissures and in patches, the ore consisting of orthoclase, chlorite, epidote and other secondary pneumatolytic minerals, with interlocked chalcopyrite, pyrite, magnetite, etc.

The Erin orebody shows excellent ore and numerous pits at various points on the property all show ore.

See Annual Report of Minister of Mines, British Columbia, 1915, for detailed description of geology, workings, etc. Examined by Walter Harvey Weed.

Development: includes the 780′ Iron Mask shaft and over 18,000′ of workings, on 9 levels; the 330′ Erin shaft sunk on ore for 300′ with 600′ of drifts and crosscuts; the 50′ Lucky Strike shaft and 3 other prospect shafts. Electric power is obtained from the City of Kamloops power-station. In 1917 and 1918, approximately 8,000′ of diamond-drilling was done.

Equipment: includes 300-ton flotation mill, one 150-h. p. compressor, one 225-h. p. motor for the "Iron Mask" hoist and 8 smaller motors, 6′ double-drum hoist, 3 air compressors of 1,300 cu. ft. capacity, good for 15 drills, an electric-light plant and a sawmill. Transportation is by a good wagon road with steep grades, leading to the railway siding below Kamloops. The management plans a 2½-mile tram, having a drop of 1,100′, when financial conditions are better.

Production: the mill was not operated to capacity during 1918, total shipments of copper concentrates amounting to 2,800 tons.

It is understood that the English corporation has extended the time for further payments on the property.

KAMLOOPS MINES, LTD. **BRITISH COLUMBIA**

Office: 151 Coronation House, 4 Lloyds Ave., London, E. C., Eng. Company in hands of trustees, as property is under lease and bond to the Kamloops Copper Co.

KING EDWARD MINES, LTD. **BRITISH COLUMBIA**

Idle. D. Braithwaite, sec.-treas., Fairview, Boundary district, B. C.

Inc. 1904, in British Columbia. **Cap.,** $500,000; shares $1 par.

Property: 10 claims, 500 acres, in the Similkameen district. Opened by 350′ of workings, said to show a sulphide orebody 6 to 10′ wide averaging 5% copper.

KING SOLOMON COPPER MINING CO., LTD. **B. C.**

Office: 206 Penfield Bldg., Philadelphia, Pa. **Mine office:** Cowichan, British Columbia.

Officers: A. S. Anderson, pres.; Philip Singleton, v. p.; J. K. Evans, sec.; H. A. Nolte, treas. Directors, preceding and B. L. Foster, James Humes, mgr. and Geo. T. Storey.

Inc. July 2, 1908, in British Columbia. **Cap.**, $1,000,000; par $1; issued 685,005 shares.

Property: 133 acres patented claims, near Cowichan, Vancouver Island, B. C., includes the King Solomon and Queen of Sheba claims, showing two fissure veins in syenite and diorite.

Development: by 700′ tunnel and two open quarries, 125 by 50′ and 50 by 70′. Operations confined to small amount of development work, since 1917, pending construction of railway (C. P. R.)

Equipped with 65-h. p. steam engine, air compressor, saw-mill, houses, etc.

About 800 tons of ore shipped to Tyee smelter returned 8 to 9% copper, 1 oz. silver and small amount of gold. No production 1917-1919.

KITSALIS MOUNTAIN COPPER CO. BRITISH COLUMBIA

Address: Usk, B. C.

Officers: J. D. Wells, pres.; Jesse Brooks, v. p.; A. J. Thomson, treas. and mgr., Usk; with S. H. Davis, and Jas. Darby, directors.

Inc. in British Columbia. **Cap.**, $500,000; par $1.

Property: 6 claims in Omineca division, one mile from Usk, with workings but 200′ above Grand Trunk R. R., shows several quartz veins opened by cuts and tunnels showing ore carrying argentiferous bornite and chalcocite, with free gold in both quartz and bornite. (See 1917 Annual Report of Minister of Mines, British Columbia).

Development: by tunnels, with several hundred feet of workings. Where cut in the tunnel the quartz vein has practically no sulphides and is of little or no value, but a new vein is said to look encouraging and work will be continued on it.

KOOTENAY BELLE GOLD MINE BRITISH COLUMBIA

M. M. McCune, mgr., Sheep Creek, via Salmo, B. C.

A. W. McCune, Salt Lake City, in 1918, had a bond on this property together with the Queen Vancouver, and Alexander mining groups, in the Sheep Creek gold camp of the Nelson mining division. The Queen is credited with a past production of $1,300,000, and the Kootenay Belle, $100,000 in gold.

Properties had been idle several years, but new management has started a 3,000′ crosscut tunnel, which will cut several parallel veins on the property. At last accounts was employing 25 men and planning to build a mill.

KOOTENAY BONANZA MINES, LTD. BRITISH COLUMBIA

Office: 901 Vancouver Block, Vancouver, B. C.

Officers: W, Finch Page, pres., London, Eng.; A. E. Rand, v. p.; R. S. Lennie, sec.-treas.; preceding with A. C. Burdick and J. A. Hendry, directors.

Inc. in British Columbia. **Cap.**, $3,000,000; shares $5 par; outstanding, $200,000. Company organized to take over the Silver King mine from the bondholders of the Hall Mining & Smelting Co., Ltd.; the claims of the Kootenay Development Syndicate, Ltd.; Dandy & Ollie Cons. Mines, Ltd., and of the Starlight Mines, Ltd., as well as other properties.

Silver King and Dandy groups of claims were sold to the Silver King Mines, Ltd. The company now holds 34 other claims, comprising the North Star, Great Western Starlight and Irene groups, comprising practically all the mineral area of Toad mountain, at Nelson, B. C.

KOOTENAY GOLD EXPLORATION CO. BRITISH COLUMBIA

Company defunct. Property acquired July, 1919, by Inland Mining Co., which see.

LADYSMITH SMELTING CORPORATION, LTD. B. C.

Address: F. A. Sieberling, Goodrich Tire & Rubber Co., Akron, Ohio.
Operating office: Col. W. L. Stevenson, mgr., H. W. Aldrich, gen. supt., Ladysmith, Vancouver Island, B. C.

Property: 1,247 acres, including 13 claims, crown granted, 342 acres, a 45-acre smelter site and 800 acres timber lands. Owns the Ladysmith

smelter, and mineral lands on Mt. Sicker, Vancouver Island, purchased from the Tyee Copper Co., in December, 1916, for $275,000. In January, 1920, 14 additional copper claims were acquired.

The Tyee mine, on Mt. Sicker, in the Somenos district, 11 miles N. W. of Duncans, and about 80 miles from Victoria, yielded only 1,200 tons of ore in 1907, and has been idle since. The orebody was rich, but shallow, and although it was explored thoroughly, nothing of value was found.

Smelter: known as the Ladysmith works, is well located, on a 45-acre site on Oyster harbor, and treated custom ores from as far N. as Alaska and as far S. as Mexico. The smelter was remodeled and practically rebuilt 1909-1910. There is a 40x210′ wharf, having an electric hoist, connected, by an elevated incline trestle, with the smelter bins, which are of 5,400 tons capacity. The works are terraced throughout, permitting handling of material by gravity, and have a capacity of 500 tons daily.

The furnace building has 42x120″ and 48x160″ Allis-Chalmers blast furnaces, of 200 and 300 tons daily capacity, respectively.

Smelter production was 3,604,474 lbs. copper in 1903; 5,045,000 lbs. in 1904; 3,039,398 lbs. copper, 103,474 oz. silver and 5,952 oz. gold in 1905; 3,173,431 lbs. copper in 1908; 2,148,058 lbs. copper in 1909; 45,758 tons of ore, yielding 3,392,901 lbs. copper, 41,128 oz. silver and 10,041 oz. gold in 1910. In 1911, 42,030 tons of custom ore were treated. Closed down, 1911.

The 250-ton mill was remodeled and flotation installed, 1917.

In 1918, the smelter was in operation for 5 weeks and closed down because sufficient ore could not be obtained to keep even one furnace running. Reported November 1919 that company had taken a bond on a property belonging to the Green Lake Mining & Milling Co., located on Thurlow Island, and that New York interests had bonded the Tyee mine.

LANARK MINING CO. **BRITISH COLUMBIA**

Address: Illecillewaet, B. C.

Officers: Wm. B. Dornberg, pres. and mgr., Spokane, Wash.; Geo. L. Allen, v. p.; A. H. Blair, treas., Yakima, Wash

Inc. in Washington. **Cap.,** $200,000; par 10c.

Property: 16 claims in Revelstoke division, near Illecillewaet, has produced considerable high-grade silver-lead ore. The main tunnel or 400′ level, is 700′ long; and the ore body has been mined out above this level. A winze 140′ deep with 180′ of drifting, is said to expose the downward extension of the orebody. Future of property said to depend upon the extent and value of the new ore and upon development of a quartz vein which is supposed to be an entirely new ore bearing zone.

Equipment: includes 250-h. p. hydro-electric plant to run the compressor, hoist, and concentrator.

LASQUETI ISLAND MINING CO., LTD. **BRITISH COLUMBIA**

Idle and company regarded as dead. Last address, Vancouver, B. C.

Officers: R. A. Mather, pres.; A. D. Tennant, v. p.; John D. Mather, sec.; Geo. E. Winter, treas.; Percy Williams, mgr., at last accounts.

Inc. 1910. **Cap.,** $500,000; shares 25c par.

Property: 3 claims, 150 acres, on Lasqueti Island, at the S. W. end of Texada Island, on the Gulf of Georgia, 55 miles from Vancouver.

Development: by tunnel, on 20′ veins known as St. Joseph, having 4 paystreaks, of 6 to 24″ width, said to carry ore averaging 10% copper and $20 gold per ton.

LE ROI No. 2, LTD. **BRITISH COLUMBIA**

Secretary's address: L. Rowell, 4 Broad St. Place, London, E. C. 2, England. **Mine office:** Rossland, Trail district, B. C.

Directors: Lord W. Hamilton, chairman; A. B. Dealtry, L. W. Harris, H. G. T. Hawes and Major C. H. Campbell. Alex Hill & Stewart, managers and cons. engs.

Inc. June 1, 1900, in Great Britain. **Cap.,** £600,000; shares £5 par; fully issued and fully paid.

Dividends: 5s. in 1901; 5s in 1902; 2s in 1904; 3s in 1905; 8s in 1906; 3s

in 1907; 6s in 1908; 6s in 1909; 6s in 1910; 5s in 1911; 1s in 1912; 2s in 1915-'16; 1% in 1916-'17. Total dividends to end of 1916 were £2 12s per share, or £312,000.

For fiscal year ending September 30, 1918, and presented March, 1919, there was a profit of £4,918 after writing off £5,979 for mine exploration and development, machinery, plant, etc. Balance carried forward was £21,218. The previous year operations resulted in a loss of £27, after writing off £17,946 for development and depreciation.

Costs: for mining, 1918, were $7.31 per ton; smelting, $7.57; which, after adding depreciation charges, total $15.06 per ton.

Property: 120 acres, including the Josie No. 1 and Annie mines, on Red mountain; also 8 claims near the old mine, 2 claims near the Velvet mine, and 5 claims in the Ymir district of British Columbia.

Company was developing the adjoining Giant-California mine by diamond-drill and tunnel, but no work was done there in 1918.

Josie mine has 5 pyrrhotite veins containing chalcopyrite and pyrite Output in 1918, averaged 1.71% copper, 0.43 oz. gold, and 1 oz. silver per ton.

Development: by the Josie main shaft to the 1,950′ level, and by 3 tunnels, 2 on the Josie and 1 on the Poorman claim.

Equipment: includes a 150-h. p. electric hoist, a machine shop, framing shop, smithy, superintendent's dwelling, etc.

The mill, across a small gulch from the Josie shaft, is of 50 tons rated daily capacity, having Blake and Gates crushers, 2 Chilian mills, 3 Jencke sizers, and 6 Wilfley tables. An Elmore oil concentrator, fully described Vol. IV, was installed 1903, proving a technical, but not a commercial success, and was superseded by Wilfley tables.

Production: largest production was 3,001,027 lb. in 1902. Recent productions has been as follows, years ending September 30:

Year	Tons ore	Copper Lb.	Gold Oz.	Silver Oz.
1918	19,642	671,122	8,516	19,687
1917	10,984	574,799	4,006	15,631
1916	19,231	730,015	7,258	17,675
1915	15,681	870,268	7,961	23,788
1914	29,679	.....	.....	.....
1913	35,553	.....	.....	.....
1912	.....	507,499	14,157	12,281
1911	.....	864,500	22,725	19,219
1910	.....	970,966	26,447	24,078

LEO MINING CO. BRITISH COLUMBIA

Office: 1005 Eleventh Ave., Spokane, Wash.

Officers: Thos. Hooker, pres.; S. Hanauer, v. p.; G. W. Roche, sec.-treas.; above with W. Merryweather, and W. S. McCrea, directors.

Inc. Aug., 1916, in Washington. **Cap.,** $50,000; shares 5c par; assessable; 750,000 issued.

Property: 3 claims near Ainsworth, B. C., showing fissure vein in gneiss-quartzite, containing galena with gold and silver values in a shoot 18″ wide. Average assays given as $80 a ton.

Development: by 2 tunnels, 625′ and 1,200′ long with 300′ of drifts.

Is still in the prospect stage.

LIGHTNING CREEK GOLD GRAVELS & DRAINAGE CO., LTD.

Office: C. H. Unverzagt, mgr.-treas., 405 Lexington Ave., New York City. John S. Horgan, pres.; Wilson M. Taylor, sec. **Mine address.** Cottonwood, B. C.

Inc. 1896, in British Columbia. **Cap.,** $3,000,000; shares $5 par; 481,359 issued. Bonds $250,000 authorized; $185,000 outstanding.

Property: 40 claims, 2,036 acres, or about 20 miles of placer leases along

lower Lightning creek, with a plant and P. O. at Wingdam, B. C. Several million dollars is said to have been taken out of the gravel deposits near Stanley many years ago. Below Stanley, deep drifting work was started at La Fontaine, and the bed rock gravel mined out for some distance, but it carried insufficient gold to be profitable. Below Fontaine down to Wingdam the placer deposits have not been worked to any extent, the ground being too deep to be worked without heavy pumping machinery. In 1919, a 195′ shaft was sunk to bedrock, and a new 3-compartment shaft was expected to be finished by March or April, 1920. This will give 3 operating shafts.

The present company claims to have spent $1,400,000 for the property and its development, but so far has been unsuccessful in its mining operations. The ground has been prospected for several seasons by a Keystone drill. The management claims "there are over $10,000,000 net values already (December 31, 1919) disclosed." For opinions see Annual Report, 1919, of the Minister of Mines, B. C., also the "New York Curb" for March and May, 1919. Company is unfavorably regarded.

LITTLE BILLY OPERATING CO. **BRITISH COLUMBIA**

Idle since 1914. Van Anda, Texada Island, B. C.

Property: the Little Billy mine is said to have an orebody of 8′ estimated average width, developed by a 260′ shaft, with a 35′ headgear.

Equipment: includes an 80-h. p. boiler, single-drum hoist, and a 5-drill air-compressor. There is a crude concentrating mill, with sorting tables, and a 500′ trestle with double-track tram to a shipping bunker on tidewater.

LORNE MINE **BRITISH COLUMBIA**

Owned by Arthur Noel, Lorne Mine P. O., B. C.

Mine on N. side of Cadwallader creek, about 50 miles from Mission Station, in Lillooet mining division, is said to have 9 distinct orebodies.

Development: by tunnels. Development work in 1918 yielded 380 tons of ore, returning 192 oz. gold and 37 oz. silver when milled. Results of work are said to be promising.

LOUIS CREEK PLACER GOLD MNG. & DEV. CO. **B. C.**

Address: 302 Hinckley Bldg., Seattle, Wash.

Officers: J. S. Sherry, pres.; Fred Breaks, v. p. and mgr., 34 Hastings St., E. Vancouver, B. C.; O. E. Newkirk, sec.-treas.; with H. P. Crosby, and M. Whaun, directors.

Inc. Feb., 1918, in Washington. **Cap.,** $200,000; par 10c; 750,000 shares in treasury.

Property: 3 half-mile leases, 200 acres, on Louis creek, Kamloops mining division, Yale district, said to have gold-platinum ore. The company has put in machinery and is getting ready to operate.

LUCKY JIM ZINC MINES, LTD. **BRITISH COLUMBIA**

Office: 16 McCallum Bldg., Victoria, B. C. Receiver, A. G. Larson, Old National Bank, Spokane, Wash.

Officers: Dr. H. C. Lamback, pres.; Dr. T. A. Russell, v. p.; G. T. Edmiston, sec.-treas., all of Spokane; A. W. Bevan Allen, asst. sec.; P. O. Box 857, Victoria, B. C.; with J. J. Collison, Chas. McKinnis, and Chas. Ehrenberg, directors.

Inc. April, 1919, in British Columbia. **Cap.,** $2,500,000; increased Jan., 1918, to $6,000,000; shares $1 par; authorized bond issue $150,000, bearing 7%.

Property: 11 crown-granted claims, 343 acres, including the Lucky Jim mine at Zincton, B. C., developed by 3,600′ of tunnels, drifts, raises, and crosscuts.

Operations were interrupted by lack of funds in the autumn of 1914, and an effort made to foreclose a first mortgage of $62,000, but the Court appointed a trustee to reopen the mine, and operations were resumed in 1915. December, 1916, receiver paid off first mortgage and was instructed by the Court to pay off the second mortgage (see later). For many years the affairs of the company were badly tangled due to an over-issue of approximately 3,000,000 shares of stock by G. Weaver Loper, formerly manag-

ing director and transfer agent, who was sent to the Washington State Penitentiary. The company was reorganized, and a statement made covering operations from April, 1914, to April, 1918. The income was $249,874, of which $228,161 was from ore shipments; expenditures totaled $246,721, leaving a balance of $2,653. On the balance sheet was an item $2,999,899, listed as over-issued shares. Total assets were $5,533 with indebtedness of $71,291, or a net deficit of $65,758. To avoid litigation, on account of the over-issue of stock an increase in capitalization was made to cover it.

Early in January, 1920, shareholders were notified that the Trustees for the mortgagees had commenced proceedings to foreclose the mortgage, and unless $12,000 was paid on account, company would eventually lose its property. It was suggested that a syndicate be formed to acquire and foreclose the mortgage, and reorganize the company with a smaller capital.

LYNN CREEK ZINC MINES CO. **BRITISH COLUMBIA**

Address: Vancouver, B. C. W. C. Woods, pres.; G. Phillips, sec., at last accounts.

Property: on west fork of Lynn creek, near North Vancouver, shows lead-zinc ore. Development is by tunnels. In 1918, only the essential assessment work was done to patent the claims.

MAPLE LEAF MINING CO. **BRITISH COLUMBIA**

Officers: H. W. Young, pres.-mgr.; John Donaldson, sec.-treas., both of Grand Forks; with J. B. Miller, S. B. Sangers, Thos. Dunlop, C. W. Brown, and H. W. Collins, directors.

Property: on N. fork of Kettle river, 40 miles from Grand Forks, said to show lead ore, with a small amount of platinum.

Development: tunnels, longest about 200′. Reported, May, 1919, that a small copper smelter was being built to handle 50 tons of ore daily.

MASTODON MINING CO. **BRITISH COLUMBIA**

J. W. Evans, mgr.

Property: 10 claims, 23 miles N. E. of Revelstoke, between La Forme and Carnes creeks, N. W. Kootenay district, shows zinc and lead ores.

Development: consists of a 110′ shaft with some driving, and much open cut work, said to have been very encouraging.

McKINLEY MINES, LTD. **BRITISH COLUMBIA**

Office: Rossland, B. C. Mine near Franklin, Boundary district, B. C.

Officers: B. Lequime, pres.; H. W. Warrington, v. p.; A. M. McKenzie, sec.; C. L. Hammond, managing director.

Property: 4 claims, on the N. fork of Kettle river, about 34 miles north of Grand Forks and 18 miles from the Kettle Valley railway terminus.

Orebodies occur as sulphides and oxides of iron carrying gold and copper. Several tunnels on property. Results of extensive diamond drilling not reported. Claims were under bond and lease to the British Columbia Copper Co., 1912, and a long tunnel driven. James Breen, of Spokane, owns 75% of the stock. The company was promoted by P. A. O'Farrell, who spent $30,000 supplied by F. A.Heinze, in diamond drilling, before Heinze abandoned the proposition. Property is too inaccessible to work its low-grade ore profitably. No recent information.

MINING CORPORATION OF CANADA **BRITISH COLUMBIA**

For office and directors, see description under Ontario.

Property: gold quartz claims on Proserpine mountain, 4 miles N. of Barkerville, Cariboo district, acquired 1919. In November, 50 men were employed on preparatory work and exploration under direction of R. H. Bryce. Diamond drilling was also to be done. Indications said to be good. Later in 1919 the Pioneer mine on Cadwallader creek, Lillooet, 54 miles by road from Mission station on the Pacific Great Eastern line, was purchased for $100,000.

Development: by a 280′ shaft.

Equipment: includes two 3-drill compressors, hoist, stamp-mill, and 190-h. p. water wheel.

Production: $37,921 in gold from 3,248 tons of ore.

MINNEAPOLIS & TEXADA COPPERITE CO., LTD. **B. C.**

Offices: 1311 Washington Ave., N., Minneapolis, Minn., and Vananda, Texada Island, B. C.

Officers: A. Stremel, pres.; E. E. Rorem, 1st v. p.; John Kraft, 2nd v. p.; A. E. Barker, sec.; John F. Danek, treas.; above, with Eden Schmidt, Hilmer Olson, B. F. Laflin and W. H. Curtis, directors.

Inc. in Arizona. **Cap.,** $1,000,000; shares $1 par; 400,000 issued.

Property: 5 claims, 225 acres, on Texada Island, 47 miles N. W. of Vancouver, said to show 2 main veins, the Swan and the Paxton, containing copper ore, with gold and silver. Paxton vein is said to be traceable 1,500′ on surface. Value of property is entirely prospective.

Development: 200′ shaft, with 300′ of drifting; also a number of test pits. Considerable mill ore extracted in this work, reported to average 4% copper, 2% lead, and $5 per ton in gold and silver.

In December, 1918, a contract was made with British interests who, it is reported, have been making a detailed examination of the property, including diamond drilling.

MOLLY GIBSON MINING CO. **BRITISH COLUMBIA**

Address: Rossland, B. C.

Property: 8 claims, in Grand Forks mining district, 4 miles S. W. of Paulsen, on the C. P. R. R., shows a mineralized area 1,500′ long. Vein where opened is about 8′ wide, and ore assays up to $14 in gold and 2 oz. in silver per ton.

Development: by several hundred feet of tunneling. Reported in Nov., 1919, that ore has been found in lower tunnel, assaying $48 to $125 per ton.

MOLYBDENUM MINING & REDUCTION CO., LTD. **B. C.**

Address: Riel, B. C.

Property: 21 claims on the Alice Arm branch of Portland Canal, 15 miles from Anyox. The group shows a series of quartz veins in a mineralized zone, 60′ wide, which for a length of about 800′ show small bunches of ore containing silver, lead, zinc, and molybdenum. A 4,000′ aerial tram connects the mine and mill.

The property has been tied up by litigation since 1916. In June of that year, the court at Victoria issued an order requiring that the property be placed on the market at a fixed price of $150,000.

MOTHER LODE SHEEP CREEK MINING CO. **B. C.**

Probably dead and property sold, but no confirmation obtainable.

Address: Sheep Creek, B. C.

Officers: Alex. L. Smith, sec., transfer agent and registrar, Cornwall, Ont.; John McMartin, pres.; J. R. Rutherford, gen. mgr., in 1916.

Inc. in Maine. **Cap.,** $1,250,000; shares $1 par. A dividend of 11% was declared in December, 1915.

Property: at Sheep Creek, West Kootenay district, B. C., shows gold ore in an orebody said to have a maximum width of 35′ on 6th level.

Equipment: includes 10-stamp mill and cyanide plant, connected with the mine by a 3,600′ aerial tram.

In 1914 ore mined and milled amounted to 20,000 tons; bullion recovered reported as $100,000. Owing to lack of power the mine has been operating only about 9 months of the year.

MOUNTAIN CHIEF MINING CO. **BRITISH COLUMBIA**

Address: Renata, B. C.

Officers: J. W. Evans, pres.-mgr.; J. H. Lawrence, sec.-treas., with A. D. Nash, Chas. F. Blacha, and W. A. Gordon, directors. **Inc.** in 1918.

Property: 5 claims, 3 miles from Renata, on Lower Arrow lake. Stripping and open cut work in 1918 is said to have disclosed an orebody 5′ wide and 100′ long, in limestone, near the contact with an intrusive granite. Ore assays about 2½ oz. silver and 3½% copper. In 1918, about 600 tons of ore were shipped from old workings. In September, 1919, a 200-ton shipment was made. A hoist and compressor were installed late in 1919, and the mine is being put in condition to ship up to 500 tons per week

MOUNTAIN CONS. MINING CO. BRITISH COLUMBIA

Property: 7 miles from Sandon, B. C., consists of two claims said to show a small, but rich vein in granite. Ore is silver-lead, with a little gold. The mine is in rough country and can be worked only in the summer. Operations each season said to result in a profit. Reported October, 1919, that company expected to realize $25,000 from one carload of ore.

MOUNT SICKER & B. C. DEV. CO., LTD. BRITISH COLUMBIA

Idle. **Office:** 30 George Square, Glasgow, Scotland. Fred L. Smith, chairman; John D. Steel, sec.

Inc. Oct. 20, 1898, in Great Britain. **Cap.,** £125,000; shares £1 par. Lands are on Mt. Sicker, Vancouver Island, B. C.

MULTIPLEX MINING, MILLING & POWER CO., LTD. B. C.

Address: P. O. Box 424, Revelstoke, B. C.

Officers: O. T. Bibb. pres.-mgr.; F. G. Wrighton, sec., with Jos. Stevenson, L. P. Schooling, and J. G. Hilbery, directors.

Inc. April, 1914, in British Columbia. **Cap.,** $1,000,000; par $1; non-assessable; 339,391 shares in treasury.

Property: 18 claims, 830 acres, 1¾ miles E. of Cambourne, at junction of Poole and Mohawk creeks, in Lardeau district, West Kootenay, said to show silver-lead-zinc ore in fissure veins, also gold ore in quartz veins of different type. It is said that $25,000 has been spent on development work by tunnels, with about 1,500′ of workings. Company planned to add a hydro-electric plant in 1919.

NEW CANADIAN METAL CO. BRITISH COLUMBIA

S. S. Fowler, Nelson, B. C., mgr. Control is held in France.

Property: the Bluebell lead-silver mine at Riondel, near Ainsworth, B. C.

Geology: the deposit is a replacement in limestone, irregular masses of ore following the bedding, with tongues projecting into the foot-wall country of pre-Cambrian sediments.

Development: mine is 600′ deep on incline of 35°, with extensive workings extending under Kootenay lake. The mine was flooded 1917, by an inrush of water; the old pump could not handle the water and a new 1,000-gal. pump has recently been added.

Equipment: includes mill and Blake crushers, rolls, jigs, trommels, Huntington mills, Wilfley and Deister tables. The mill was not operated in 1918.

Production: shipped 5,000 tons of oxidized ore from surface workings in 1918.

NEW DOMINION COPPER CO., LTD. BRITISH COLUMBIA

Controlled by B. C. Copper Co. Mines considered exhausted and of no commercial value. For description, see Vol. XII.

NEW ERA MINING CO. BRITISH COLUMBIA

Address. Camborne, B. C. W. E. Morphy, mgr.

Property: lease and bond on 3 crown-granted claims above timber line, including the old Beatrice mine, near Camborne, Lardeau mining division. The mine which has 1,400′ of tunnel work, was closed down some years ago on account of the low price of silver. Ore said to assay about 34% lead and 100 oz. silver per ton. Company expects to work the mine during the winter.

NEW HAZELTON GOLD-COBALT CO. BRITISH COLUMBIA

Address: Nicholas Thompson, pres., Vancouver, B. C. R. Dalby Morkill, sec.-treas.

Property: near Hazelton, on W. slope of Rocher De Boule mountain, 5 miles from Carnaby, shows a 2′ vein in granodiorite. This vein contains bunches and bands of ore varying from 3 to 18″ in width; ore contains auriferous arsenopyrite with some molybdenum. In 1918, a 26-ton shipment assayed 1.24 oz. gold; 1.4% MoS_2; 1.18% MoO_3; 1.12% cobalt; 0.6% nickel; 8.98% arsenic.

Development: by tunnels, the main one is over 700′; a second tunnel 250′ lower, in about 200′.

An aerial tram carries the ore 1,000′ down the mountain, from which point it is packed 5 miles to the Grand Trunk railway.

Property shows another vein which is supposed to be a continuation of the main Rocher De Boule vein.

NOBLE FIVE MINING CO. **BRITISH COLUMBIA**

Operated by Jas. Dunsmuir, Victoria, B. C.; Paul Lincoln, mgr.

Property: the Noble Five and Deadman groups between Sandon and Cody in the Slocan mining division, has been extensively developed during the past 8 years. The present lowest level has a 4,000′ crosscut, 1,100′ below upper workings, and about 3,000′ below apex of the Noble Five and Last Chance veins, proving the continuity of the veins at depth. The veins contain silver-lead ore and development said to warrant the new 100-ton mill built in 1919 to replace an old one operated years ago. A 4-compartment, 1,100′ raise with 2 ore ways connect the upper workings with the lower level which is to be the main haulage way. Company employs between 30 and 40 men. Said to have ore reserves sufficient to keep the mill busy for 2 years or more.

Is an old and well known mine that produced bonanza ore from its upper levels.

NOONDAY MINES CO. **BRITISH COLUMBIA**

Office: 704 Paulsen Bldg., Spokane, Wash.

Officers: R. C. Lammers, v. p.; J. M. Scott, sec.; J. B. White, treas., with H. S. Burdick, directors.

Cap., $750,000; shares 25c par; 1,800,000 issued.

Property: the Noonday and other claims near Sandon, B. C.

Development: by tunnels, with several thousand feet of workings, which have opened 14,000 tons of $17.50 lead-silver ore. A long development tunnel is to be driven through the properties.

A promising prospect. Shipments have been made at various times.

NORSEMEN EXPLORATION CO. **BRITISH COLUMBIA**

Office: 1048 McKnight Bldg., Minneapolis, Minn. **Mine office:** Capsheaf, Vananda, Texada Island, B. C.

Officers: E. E. Rorem, pres.; W. H. Curtis, v. p.; C. A. McKenzie, sec.; Allen T. Rorem, treas.; B. F. Laflin, A. E. Barker and Eden Schmidt, directors; Robt. Forbes, cons. engr.; Jas. Forbes, Sr., supt.

Inc. in Arizona. **Cap.,** $500,000; shares $1 par; issued, $375,000.

Property: 23 claims, 1,000 acres, 730 patented, on Texada Island, B. C., shows contact deposits between limestone, granite and diorite. Copper occurs as chalcopyrite and bornite, with gold and silver values. The Capsheaf claim has an 80′ vertical shaft that showed 10′ of ore., said to have averaged 4% copper and $6 gold and silver. Test shafts along the vein for several hundred feet show a continuity of the vein, and crosscutting proved it to be about 25′ wide. The Cameron claim, adjoining the Texada iron mine, owned by the Puget Sound Iron Co.—on which extensive development has been done, has a capping of magnetic iron with large lenses of chalcopyrite. The vein is reported to be over 180′ wide and is thought to average 4% copper. The Aladdin claim carries silver-lead ores. It has a 212′ vertical shaft with about 250′ of crosscutting. The Aladdin, De Ore, and Blizzard claims are leased to the Minneapolis & Texada Copperite Co., Ltd., which is now developing.

Reported 1919, that British interests are making a detailed examination of the property, including diamond-drilling.

Company's property covers about 4 miles along the various veins, is convenient to tide water transportation and about 20 miles from a smelter.

NUGGET GOLD MINES, LTD. **BRITISH COLUMBIA**

Address: 901 Vancouver Block, Vancouver, B. C.

Officers: A. C. Burdick, pres.; Geo. Rorie, sec.; with J. M. Turnbull,

R. S. Lennie, W. R. Robertson, and W. B. Pool, directors. R. H. Stewart, mgr., 736 Granville St., Vancouver.

Inc. in British Columbia. **Cap.,** $1,050,000; par $1. Cash on hand in November, 1919, amounted to $28,855.

Property: 15 claims, including the Mother Lode, Searchlight, and Nugget groups, in Sheep creek district, 15 miles from Salmo, claims show veins in schistose quartzite.

Development: by tunnels. A 1,250′ tunnel cut vein of the Mother lode mines in January, 1920, on the Sheep creek side of the mountain, 600′ beneath the old Nugget workings. This work cost $26.84 per foot. The shoot is 12′ wide, 3′ of which is good ore.

Equipment: includes a 14-drill compressor and a 100-ton mill which was on the Motherlode property when it was acquired by present company.

Past production reported as 37,153 oz. of gold.

NUMBER ONE MINE **BRITISH COLUMBIA**

Owned by J. M. Harris, Sandon, B. C., and F. T. Kelly.

Property: 5 claims, 231 acres, shows a fissure vein containing silver-lead ore, cutting through slate, and porphyry.

Development: by 3 tunnels, 200, 500 and 700′ in length. Total output to date, 312 tons of ore. Owners report $22,270 received from ore sales in 1918, with operating expenses of $16.702 and $3,000 paid as dividends.

OLALLA COPPER MINING & SMELTING CO. **B. C.**

Office: 305 Colt Bldg., Paterson, N. J. **Mine office:** Olalla, Yale district, B. C.

Officers: Robt. Gaede, pres.; Jos. Bamford, Jr., v. p.; John E. Tylee, sec.-treas.

Inc. Oct. 19, 1901, in Maine. **Cap.,** $8,000,000; shares $25 par. Annual meeting, first Monday in August.

Property: 32 claims, crown-granted, 1,183 acres, and a 92-acre mill, smelter and town site in Olalla, in the lower Similkameen and Keremeos camps, Osoyoos district, 4 miles from a railway. Lands show contact deposits between diorite and felsite, with orebodies in both, but mainly in the felsite. Twelve claims adjoin the town site of Olalla, and the Dividend group of 7 claims is 17 miles distant. Vein under development claimed by management to carry bunchy replacement deposits of chalcopyrite, with garnetite and magnetite gangue, in limestone, near intrusive contacts, assaying 1.5 to 5% copper, a little silver and $1 to $7 gold per ton.

Development: by 70′ shaft, and tunnels of 642′, 600′, 150′ and 112′, with 1.504′ of workings. There is no power equipment. Property idle, but under 25-year lease to Yale Development & Construction Co., organized among the stockholders of this company. No recent information.

OREGON & B. C. MINING & DEV. CO., LTD. **BRITISH COLUMBIA**

Office: 826 Northwestern Bank Bldg., Portland, Ore. Mine at Copper Mountain, near Princeton, B. C.

Officers: W. J. Peddicord, pres.; Walter T. Woodew, v. p.; G. Evert Baker, sec.-treas.-gen. mgr. at last accounts.

Inc. Jan. 6, 1906, in Oregon. **Cap.,** $150,000; shares 10c par; nonassessable; issued, 1,455,000 shares.

Property: 8 claims, crown-granted, 379 acres, well timbered, in the Yale district, B. C. Claims show diorite cut by diabase carrying pâtches, stringers and disseminations of chalcopyrite, bornite and magnetite, without quartz. The ore carries from 1½ to 3½% copper and is said to show as high as $4.50 gold per ton.

Development: a 176′ tunnel, reported to show 40′ of mineralized ground, carrying chalcopyrite and bornite, the last 8′ of the tunnel said to show an 8′ vein of solid ore, with 18″ to 2′ of talc gangue. Claims adjoin the Sunset mine and other properties of the British Columbia Copper Co. Management expects to resume development work. No recent information.

OUTSIDER MINE **BRITISH COLUMBIA**

Owned by Martin Woldson, Spokane, Wash., and associates.

Property: 8 claims, at Maple bay, 35 miles from Stewart, formerly known as the Brown Alaska property which was equipped in 1916 with an aerial tram from the mine to the beach. Several thousand tons of ore assaying about 2.8% copper, were shipped during 2 years operations. Shows several veins from 6 to 30′ in width. The ore is low grade and silicious.

Development: by tunnels, the longest about 800′. Five hundred feet of new work in 1918, opened an oreshoot 200′ long and 16′ wide, assaying 2% copper.

Equipment: includes two compressors. Power is supplied by a 24″ Pelton water wheel.

PANAMA MINE **BRITISH COLUMBIA**

H. Giegerich, Kaslo, B. C., owner. The mine, W. of Whitewater, in the Slocan country, is developed by 2,000′ of tunnels and drifts to depth of 300′. Reported to carry a contact vein, from 3-5′ wide, that averages 120 oz. silver. Small shipments made to the Trail smelter. Developing with a small force. No recent information, probably idle.

PARADISE MINES **BRITISH COLUMBIA**

Owned by R. Randolph Bruce, Invermere, B. C., Robt MacDonald, supt.

Property: in Windermere mining division, shows silver-lead carbonate ore in limestone. Ore assays 35 to 45% lead and 35 to 45 oz. silver per ton.

Development: by tunnels, with 7,000′ of workings.

Production: in 1918, shipped over 2,700 tons of ore, an increase of 400 tons over previous years. Employs 35 to 40 men.

PIONEER MINE **BRITISH COLUMBIA**

Sold in 1919 to Mining Corporation of Canada, which see.

PORTLAND CANAL TUNNELS, LTD. **BRITISH COLUMBIA**

E. J. Hearn, sec., 214 Belmont House, Victoria, B. C.

Officers: R. I. Elliott, K. C., pres.; J. A. Mara, R. M. Stewart and J. R. Waghorn, directors.

Inc. Aug. 23, 1912, in British Columbia. **Cap.**, $700,000; shares 25c par.

Property: 10 claims, crown-granted, near Stewart, Portland Canal, B. C. Company was organized to drive a crosscut tunnel to intersect the vein series of Glacier Creek, previously worked in the Portland Canal and in the Stewart Mining Co.'s properties. The tunnel, over 3,000′ long, has so far failed to disclose orebodies of permanent commercial values. Idle since 1914, owing to lack of funds.

PREMIER MINING CO., LTD. **BRITISH COLUMBIA**

Address: R. K. Neill, mgr., Premier mine, via Stewart, B. C.; or American Smelting & Refining Co., 120 Broadway, New York City.

Officers: R. W. Wood, pres., Fernie, B. C.; H. A. Guess, of A. S. & R. Co., v. p. and managing director, 120 Broadway, New York; Minor C. Keith, v. p.; with R. K. Neill, mgr., W. R. Wilson, H. B. Price, W. C. Potter, directors, W. E. Merriss, sec.; L. A. Chapin, treas.

Property: the Premier or Bush mine, with the 8 Cascade Falls claims, located in 1910 by William Dilworth and the Bunting brothers. Claims Nos. 4 and 8 contain the Premier mine. The property is adjacent to the Alaska line, on the east side of Cascade creek a tributary of the Salmon river, and 14 miles from Stewart at the head of Portland Canal.

The claims were formerly owned by the Salmon-Bear River Mining Co., ('See Canadian Mining Journal' of October 7, 1919), which did a little trenching and tunneling, but neglected to open the great outcrop of the high-grade vein now being worked. The claims were idle until the summer of 1914, when W. J. Rolfe examined them for a Canadian company. The vein was traced for 800′ down the hill, the surface stripped and the trenches cut at regular intervals all exposed pay ore, some high-grade. The mine was then bonded to New York interests and work re-started in the winter of 1914, in charge of H. P. Plate, who drove 3 exploratory tunnels. After 18 months work, at cost of $60,000, the option was given up.

In 1918 R. K. Neill examined the ground and bonded it for $100,000. A few yards crosscut work in the reopened tunnel showed that it paralleled the vein and was 6′ from it. An 82′ crosscut showed ore that averaged $55 per ton in gold and silver. Recent work has blocked out 1,000,000 tons of $30 ore.

Development: by an adit, 600′ long, opening milling ore the entire length, also 2 shoots 70′ long, assaying $100 and $200 per ton, respectively. Two lower adits, 250 and 710′ below the upper one, were in 400 and 550′, February, 1920. Diamond-drilling is under way from the upper adit.

Production: during the winter of 1918-'19, 512 tons of ore shipped, averaged $350 per ton in gold and silver. In 1919, 490 tons of ore yielded 3,194 oz. of gold and 108,285 oz. silver.

In October, 1919, the American Smelting & Refining Co. obtained a 40% interest in the mine.

In December, M. D. W. Bacon, of Los Angeles filed suit against Mr. Neill, claiming a half interest in the mine, based on an alleged partnership between them.

The Premier is evidently a big potential producer, equal, if not greater, than the Tonopah Divide in Nevada.

PRINCETON MINING & DEV. CO. **BRITISH COLUMBIA**

Address: Princeton, B. C.

Officers: F. F. Foster, pres.-mgr.; G. E. Murphy, v. p.; Perley Russell, sec.-treas.

Inc. Oct. 12, 1917, in British Columbia. **Cap.,** $150,000; par 10c; non-assessable; 500,000 shares issued.

Property: the Copper Farm group of 3 claims, 156 acres, 4½ miles E. of Princeton, on Great Northern R. R.

On the upper levels the vein shows 6″ of ore assaying up to 16% copper and 2 oz. silver. On the lower level the vein is shattered and displaced, but is said to have large tonnage of milling ore blocked out.

In 1918, only $1,000 was received from ore sales; operating expenses reported as $6,000. Work was resumed in December, 1919, and machinery is to be erected in the Spring of 1920.

PTARMIGAN MINES, LTD. **BRITISH COLUMBIA**

Address: care H. H. Johnson, Victoria, B. C.

Property: 8 claims at 5,300′ elevation, 15 miles inland from the mouth of Bear River, on Bedwell Sound, Vancouver Island. Considerable development work was contemplated on this property, but all work was suspended shortly after the outbreak of the European war.

Claims are on Big Interior mountain and show gossan outcrops underlain by chalcopyrite-magnetite ore. No recent information.

QUATSINO COPPER CO. **BRITISH COLUMBIA**

Dead. Succeeded 1916 by Coast Copper Co., which see.

QUEEN BESS MINE **BRITISH COLUMBIA**

Owners: Clarence Cunningham, London, B. C., and Dr. J. G. Cunningham, Spokane.

Property: 9 claims, N. W. of Sandon, show silver-lead ore in fissure veins developed by tunnels and by a 300′ shaft. Spent $50,000 for equipment in 1918. Shipments, reported to aggregate several hundred tons a month, are made to the Alamo mill at Alamo, owned by the same people. Record of output not available.

QUEEN BESS MINES CO. **BRITISH COLUMBIA**

Address: O. A. Thomas, pres. and mgr., Hoge Bldg., Seattle, Wash. C. E. Max, sec., Kamloops, B. C.

Property: 6 claims on E. side of North Thompson river, 2 miles south of Blackpool Station on Canadian Northern Ry., said to show fissures in greenstone, with silver-lead and zinc ores. Veins are from 2 to 6′ wide.

Development: 300′ shaft and several tunnels, with several hundred feet of workings in which sufficient ore was considered in sight to warrant building a 50-ton concentrator which began operating in February, 1919.

QUEEN MINES, INC. **BRITISH COLUMBIA**

Address: E. V. Buckley, mgr., Salmo, B. C.

Property: the Queen, Yellowstone and Alexandria mines and a mill-site on Sheeps Creek, near Salmo, said to show several veins containing gold ore. Recent work has been concentrated on the Queen group, developed by 700′ shaft with drifts run every 100′.

Equipment: includes 20-stamp mill.

Property was under option to Tonopah Belmont M. Co., in 1916.

Mine credited with total production since 1908 of $700,000 in gold.

Reported in 1919 that property had been bonded to A. W. McCune, Salt Lake City. See Kootenay Belle Gold Mine.

QUESNEL FORKS GOLD MINING CO. **BRITISH COLUMBIA**

See Bullion Mining Syndicate.

RAMBLER-CARIBOO MINES, LTD. **BRITISH COLUMBIA**

Address: Three Forks, B. C.; Sandon P. O., B. C.

Officers: A. F. McClaine, pres.; Alfred Coolidge, sec.-treas; W. A. Cameron, supt., with J. F. Hall, C. L. MacKenzie, Johnston Armstrong and H. Cornwell, directors; A. E. Cable, asst. sec.; J. A. McPhee, asst. treas.

Cap., $1,750,000; shares $1 par; all issued. Listed on Spokane Exchange.

Balance sheet of December 31, 1918, covering 8 months, showed total receipts of $83,708, which included balance forward, $20,833; ore in transit and at smelter, $62,775. Disbursements were $38,777, including $17,233 for ore production and development, $10,119 for general mine expense, and $7,606 for milling expenses. Net earnings amounted to $44,930. Cash on hand amounted to $44,930, not including $10,800, ore on hand and in transit. At end of January, 1920, cash amounted to $20,000.

Dividends: 1915-'16, $52,500; 1916-'17, $87,500; 1917-'18, $17,500. The company is reported as having paid 22c per share in as many consecutive installments prior to suspension of dividends in 1903. Total dividends including September 1, 1917, said to be $542,500; exact records not available.

Property: 5 crown-granted claims, at the head of McGuigan creek, near Three Forks, Slocan mining district, has been operated for many years as a silver-lead and zinc mine, and has been extensively developed at depth. On the 14th level a 5,000′ crosscut was run, but development there was disappointing, the orebody apparently not extending that far. The Jennie and Last Chance claims were acquired for $65,000, of which the final payment of $25,000 was made in January, 1920.

Development: for last 8 months of 1918, amounted to only 200′. In January, 1919, the superintendent stated that there was sufficient ore in sight to keep the mill operating for one year. In July, 1919, company purchased 2 adjoining claims, mentioned above, which are said to have 1,600′ of the vein. In November, 1919, company was mining ore from the 1,000′, 1,200′ and 1,300′ levels.

Concentrator during last 8 months of 1918 treated 5,400 tons of ore, producing 400 tons lead concentrate and 310 tons zinc concentrate.

The product is lead and zinc concentrates and crude lead ore. The first-class crude ore runs from 148 to 165 oz. silver and 50 to 58% lead, and the lead concentrate averages from 70 to 100 oz. silver and 32 to 40% lead. The zinc concentrate runs 35 to 37% zinc and about 25 oz. silver; it is sent to the smelter at Trail.

Management is considered "honest, efficient, and extremely conservative," but gives out but little information.

RECO MINING & MILLING CO. **BRITISH COLUMBIA**

J. M. Harris, pres. and mgr., Sandon, B. C.; F. T. Kelly, sec.-treas., Sandon.

Inc. Sept. 18, 1896, in British Columbia. **Cap.,** $1,000,000; par $1; outstanding 958,200; non-assessable.

Gross earnings for 1918 were but $4,023, and operating expenses $3,020.

Dividends: to 1919 totaled $332,492.

Property: the Reco mine, a formerly famous producer, 5 claims, near

Sandon, B. C. Claims show 2 fissure veins in slate and porphyry carrying silver-lead ore.

Development: by tunnels, with about 15,000′ of workings. Output in 1918 reported as only about 37 tons of ore.

RECORD MINING CO. **BRITISH COLUMBIA**

Address: Exchange Nat'l Bank Bldg., Spokane, Wash.

John R. Cassin, trustee; W. H. Turner, mgr.

Cap., $100,000; shares 10c par; 600,000 issued.

Property: the California mine, about 3 miles from Nelson, said to show a 4-8′ vein with 6″ shoot of gold-silver-zinc ore, developed to 500′ vertical depth, with 1,300′ of workings. Shipments by former owners reported to total $50,000. In 1918 considerable development was done, but no shipments made. Employs about 8 men.

RED CLIFF MINING CO. **BRITISH COLUMBIA**

Idle. Bankrupt. Mine at Stewart, Skeena district, B. C. See description in Vol. XII.

RELIEF MINING CO. **BRITISH COLUMBIA**

Address: Erie, B. C., and Bayfield, Wis.

Officers: Frank Stark, pres.; H. J. Wachsmuth, v. p. and treas., with C. R. Liehy, R. J. Nelson and A. D. Westby (mgr.), directors; F. V. Holston, sec.

Inc. March, 1914, in Arizona. **Cap.,** $300,000; shares $1; 250,000 shares issued. First Nat'l Bank, Bayfield, Wis., registrar. Annual meeting, first Tuesday in May.

Property: 6 claims, patented, 186 acres, on Salmon river, in West Kootenay, Nelson mining division, 14 miles N. from Erie B. C., said to show sulphide ore in a quartz fissure vein in diorite. Vein strikes N.-E. with dip of 85°. Pay ore occurs in shoots, from 50-170′ wide, and is said to average $18 per ton in gold.

Development: to 416′ depth by 4 tunnels, each 1,200′ long.

Equipment: includes 14-drill compressor, pump, steam power and 75-ton cyanide mill.

Mine is credited with production of over $500,000. In 1918, shipments to Greenwood smelter amounted to 85 tons concentrates resulting from 1,241 tons ore treated. Eleven men were employed and $13,700 was spent on new equipment. In July, 1919, a fire destroyed much of the surface equipment. Work will be resumed.

ROCHER DE BOULE COPPER CO. **BRITISH COLUMBIA**

Temporarily idle.

Office: 419 D. F. Walker Bldg., Salt Lake City, Utah. Mine at Hazelton, B. C.

Officers: M. S. Browning, pres.; A. Fred Wey, v. p., and S. A. Douglass, directors.

Inc. Oct. 15, 1911, in Arizona. **Cap.,** $1,000,000; shares $1 par; non-assessable; fully issued, fully paid. Listed on Butte (Mont.) Exchange. Annual meeting, October 20.

Property: 6½ claims, crown grant, 325 acres with 50 acres millsite and 100 acres other lands, in Hazelton district, 9 miles from the Grand Trunk Pacific railroad.

Ore occurs in fissure veins in granite, veins having an E.-W. strike with dip of 60°. Five ore-shoots developed had average width of 5½′, 3,000′ long and proven to depth of 150′, according to management.

Development: by shaft and 800′ tunnel. Copper occurs as chalcopyrite and bornite.

Mine was under lease to Montana Continental Dev. Co. from 1913 to February, 1916, and during this time value of shipments totaled over $700,000.

Equipped: with 240-h. p. hydro-electric plant, aerial and surface tramways, compressor and saw-mill by lessees who worked mine on royalty basis.

For several years this mine was the most important in the district, but exhaustion of the developed orebodies in the upper levels caused a decreased

production in 1918, and in October, 1918, the property was shut down until conditions should become normal.

Production: from April, 1915. to the time it closed down, was 39,833 tons of ore, containing 4,214 oz. gold, 62,865 oz. silver, and 5,746,306 lb. copper. For detailed descriptions, see the 1914, 1916, 1917, and 1918 Annual Reports of the Minister of Mines, B. C.

ROSEBERY SURPRISE MINING CO., LTD. BRITISH COLUMBIA

Head office: Nelson, B. C. **Operating office:** Sandon, B. C.

Officers: H. L. Hollis, pres.; W. C. Boyden, v. p.; Otto T. Langbein, sec.-treas. J. P. MacFadden, gen. supt.

Property: company operates the Surprise and Ivanhoe mines near Sandon, shipping to concentrator at Rosebery, and the Canadian mine, now under development; it also operates the Bosun mine at New Denver, the Ivanhoe mill at Sandon, and the Rosebery mill at Rosebery, B. C.

Bosun mine: near shore of Slocan lake, half-way between New Denver and Silverton, was worked about 15 years ago, but only acquired by present company in 1917. Vein is large and carries lenses of galena ore carrying zinc blende, but running high in silver. The blende ore is said to assay 70 to 90 oz. silver and between 45 and 55% zinc. Old workings consist of 5 tunnels driven on the vein and opening it to a depth of 400′. Recent work comprises an extension of old workings and driving the lower or No. 6 tunnel a half mile to gain a depth of 800′ on the vein. Sixty men employed. Production for 1918, reported as 27,764 tons of ore; grade not given.

Surprise mine: 3 crown-granted claims, 93 acres, 2 miles N. E. of Sandon, has lead-zinc ore in a fissure vein in slate. Development: a main tunnel over 3,000′ long, with total workings of 15,000′. Mill feed assays 62 oz. silver, 19% lead, and 16% zinc. Output in 1918 totaled 13,998 tons of ore.

Ivanhoe group: acquired under option in 1918, from **Minnesota Silver Co.,** located in the divide between Sandon and Four-mile crek, though in development stage, is producing. Its output in 1918 was 53 tons, but in September, 1919, it had reached 1½ cars daily. The company also owns the Monitor-Ajax, and Canadian groups in the same locality.

Rosebery concentrator: acquired in 1917, was built by original owners of the Monitor, Ajax, and Bosun properties. Present owners have spent over $30,000 in remodeling the mill. Ivanhoe concentrator operated until February, 1919, on Surprise ore, then closed temporarily. All concentrates are shipped to the United States under a long-term contract.

It is probable that the Surprise mine has passed its zenith, but with the present efficient management and the acquisition of new properties the company has a most promising future.

ROSSLAND KOOTENAY MINING CO., LTD. BRITISH COLUMBIA

Idle since 1904. **Office:** 325 Crown Court, Old Broad St., London, E. C., Eng. **Mine office:** Rossland, Trail district, B. C.

Officers: C. Williamson Milne, chairman; Dr. G. Schack-Sommer and Lionel W. Harris, directors; W. S. Gregg, sec.

Inc. May 17, 1902, in Great Britain, as a reconstruction of Rossland-Great Western Mines, Ltd., and Kootenay Mining Co., Ltd. **Cap.,** £150,000; shares £1 par; issued, £148,607.

Property: 171 acres, at Rossland, carrying auriferous and argentiferous copper ores, of low grade, and 113 acres placer at West Kootenay. The company also owns 2,615 shares of the Santa Eulalia Development Co., Ltd., owning the Nueva Chihuahua property at Santa Eulalia, Chih., Mex. Revolutionary conditions have prevented any work for several years in Mexico.

RUTH MINES, LTD. BRITISH COLUMBIA

In 1917, company went into voluntary liquidation and property was offered for sale. Reported in March, 1919, that company was being reorganized. No details of officers or capital.

Property: the Ruth and Hope mines, near Sandon, were worked during 1918 and small shipments made. In September, 1919, reported that the vein

had been cut in the lower tunnel 600′ from the portal, and where cut had a width of 8′.

SALMON BEAR RIVER MINING CO. **BRITISH COLUMBIA**

Property: the Bush mine, now operated by the Premier Mining Co., Ltd., which see.

SILVER BELL MINE **BRITISH COLUMBIA**

Owners: R. F. Green and Sam Green, Kaslo, B. C.

Property: a high-grade silver-lead mine on S. fork of Kaslo creek. **Development:** by tunnels. Several carloads of ore shipped in 1919.

SILVER CREEK MINES, LTD. **BRITISH COLUMBIA**

Address: Revelstoke, B. C. D. Woolsey, mgr., Albert Canyon, B. C.

Officers: J. H. Brasetti, pres.; D. Molsey, v. p. and mgr., with Patrick Treanor, directors; H. C. Forsyth, sec.; J. B. Watson, treas.

Inc. Sept., 1918, in British Columbia. **Cap.,** $750,000; par 50c; issued 700,000 shares; non-assessable.

Property: the Woolsey group, 11 claims, unpatented, about 500 acres, 7 miles by trail from Albert Canyon Sta. on C. P. R., shows a fissure vein in slate and gneiss. Ore is silver-lead, with a quartz gangue.

Development: by tunnels. Property is a promising prospect.

SILVER CROWN MINING CO. **BRITISH COLUMBIA**

Office: 505 Rookery Bldg., Spokane, Wash. **Mine office:** Trout Lake, B. C. **Officers:** Fred Hamilton, pres.; A. C. Bartels, v. p.; A. Herman, sec.-treas., with Geo. Skore and H. C. Weyerhoist, directors.

Inc. Feb., 1917, in Washington. **Cap.,** $125,000; shares 10c par; assessable: 852,250 issued.

Property: 3 claims, 150 acres, in West Kootenay mining division, B. C.

Geology: fissure vein in granite and limestone, dipping 45° and pitching N. W. Shoots are from 18 to 36″ wide. Ore contains silver and lead, assaying $125 per ton. **Development:** by 1,300′ tunnel to depth of 550′.

Production: in 1917 was $65,000. No recent information; probably idle.

SILVERED-COPPER MINING CO. **BRITISH COLUMBIA**

Office: 1621 Madison St., Denver, Colo. **Mine office:** Aldermere, Omineca district, B. C.

Officers: F. Thoman, pres.; C. W. Peaslee, v. p.; C. A. Hubbard, sec.-treas.; C. E. Thoman, gen. mgr.

Inc. March 23, 1908, in Arizona. **Cap.,** $1,000,000; shares $1 par; non-assessable; issued, 568,754 shares. Debentures, $50,000 authorized and unissued.

Property: 6 claims, 300 acres, in the Hunter Basin, Omineca district, about 15 miles from the railway at Telkwa, shows a bedded agglomerate of volcanic rocks, chiefly diorite, beds standing almost perpendicular and striking N. 35° E. Orebodies occur as true fissure veins in diorite. Ores contain bornite and chalcocite. Three cars ore shipped to smelter in 1914 said to have averaged a little over 100 oz. silver and 5% copper per ton.

Development: by a short tunnel, numerous pits and open cuts, with a total of about 200′ of workings.

SILVER HOARD MINING CO. **BRITISH COLUMBIA**

Reorganized as the Dellie Mining & Milling Co., which see.

SILVER KING MINES, LTD. **BRITISH COLUMBIA**

Office: Trail, B. C. **Mine address:** Nelson, Kootenay Lake, B. C.

Officers: Jas. J. Warren, pres.; S. G. Blaylock, v. p.; T. W. Bingay, sec.; W. M. Archibald and R. S. Lennie, directors. Company is owned jointly by the Kootenay Bonanza Co., and the Consolidated Mining & Smelting Co., of Canada, Ltd., in the proportion of ¼ and ¾, respectively.

Property: 5 claims, on Toad mountain, back of Nelson, B. C., includes the old Silver King mine, formerly owned and operated by the Hall Mining & Smelting Co., Ltd. Mine is opened by a shaft to the 10th level, showing 3 well defined veins in diabase schist. The ore occurs where the veins are intersected by 2 dikes, and in the altered surface zone is principally bornite, with tetrahedrite, iron pyrites and silver occurring in the unaltered zone below. Gold is present

in small amounts. Considerable ore was extracted in the past from above the 5th level in the Main vein. The South vein and the K. vein were practically untouched. Ore reserves are estimated at 100,000 tons. Ore in the Main vein has been proven to a depth of 1,130′ by diamond drill borings.

Equipment: includes electrical motors of 50-h p., a 100-h. p. electric pump, an 1,850′ tramway, and all necessary mine buildings. Shut down 1915-16. In 1918 mine was kept unwatered and 6,180′ of diamond-drilling was done. No ore was shipped.

SILVERSMITH MINES, LTD. **BRITISH COLUMBIA**

Offices: Sandon, Slocan district, B. C. John B. White, pres., 1017 Paulsen Bldg., Spokane, Wash.; Oscar V. White, gen. mgr.

Company is the successor of Slocan Star Mines, Ltd., which went into liquidation in 1917. Present company organized in 1918, acquired entire assets of Slocan Star Mines by assuming a $98,000 bond issue and a $24,000 floating indebtedness. Shareholders of Slocan Star were given share for share, upon payment of 3½c additional. For every $5 so paid in, shareholders received one share of preferred stock.

Cap., $750,000, of which $150,000 is 7% preferred, par $5, and $500,000 common stock, par 20c; assessable, of which $165,193 and $103,044 issued, respectively. Preferred stock must be retired before dividends can be paid upon common. In February, 1920, preferred shares could be retired at rate of $5 each without interest, and common to be issued at 15 cents. At end of 1919 outstanding bonds were reduced to $40,000. Cash assets at end of 1919 were $28,513, plus $40,000 for concentrate in transit. The profit in 1919 was $41,754.

Failure of Slocan Star Mines is laid to excessive construction costs due to new milling, hydro-electric, and other equipment, failure to keep development ahead of extraction, and largely lack of sufficient capital.

Property: at Sandon, Slocan district, consists of the Slocan Star and Rabbit Paw groups of 12 crown-granted claims, which were involved in the protracted and costly apex litigation between the Star Mining & Milling Co., plaintiff, and the Byron N. White Co., in the Supreme Court of B. C. for about 10 years. Holdings also include a patented millsite and extensive water rights.

Ore carries silver, lead and zinc, occurring as large shoots in the Slocan Star lode, a strong fissure vein in slate, traceable over a mile. This strikes N. E.-S. W., dips S. 47° and is 6 to 8′ wide, bulging in places to as much as 50′ across.

Development: by 10 main tunnels, No. 10, the lowest, is 2,300′ long; total workings over 15,000′. Reserves have been practically exhausted down to 5th level. From the 6th level to surface several shoots of sphalerite with siderite gangue were left intact in former years. Reported in May, 1919, that the work disclosed a new oreshoot 400′ long, that had a width of 7′ for half this distance and averaged 4′ wide for the other half. It continues up to the 200′ level, but a fault cuts it off on the 400′ level. Shipments totaling 500 tons are said to have averaged $121 per ton. In June, a new orebody 3′ wide was reported cut on the 8th level. On No. 10 level the main shoot is 450′ long and 4′ wide. Reserves were given as 90,000 tons at end of 1919.

Equipment: added recently includes 15-drill compressor, 1,500-h. p. electrical plant, 4,000′ aerial tram connecting mill with shipping bins at Sandon, and flotation units added to the 100-ton concentrator, increasing capacity to 250 tons. Mill is level with No. 10 adit. There are 64 men employed.

Production: in 1919 was $219,432 from crude ore shipped and concentrates from 14,235 tons milled. Expenses were $175,382.

SILVER STANDARD MINING CO. **BRITISH COLUMBIA**

Office: 506 Winch Bldg., Vancouver, B. C. **Mine office:** W. C. Norrie-Lowenthal, New Hazleton, B. C.

Owners: J. W. Stewart, Angus Stewart, D. McLeod, and the estate of late A. L. McHugh.

Gross earnings in 1916 were $49,000, and $65,000 in 1918.

Property: the Silver Standard mine, 14 crown grant claims, 700 acres, 7 miles N. of New Hazelton, in Omineca district, said to show 9 fissure veins

in calcareous sandstone, dipping 62° and pitching N. 50° E. Veins are from 12 to 72" wide and 3 of them carry profitable ore. Shoots are 100 to 200' long. Ore is a sulphide, mill ore averaging 0.10 oz. gold, 30 oz. silver, 3% lead and 11% zinc.

Development: by 1,300' tunnel to be extended 200', and total of over 4,000' of workings to 500' depth. Mining is by shrinkage stoping. Reserves are 15,000 tons. No. 4 vein has a continuous shoot over 400' long.

Equipment: includes Jenckes hoist, 350 cu. ft. compressor. In 1918, a 50-ton concentrator of the Faust type was completed on Two Mile creek, about 3 miles from the mine. Ratio of concentration is 5 to 1. Ore is hauled by truck from mine to mill. In 1918 lead concentrate assayed ½ oz. gold, 200 oz. silver, 55% lead and 4% zinc, shipped to Trail, B. C. Zinc concentrates that assayed 0.3 oz. gold, 140 oz. silver, 35-40% zinc, and 5% lead, were shipped to U. S. Zinc Co., Okla.

Production: in 1916, 707 tons of ore yielded 444 oz. of gold, 269,624 oz. silver, 110,868 lb. lead, and 297,372 lb. zinc. The 1917 figures are not available. In 1918, 3,370 tons of ore were milled, producing 185 tons lead and 500 tons zinc concentrates, containing approximately 600 oz. gold, 450,000 oz. silver, 950,000 lb. lead, and 860,000 lb. zinc.

The property was closed down early in 1919, but work was resumed May 1. The mine is well located for cheap mining; wood and water are plentiful and railway transportation is within a short distance.

SILVER TIP MINING & POWER CO. BRITISH COLUMBIA

Office: J. H. Beattie, 718 Green Bldg., Seattle, Wash.

Officers: at last accounts, A. Julian, pres.; G. B. Gilfillan, v. p.; M. S. Davys, engr.

Inc. Jan. 15, 1910, in Washington. **Cap.**, $1,000,000; shares $1 par; 615,862 issued. Bonds, $700,000 of 7%.

Property: the Lake Side mines, 557 acres, Skagit county, Wash.; also the Hewitt and Lorna Doone mines in Slocan district, B. C., acquired from Silverton Mines, Ltd., in 1917, and which are now operated under lease and bond by Clarence Cunningham. See Hewitt-Lorna Doone Mines, in this volume.

SILVERTON MINES, LTD. BRITISH COLUMBIA

In 1917 assets were transferred to the Silver Tip Mining & Power Co. Described in Vol. XIII.

SIMILKAMEEN CONSOLIDATED COPPER CO. BRITISH COLUMBIA

At last accounts property was worked by Pacific Syndicate, Ltd., on which there is no recent information. Company, etc., described in Vol. XII.

SIMILKAMEEN MG. & SM. CO., LTD. BRITISH COLUMBIA

Idle. No recent information. Described in Vol. XIII. Address, at last accounts, care Bank of British North America Bldg., Vancouver, B. C. Mine near Princeton, B. C.

SITTING BULL MINING CO. BRITISH COLUMBIA

Address: F. W. Wonn, Seattle. E. D. Smith, supt.

Property: the Sitting Bull mine on Boulder creek, Windermere mining division, said to have high-grade silver-lead ore.

Development: on 5 levels by tunnels. In March, 1919, company had 90 tons of ore sacked for shipment that averaged 132 oz. silver and 29% lead.

SLOCAN STAR MINES, LTD. BRITISH COLUMBIA

Went into liquidation in 1917 and entire assets acquired by Silversmith Mines Ltd., which see. Described in Vol. XIII.

SOUTH EASTER MINING CO. BRITISH COLUMBIA

A subsidiary of the Northern Customs Concentrators, Ltd., of Cobalt, Ont. A. S. Holmes, local mgr., Skidegate, Queen Charlotte Islands, B. C.

Property: 7 claims, one mile from Skidegate, shows 3 quartz veins; one, with commercial ore traceable on surface over 1,000', is 8 to 10' wide, and assays $8 to $15 gold per ton.

Development: 100' shaft, with several hundred feet of workings on the 50 and 100 levels.

Equipped with a small, efficient plant, including a compressor. Owners hope to develop sufficient tonnage to warrant building a mill.

SPOKANE MINING & DEV. CORP. BRITISH COLUMBIA

Office: Nelson, B. C.

Officers: J. A. McLean, pres.; F. A. Starkey, v. p.; Chas. F. Caldwell, v. p.; C. M. Leamonth, sec.; W. F. Baker, treas., with H. T. Hodge, and M. C. Monahan, directors. C. M. Moir, mgr.

Inc. May, 1917, in British Columbia. **Cap.**, $1,500,000; par $1.

Property: the Monarch mine, 7 claims, in Nelson mining division, 37 miles from Trail, said to show 2 fissure veins between diorite footwall and granite hanging-wall. Vein matter consists of quartz, calcite, pyrite, and chalcopyrite. No. 1 vein is proven for 800′ by open cuts and pits, and varies up to 20′ in width. Several cars of ore shipped assayed 3½% copper, and $1.50 to $2.00 gold and silver per ton. No. 2 vein opened by open cuts and 150′ tunnel, is said to be traceable for a mile on surface. Shipments amounted to about 170 tons in 1918.

SPOKANE ROCHER DE BOULE MINING CO. B. C.

Officers: P. J. Jennings, pres., 1314 Addison St., Spokane, Wash. P. A. Brady, v. p.; John J. Jennings, sec.-treas., at last accounts.

Inc. April, 1916. **Cap.**, $100,000; shares 10c par; 600,000 shares subscribed by incorporators, balance in treasury.

Property: 7 claims, including Spokane & Washington and has bond on Daly West group, near New Hazelton, B. C. Ore so far developed said to carry 7% copper, $2 gold and 15 oz. silver per ton.

Development planned is 1,000′ drift tunnel on vein giving 1,000′ back at face and cutting beneath four ore-shoots. In 1917, $30,000 was to be spent in installing compressor plant, power station on Mission creek, an aerial tram and wagon road, an ambitious program for this amount of money.

No recent information; probably idle.

STANDARD SILVER LEAD MINING CO. BRITISH COLUMBIA

Offices: Empire State Bldg., Spokane, Wash., and Silverton, B. C.

Officers: W. J. C. Wakefield, pres.; Geo. H. Aylard, v. p.-gen. mgr.; Chas. Hussey, sec.-treas., Victoria, B. C., with Henry White and W. A. Corey, directors.

Inc. Dec., 1910, in Washington. Operated under present management since 1911. Controlled by the Finch-Campbell-Clark estates of Spokane. **Cap.**, $2,000,000; shares $1 par; fully paid; non-assessable; all issued. Annual meeting, first Tuesday in May. Security Transfer & Registrar Co., New York, registrar and transfer agent. Listed in Spokane and on New York Curb.

Annual report for 1918 showed a profit for the year of $114,764, compared with $377,494 in 1917. The surplus increased from $202,801 to $317,565. In May, 1919, the mine earned a profit of $8,788, but June operations were at a loss of $15,637. Balance at end of 1919 stated to be about $300,000.

Dividends: 1912, $425,000; 1913, $650,000; 1914, $475,000; 1915, monthly at rate of 2½% commenced September 10, total for year, $250,000; in 1916, $600,000; in 1917, $300,000; none since; a total of $2,700,000 to 1920.

Property: 10 full claims, 6 fractions, 600 acres, 2 miles N. E. of Silverton, located on Slocan Lake, B. C. The claims carry fissure veins in slate and graphitic schist. Ore carries silver, lead and zinc in a quartz-pyrite gangue. Silver occurs as gray copper and ruby. The orebodies occur in the form of lenticular masses along the vein, varying in width from 1′ to 25′.

Development: tunnels numbered from 1 to 7, inclusive, open the vein to a depth of 800′; tunnel No. 8, now being driven, gives an additional 400′ depth. Ore reserves are not reported, but management claims that reserves guarantee many years of profitable operations. By December, 1919, a new ore shoot, between No. 5 and 7 levels had been opened for over 300′ in length. The ore is 12 to 14′ in width, and averages 16% zinc, 5% lead and some silver.

The low grade ores are readily concentrated and constitute the bulk of the mine's output. There is, however, a large amount of material in the vein in

which ruby silver and zinc blende occur as streaks and coatings and in which galena is found in a very finely divided state in graphitic schist and slate. Such ores are treated successfully by using Wyman pneumatic flotation machines which have given a total recovery of 93-95% of the value in the mill feed. The ore as sent to the mill averages 24% lead, 35 oz. silver and 14% zinc.

Equipment. 150-ton concentrator, hydro-electric power plant on Four Mile creek and an 8,000′ tramway connecting mine and mill. Seventy-five men employed.

Production: in 1918, silver-lead ore realized $112,898, and zinc ore, $227,-338, a total of $340,236, compared with a total of $881,616 in 1917. Other years follow:

Year	Ore, tons	Silver, oz.	Lead, lb.	Zinc, lb.
1916	69,764	.....	.....	.....
1915 (b)	39,447	.....	.....	.....
1914 (a)	49,720(b)	1,050,000	10,000,000	5,000,000
1913	13,959	1,081,849	17,988,805	.....
1912	9,702	811,823	13,497,260	.....

(a) Approximate production. (b) Gross; tons milled, 44,806 in 1914; 35,920, in 1915.

Mill shut down by labor trouble for four months preceding August, 1919, when work was resumed and concentrates shipped.

STAR MINING & MILLING CO. **BRITISH COLUMBIA**

See Silversmith Mines, Ltd.

SUNLOCH MINES, LTD. **BRITISH COLUMBIA**

Officers: R. H. Stewart, pres. and mgr.; W. P. Tierney, v p.; with W. J. Wilson, H. Rindal, Stuart Campbell, and R. J. Winters, directors, all of Vancouver.

Inc. 1917. **Cap.,** $1,000,000; par $1.

Property: Sunloch group, *22* claims, on Jordan river, 42 miles by road from Victoria; also an option on adjoining Vulcan group. A logging railway connects the property with tidewater.

Development: has been confined almost entirely to one claim, Sunloch No. 6, on which there are 3 well-defined ore-bearing zones, known as the River, Cave, and Archibald lodes. A tunnel on the River zone cut 5′ of 1.9% copper ore, 20′ of 3.7% ore, and 3′ of 3.8% ore, partly opening 280′ along vein at a depth of 240′. An adit on the Cave zone passed through 60′ of 4% ore; at 180′ a crosscut S. cut 60′ of 0.9% ore, 20′ of waste, 36′ of 2.58% ore, including 11′ of 5.1% ore, this at a depth of 240′ from surface. A diamond drill hole, 150′ farther in than the crosscut and at a depth of 400′ cut about 15′ of ore assaying 0.65 to 7.9% copper. Less work has been done on the Archibald zone, but it is considered equally promising. Work on opposite side of river shows that the Cave zone continues into the Vulcan group.

Development on the property has shown that property has merit and fully warrants further development. Reported in October, 1919, that Cons. Mng. & Sm. Co. is considering building a 500-ton mill to treat the ore.

SURF INLET GOLD MINES **BRITISH COLUMBIA**

Corporation sold its property to Belmont Surf Inlet Mines, Ltd., for 20% of the capital stock of that company.

SURPRISE MINE **BRITISH COLUMBIA**

Owned and operated by Rosebery Surprise Mining Co., which see.

TACOMA STEEL CO. **BRITISH COLUMBIA & WASHINGTON**

Office: Tacoma Bldg., Tacoma, Wash. **Mine offices:** Van Anda, Texada Island, B. C. and Darrington, Snohomish county, Wash.

Officers: S. R. Balkwill, pres.; E. M. Shelton, v. p.; A. F. Eastman, sec.-treas. and gen. mgr.; D. C. Stephens, supt.

Cap., $50,000 (originally $5,000,000). Paid five $35.000 dividends.

Property: a mine at Darrington, carrying gold-copper ore, idle for some years, 4,000 acres of coal-bearing properties in Washington, 208 acres of iron

ore lands on Vancouver Island, B. C., and the Marble Bay copper mine, 3,000 acres, crown-granted, near Marble Bay harbor, at the northern end of Texada Island.

The Marble Bay mine, about one-fourth mile from the Cornell and Copper Queen mines, has ore of similar nature occurring as lenticular shoots, carrying argentiferous chalcopyrite, with bornite, in a garnetiferous marble. The mine is developed by a 1,600′ three-compartment shaft, showing, on the lower levels, a vein of 18′ width, with copper values unchanged and gold values gaining with depth. Recent development work mainly between 1,600′ and 1,750′ below sea level.

Development: work in 1919, entirely by diamond drilling between 16th and 17th levels.

Equipment: includes steam and electric power, with 5 hoists, 5-drill and 10-drill air compressors. There is a wharf, on Marble Bay, having large ore bunkers, connected with the mine by a ground tram. In connection with the mine there is a limestone quarry and 4 kilns, with daily capacity of 300 bbls. of lime.

Production: 11,697 tons of gold-silver-copper ore in 1917; 626,422 lb. of copper in 1918. Employs 80 to 100 men.

TARHEEL COPPER CO., LTD. **BRITISH COLUMBIA**

C. J. Lincke, supt.

Property: the Tarheel group of claims, near Golden, B. C., on the middle fork of the Similkameen river, Golden mining division. Reported in September, 1919, that company expected to ship several carloads of ore that would assay about 15% copper.

TASSOO MINING & SMELTING CO., LTD. **BRITISH COLUMBIA**

Out of business. Property now owned by F. C. Elliott, of Victoria, B. C., and J. E. Cortell, of Seattle, Wash., described , Vol. XIII.

TAYLOR MINING CO., LTD. **BRITISH COLUMBIA**

Office: Victoria, B. C., and at Dolly Varden mine, Alice Arm, B. C.

Officers: A. J. . Taylor, pres.; with R. P. Butchart, H. C. Chiene, C. M. Rowlson, and J. F. Tener, directors. D. E. Young, gen. mgr.; R. B. McGinnis, asst. supt.; H. S. Brownin, accountant.

Inc. in June, 1919, with capital of $1,500,000, $1,200,000 paid up, by the Taylor Engineering Co., to take over the property of the Dolly Varden Mines Co. This ended a legal squabble that tied up the property for some time, and was a much discussed matter in the Provincial Legislature. The Taylor Engineering Company constructed a railway from tidewater to the mine, but the Mines company failed to pay for the work done, which drove the Engineering company into financial distress as it owed $462,500 borrowed to pay construction bills. Meanwhile, the Dolly Varden company gave the Temiskaming Mining Co., of Ontario, an option on the mine for $900,000. Finally, the Legislature gave owners 10 days in which to pay off all labor claims and the Engineering company's account. The D. V. mines company defaulted, so the Engineering company took possession, paid off the debts and organized the Taylor Mining Co. for development of the mine. In December it was announced that the validity of the legislation ordering the transfer was to be contested in the Dominion courts.

Property: the **Dolly Varden** and Wolf silver mines, 480 acres of patented ground, on the Kitsault river, 18 miles from Alice arm, near Granby bay. Railroad connects mine with tidewater, 18 miles distant. Mine is described in "Eng. & Min. Jour." of March 13, 1920, by Robert Dunn.

Geology: ore occurs in a shear zone in andesite, the ore being considered as secondary. Near the surface native silver occurs in extremely rich streaks. Lower down, ruby, silver, argentine, and stephanite also occur and at 270′ in depth ruby silver is the principal mineral. Fine-grained pyrite, carrying good silver values occurs from surface to bottom level (300′ in 1919). Faulting and cross-fissuring is common and make a complex structure.

Development: to depth of 300′ by 3,000′ of drifting in several tunnels, connected by raises. Besides this tunnel work, 9,000′ of diamond drilling has

shown ore to depth of 500′. The work so far done is said to have developed about 45,000 tons ore, an amount which will probably be increased by further work. Samples of shipping ore gave 244 oz. silver, 18% lead, 12.4% zinc.

Equipment: includes 18-mile railway from mine to Alice Arm and 2,000′ aerial tram, etc. The railway was extended to the Wolf mine in 1920.

Company was reported to be planning a 150-ton concentrator with final separation by flotation, 700 h. p. hydro-electric plant, etc.

Production: total shipments amount to 7,000 tons, and silver output in 1919, was 400,336 oz. from 6,373 tons of ore.

The Wolf group: 2 miles N. of the Dolly Varden, on opposite side of river, also belongs to the Dolly Varden group. Ore is similar to the Dolly Varden, though a little lower in silver.

Development: consisting of 85′ of tunnels, 770′ of open cuts, and 4,900′ of diamond-drilling has shown probable existence of 120,000 tons ore containing about 1,800,000 oz. silver, and over 400,000 tons of lower-grade ore.

TIDEWATER COPPER CO. **BRITISH COLUMBIA**

A subsidiary of the Alaska British Columbia Metals Co., 74 Broadway, New York. H. B. Price, pres.-gen. mgr. The A. B. C. Co. owns 90% of entire stock issue. Dan M. Drumheller, Jr., supt.

Inc. in Washington. **Cap.**, $1,000,000; par $1. **Bonds:** $300,000, 7-year, 7% first mortgage conv., guaranteed by A. B. C. Co.

Property: 8 claims, 300 acres, also an 80-acre manufacturing site on the beach, 200 miles N. W. of Seattle, Wash., by boat to Sydney inlet on west coast of Vancouver Island, B. C. Property formerly known as the Indian Chief claims, has been worked by many different companies since 1897, and is said to have produced 15,000 tons of 4½% copper ore. Ore is a contact deposit of garnetized limestone containing bornite, with small quantities of chalcopyrite and chalcocite, capping a granodiorite hill.

The present company acquired the property in 1916, and in 1917 built a 100-ton flotation mill, operated a few months at a considerable loss, due, it is reported, to unsatisfactory machinery, and to an irregular ore supply, often too low grade. A new 300-ton mill was under construction, March, 1920. A 3,000′ aerial tram connects the mill and mine, which is opened by tunnels.

The Provincial Mineralogist reports that (Annual Report of Minister of Mines of B. C. for 1917) : "The south orebody in the No. 2 adit has a length of 480′ with a width of 4′ to 40′ and a vertical development of 180′. Until further work is done, no reliable estimate of tonnage is possible. There are no well-defined walls, but vein material merges into barren rock similar to the gangue, and this change is erratic and irregular."

The company claims to have 500,000 tons of developed ore assaying 2% copper, 1 oz. silver, and 40c gold per ton, with a net value of $4 per ton. Production costs when milling 200 tons of $8.20 ore per day are estimated by company (January, 1919) as follows: Mining, $1; milling, $1.25; tramming, 10c; freight and smelting, $1; new development, 30c; amortization, 10c; overhead, 25c; a total of $4 per ton, an estimate which is regarded as far too low. (See Annual Report of Minister of Mines, British Columbia, for 1917, pp. 248-254, and in the 1918 report, p. 266.)

TRAIL SMELTER **BRITISH COLUMBIA**

Owned by Consolidated Mining & Smelting Co. of Canada, Ltd., and described under that title.

TREASURE MOUNTAIN MINING CO. **BRITISH COLUMBIA**

Officers: W. B. Dornberg, pres.; J. C. Edwards, v. p.; W. W. Dreyfus, sec.-treas., all of Spokane, Wash.

Cap., $1,000,000; par $1; non-assessable.

Property: 6 claims, 20 miles N. of Tulameen on Kettle Valley R. R., Similkameen division, Yale mining district, shows veins with silver-lead ore, developed by several tunnels, longest over 800′, with about 1,500′ of workings. Ore is said to be of good grade. Property is 20 miles from railroad. No information since 1918.

TRUE FISSURE MINING & MILLING CO. **BRITISH COLUMBIA**

Officers: G. F. Park, pres.; T. W. Mitchell, sec., both of Cincinnati, Ohio. A. C. Houston, supt., Ferguson, B. C.

Cap., $2,500,000; par $1; non-assessable.

Property: 8 crown-granted claims, and 160-acre millsite on Trout Lake division, West Kootenay district, ½ mile from Ferguson, shows silver-lead-zinc ore with some gold, which assays to 75 oz. silver, 35% lead, 25% zinc, and 0.15 oz. gold. Developing in 1918 and 10 men employed.

TYEE COPPER CO., LTD. **BRITISH COLUMBIA**

Smelter and assets sold in December, 1916, to the Ladysmith Smelting Corporation, Ltd., which see.

UNION MINING CO. **BRITISH COLUMBIA**

Address: Grand Forks, Lewis Johnson, part owner and mgr.; company not incorporated.

Property: 4 claims, 150 acres, Gloucester camp, Grand Forks division, Yale district, shows gold-silver ore.

Development: by 4 tunnels, with several hundred feet of workings. The mine is 27 miles from rail, and transportation and smelting charges absorb most of the value. Owners have been trying to raise money to build a mill.

Production: in 1916, 605 tons of $35 ore; in 1917, 751 tons shipped returned $31.80 per ton; in 1918, 153 tons assaying $6.20 to $12.80 gold and 31-50 oz. silver per ton.

UNITED METALS MINING CO. **BRITISH COLUMBIA**

D. J. Hancock, supt.

Property: 3 claims, 14 miles up Illiance river, showing numerous quartz veins in sedimentaries; continuity of ore-shoots in length and depth is very irregular. Mineralization consists of galena and zinc-blende, carrying high silver values. Property has been undergoing exploration, no ore being shipped, though high-grade ore has been sacked, ready for shipment.

Reported in September, 1919, that all right, title, and interest in the company had been sold to D. J. Hancock for $25,000, and that the only interest the stockholders have remaining is the division of the money to be paid by him.

UTICA MINES, LTD. **BRITISH COLUMBIA**

Office: Kaslo, B. C.

Officers: Chas. F. Caldwell, pres.; T. R. French, sec.-treas., with H. R. Wade, F. T. Abey, and V. D. Williamson, directors. W. C. Sivyer, R. H. Voorhees and W. Tolman, directors.

Inc. in British Columbia. **Cap.,** $2,000,000; shares $1 par; non-assessable; 1,600,095 issued; 200,000 shares offered at 10c each in December, 1919, to pay pressing debts. Auditors' report, January 12, 1918, showed cash on hand, $213; buildings, equipment, etc., $28,470; mine, $1,427,945; stock discount, $184,628; total assets, $1,690,310. Liabilities included accounts payable, $6,994; bills payable, $7,500; profit and loss, $75,690. An initial dividend of 2c was paid in June, 1917, followed by 2c in September. These two dividends, together with fact that smelters refused to accept the ore on account of the high zinc content, left the treasury in a depleted condition at end of year.

Property: silver-lead-zinc holdings in Ainsworth district, B. C.

Development: by tunnels to 1,200′ below vein outcrop. Workings cover over 6,000′. In 1918, the mine operated only about 3 months, due to lack of funds. Output was 222 tons of ore, which produced 13,661 oz. silver, and 10 tons lead. Operations were suspended in April, 1919, but in November some ore was being mined.

VALDEZ ISLAND COPPER CO. **BRITISH COLUMBIA**

Address: Victoria, B. C.

Officers: F. E. Rosher, pres.; C. B. Rosher, sec., with G. A. Fraser and E. Brammer, directors. T. H. Kerrnish, supt.

Cap., $500,000; shares non-assessable.

Property: 19 claims, Copper Mt. group, about 730 acres, at head of Gowland harbor, on Quadra Island, 120 miles N. W. of Nanaimo, is one of oldest locations on coast, but has never been thoroughly prospected until re-

cently. Ore is chiefly chalcocite and bornite, occurring along joint planes and shear zones, apparently as isolated ore bodies of lenticular shape. The Senator claim is said to have the best showing, and yielded most of the ore shipped in 1918. Property needs further development. See Annual Report of Minister of Mines, British Columbia, 1918.

VAN ANDA COPPER & GOLD MINES CO., LTD. B. C.

Inactive. H. W. Treat, gen. mgr., and L. Goodacre, trustees; Jas. Raper, agt., Van Anda, B. C. Company is presumably alive, but not operating.

Property: 20 claims, crown-granted, 840 acres, including the Copper Queen.

The Copper Queen mine has lenses of rich ore, mainly bornite, with some chalcopyrite along a diorite-limestone contact. The deposit has one main ore-shoot, 150′ long and 30′ wide. See Texada Id., B. C., by R. G. McConnell, Geol. Survey Canada Memoir 58, 1914, pp. 566-64.

The Copper Queen shaft is 600′ deep with a winze 240′ deep on the 500′ level. In 1918 the mine was operated under lease by Thomas Davis, of Seattle, Wash.

VANCOUVER MINING DEV. SYNDICATE BRITISH COLUMBIA

Address: Vancouver, B. C.

Directors include Nicol Thompson, A. M. Whiteside, J. H. Greer, A. H. Wallbridge, and A. E. Smith, all of Vancouver.

Inc. in 1919. **Cap.,** $500,000; $100,000 issued. The Syndicate was formed to bring mining prospects of British Columbia to the attention of the investing public, helping prospectors who have located promising properties, but who lack the means to develop them.

VAN ROI MINING CO. BRITISH COLUMBIA

Controlled by Le Roi No. 2, Ltd., Rossland, which holds 63,193 ordinary and 10,483 preference shares, out of 90,000 and 30,000 issued.

Office: Leonard Rowell, 4 Broad St. Place, London, E. C. 2, Eng. **Mine office:** Silverton, B. C.

Directors: Lord Ernest Hamilton, chairman; A. B. Dealtry. T. J. Lloyd, supt.

Inc. July 9, 1908. **Cap.,** £34,500 in 30,000 £1 pfd. and 90,000 1s. ordinary shares.

Property: the Vancouver group of claims in Slocan district, B. C. Operations were resumed early in 1917 at mine and mill. Ore contains silver, lead and zinc.

VERONICA GOLD MINING CO. BRITISH COLUMBIA

Inc. 1916. **Cap.,** $250,000; par 25c. T. T. McCredy, Dr. J. W. Rutledge, D. A. McIntosh, Geo R. Leask, Fred Bryan, and Ed. McMahon, of Spokane, Wash., incorporators.

Property: Eclipse group of 6 claims, adjoining Homestake group on Perry creek, Southeast Kootenay district. No recent information.

VICTOR SILVER LEAF MINING CO. BRITISH COLUMBIA

Officers: R. Abernethy, pres.; E. R. Abernethy, sec.; C. E. Berry, treas.; all of Spokane, with Geo. F. Gundry, and John Tospon, directors.

Cap., $1,500,000; par $1; non-assessable.

Property: 3 unpatented claims, 10 miles E. of Fort Steele, said to show gold-silver-lead-zinc ore in 3 shoots. No shipments have been made, though sorted ore is said to assay $100 per ton.

Development: by tunnels, longest 400′. Early in 1918 company was planning to erect a mill, but funds failed to materialize and little work was done on the property. In November, 1919, reported that company was again trying to finance the erection of a 50-ton mill.

VIKING COPPER CO. BRITISH COLUMBIA

S. D. Craig, John Vedaa and J. G. Vedaa, owners. Van Anda, B. C.

Property: 3 claims, 143 acres, on S. side of Texada Island, 65 miles N. of Vancouver, shows copper-gold-silver ore. Small shipments returned 7.9% copper. Developed by shallow shafts.

WASHINGTON MINE, LTD. **BRITISH COLUMBIA**

Idle.

Directors: J. L. Retallack, O. T. Stone and W. H. Burgess, sec., all of Kaslo, B. C., and Clive Pringle, Ottawa, Ont.

Inc. in British Columbia. **Cap.,** $300,000; par $1; assessable.

Property: Washington and Slocan Bay groups, in McGuigan basin, Slocan district, was, for several years, the largest shipper of that section, but ore became baser in depth and property was closed down in 1911. Mine is said to contain large bodies of complex lead-zinc ore in its lower levels, which can now be profitably concentrated.

WESTERN BELLE MINING CO. **BRITISH COLUMBIA**

Address: S. R. Green, sec.-treas., Spokane, Wash. Colen Smith, pres., with Samuel Smith, L. V. Wells, A. McCormick, directors.

Cap., $200,000; par 10c; assessable.

Property: 4 claims, 7 miles N. E. of Idaho-Continental mine, but in Kootenay district, B. C., said to show silver-lead ore in vein 12 to 20′ wide, traceable for 3,000′. **Development:** by tunnels.

WESTERN MINE EXPLORATION SYNDICATE **B. C.**

Address: Vancouver, B. C. Is doing development work on a copper property at Tacla lake in central B. C., and on a placer gold property at Horsefly, in Cariboo mining district.

WESTERN MINING & DEVELOPMENT CO. **BRITISH COLUMBIA**

Dead.

Inc. July, 1915, to take over the Yreka group, Quatsino Sound, Vancouver island, B. C., but apparently never did so. See Vol. XIII.

WEST KOOTENAY POWER & LIGHT CO., LTD. **B. C.**

Controlled by Consolidated Mining & Smelting Co.

Office: Rossland, B. C.

Company owns three hydro-electric plants with a revenue-producing load of 22,360 h. p., current being supplied to mines and works along the International boundary. Company is an important accessory to mining in British Columbia.

WHITEWATER MINES, LTD. **BRITISH COLUMBIA**

Controlled by J. L. Retallack & Co., of which W. H. Burgess, of Kaslo, is mgr. Mine was one of the earliest producers in Slocan district, and was sold over 20 years ago to Whitewater Mines, Ltd., of London. Reported that Retallack & Co. are now operating it under lease.

Property: at Retallack, on a branch of the C. P. R. R., was worked under lease in 1918; 15 men employed.

Production: 1918, consisted of 409 tons of silver-lead ore, and 135 tons silver-zinc ore.

WHOLE CHANNEL MINES CO. **BRITISH COLUMBIA**

Company organized in December, 1919, to develop 6 claims on Princess Royal island, 3 miles north of the Belmont Surf Inlet mine. A 1,500′ tunnel is to be driven to open a 12′ vein which has been traced for 3,500′ on surface.

WOLF GROUP **BRITISH COLUMBIA**

See Taylor Mining Co., Ltd.

WOLVERINE MINING & DEVELOPMENT CO. **B. C.**

Succeeds Kootenay Dev. Co., Ainsworth, B. C. Jere Madden, pres., Rapid River, Mich. J. Cleveland Haas, Wellington Apts., Spokane, managing director, and J. F. Carey, of Spokane, Wash., director.

Property: the Nicollet group of 14 claims on Kootenay lake, north of Ainsworth and adjoining the Highland and Florence mines (Florence Mng. Co.). Veins in metamorphic rocks are said to carry rich silver-lead ores. Idle since 1917.

WONDERFUL MINE **BRITISH COLUMBIA**

Owned by Clarence Cunningham, Sandon, B. C.

Property: 9 claims, in 2 groups, acquired from Miller Creek Mng. Co. and Wonderful Group Mg. Co., in 1913, for $75,000. Ore is lead-silver.

New owner seems to have found the main vein so unsuccessfully sought by former owners, as it was reported in 1918, that $125,000 worth of ore had been shipped, and the daily output in September, 1919, was 100 tons. Ore is milled in the Alamo concentrator at Alamo, on the Kaslo-Nakusp Ry. See Alamo mine.

YALE DEVELOPMENT & CONSTRUCTION CO. **B. C.**

Has a 25-year lease on property of Olalla Copper Mining & Smelting Co., which see.

YMIR-WILCOX DEVELOPMENT CO., LTD. **BRITISH COLUMBIA**

Office: J. C. Breese, 1580 Sherman Ave., Evanston, Ill.

Officers: W. S. Mason, pres. and treas.; J. C. Breese, sec., with C. H. Poppenhusen, E. R. Johnston and B. J. Jayne, directors.

Inc. June 29, 1911, in British Columbia. **Cap.,** $500,000; shares $1 par; non-assessable; 400,000 issued.

Property: 6 patented claims, 188 acres, near Nelson, B. C. Examined by Arthur Lakes, Jr. Ore carries gold and some silver. Under development in 1917, but no later information.

MANITOBA

The Province has a richly mineralized belt that extends easterly for 100 miles from the Saskatchewan border, at Lake Athapapuskow, to Herb lake (formerly called Wekuska). The deposits at Flin Flon, Schist and Copper lakes are near the west end of this belt, and include the Great Sulphide mine, Mandy mine and several other properties. The Pine Root area, on the east arm of Athapapuskow lake, is said to rival the Flin Flon. At Herb lake, at the east end of the belt, the Rex mine, Dauphin and 3 other properties are being opened up.

The Flin-Flon and Schist Lake districts have attracted much attention since 1916, because of the large size and richness of the copper deposits found there. They are situated 650 miles N. W. of Winnipeg and 90 miles N. W. of The Pas, northern Manitoba, and reached by steamer from The Pas to Sturgeon lake, thence 40 miles east to Flin Flon lake.

The rocks are greenstones, conglomerates, etc., intruded by quartz-porphyry dikes and masses. The ores are sulphides and carry copper, gold and silver, with some zinc.

BROOKLYN MINING CO. **MANITOBA**

Bert Clarkson, pres., Buffalo, N. Y., A. L. Anderson, supt.

Property: in Gold Lake area has been worked since March, 1919. In November, drifting was in progress on the 100′ level.

BRUCE CONS. MINING CO. **MANITOBA**

Address: Winnipeg, Canada.

Officers: Col. Wm. Grassie, pres., with E. D. Alderson, W. B. Tobias, J. J. Papineau and Dr. Halpenny, directors.

Cap., $2,500,000; par $1.

Property: 275 acres in Gold Lake area.

CALUMET-CORBIN MINES CO. **MANITOBA**

Succeeded by Dominion Gold Mining Co., q. v.

Wm. Bracken, pres.; J. K. Heath, v. p.; Erik Hunelker, sec.-treas., at last accounts.

Inc. Jan. 11, 1915, in Maine, as a reorganization of the Calumet-Corbin Mng. Co. **Cap.,** $2,500,000; shares $1 par. Paul Revere Trust Co., Boston, registrar. Shares in the old Calumet-Corbin Co., exchangeable on certain terms for those of the new company. Listed on Boston curb.

Company had a lease on the Gold Seal and Gold Pan claims, 102 acres in Gold Lake mining district, Manitoba, Can. Free gold occurs in a vein of gray quartz, in porphyry and schist. Samples evidently not representative of the quartz as a whole, reported to show from $600 to $4,880 per

AREA OF MANITOBA
251,832 SQUARE MILES

AREA OF NORTHERN MANITOBA
178,100 SQUARE MILES

GEOLOGIC MAP OF MANITOBA, SHOWING THE NEW MINING DISTRICTS.

ton gold with no silver contents. Some development work is said to have been done in 1916.

It appears that the Gold Lake lease covers a swamp in which quartz is found. Such quartz exposures are known at a great many places in Western Canada, but so far as known none of them are now commercially worked.

The New Era mine near Idaho Springs, Colo., taken under lease for $150,000, was lost through default of semi-annual payments of $7,500 in 1914, with local debts of $10,000. The Montana holdings were previously abandoned.

It appears that the company had no real property and its stock represented nothing but paper. The sponsors for the stock were apparently interested in stock dealing, not mining, and caveat emptor applies to all stock buyers.

DOMINION GOLD MINING CO. **MANITOBA**

(See Calumet-Corbin Co.) **Office:** 802 Pioneer Bldg., St. Paul, Minn.

Officers: at last accounts, Bernard Noon, pres.; J. P. Fetsch, v. p.-treas.; J. E. Liebe, sec., with N. L. Watson and George Werner, directors.

Inc. Oct. 5, 1915, in Arizona. Cap., $2,500,000; outstanding Dec., 1915, $1,500,000; shares $1 par. Registrar & Transfer Co., New York, registrar and transfer agt. Cash on hand, November 8, 1915, $5,500. Outstanding shares, 1,500,000, used in the purchase of property. Of this amount 1,000,000 shares were set aside to be given to stockholders of the Calumet-Corbin Mines Co. of Maine, in exchange for stock of that company, received by them in exchange for stock of the old Calumet-Corbin Mining Co., of Ariz., when the reorganization was effected early in 1915. "Reason for the gift of this stock to the stockholders of the Calumet-Corbin Mines Co. is stated by those giving it to be because they feel a certain measure of responsibilty for the failure of the old Calumet-Corbin Mining Co., to make good, and because their efforts to bring it to a successful issue through its reorganization into the Calumet-Corbin Mines Co. failed." If the whole 1,000,000 shares are exchanged it will make the Dominion Gold Mining Co. a stockholder of the Calumet-Corbin Mines Co. to that extent.

Property: 6 claims, 280 acres, held by location, not contiguous, in the Gold Lake mining district, 100 miles N. E. of Winnipeg, Manitoba. Nearest P. O. is Manigotagan, at mouth of Manigotagan River, on eastern shore of Lake Winnipeg. Mine reached by boat to Manigotagan from either Selkirk on Red River, 23 miles north of Winnipeg, or from Gimil, or Icelandic Riverton, on the Gimil branch of the C. P. R. R.

The Gold Seal and Gold Pan claims, which were said to belong both to this company and to the Calumet-Corbin, were reported "abandoned 1915" at the office of the New York Curb.

The property is practically undeveloped. The country generally is covered by a swamp. Claims are said to show quartz veins "well exposed at the surface, except where covered by the swamp," and to contain considerable free gold. Stock is a rank gamble and unfavorably regarded. No recent information.

FLIN FLON SYNDICATE **MANITOBA**

See Great Sulphide Co.

GABRIELLE MINES, LTD. **MANITOBA**

Office: Winnipeg, Canada.

Inc. in 1919. **Cap.,** $1,000,000; par $1.

GREAT SULPHIDE CO. **MANITOBA**

Address: J. E. Hammell, 289 Indian Road, Toronto, Ont.

Property: the Hammell mine at Flin-Flon lake, 90 miles N. W. of The Pas, northern Manitoba, located in 1915. About 40 diamond-drill holes have been put down to 1,600′ depth, and are said to prove the orebody over a length of 2,500′ and 125′ width on surface, assaying in places $10 per ton in gold, silver, and copper. Drilling is said to have proved over

20,000,000 tons of ore, averaging 1.7% copper; 1.5 oz. silver, and $1.40 gold per ton, while 50,000,000 tons is considered a possibility, if not a probability.

Property requires an 80-mile railroad connection to the Pas and it was reported, that the Government had definitely promised this road, if the syndicate would erect a smelter with a capacity of not less than 2,000 tons a day. A year's option on the property was given to W. B. Thompson interests in March, 1920. The price is $1,500,000 cash; $200,000 is to be spent in exploration.

GOLD PAN MINING CO. **MANITOBA**

Officers: Jas. H. Ashdown, pres.; F. O. Fowler, v. p.; Gordon McTavish, sec-treas., with E. F. Hutchings, S. Hart Green and Sam Scott, directors. J. B. Tyrell, cons. engr., Toronto. Frank Phillips, mine supt.

Property: at Big Rice Lake, 130 miles N. E. of Winnipeg, was idle for some time previous to the reorganization in 1919 and the finances of the company were in bad shape. In November, 1919, 200,000 shares of 8% preferred stock was offered to the public.

Development: by 150′ shaft, from which some rich specimen ore is said to have been taken during the past 3 years.

Though an adverse report on property was made by R. W. Brigstocke in February, 1920, management decided to continue work awhile.

HERB LAKE GOLD MINES, LTD. **MANITOBA**

Offices: Herb Lake, via The Pas, Manitoba, Canada, and Makeever Bros., 170 Broadway, New York City.

Officers: M. M. Makeever, pres.; J. S. Cooper, v. p.; Sanford Makeever, sec.-treas., above with C. C. Pringle, J. R. Campbell, Barney Asran, directors. Walter Neal, mgr.; J. R. Campbell, Supt., Herb Lake, via the Pas, Manitoba.

Inc. in Manitoba, Canada. **Cap.,** $1,000,000; par $1; all issued.

Property: 7 claims, about 300 acres on N. E. shore of Herb lake, Pas mining district, Manitoba, Canada. Claims said to show a quartz fissure vein 3′ wide in hornblende schist, traceable for a distance of 1,700′. Ore is free milling gold reported to average $27 per ton. Pay ore shoot is 75′ long, depth not determined. Overhand stoping methods are used for mining ore.

Development: by 65° inclined shaft, 130′ deep, and 420′ of workings. Ore blocked out is estimated at 4,000 tons.

Equipment: 5x7″ steam hoist, 300 cu. ft. air compressor, pump, 30-ton amalgamation mill with Deister and Overstrom tables.

Production: from May to November, 1918, reported to have shipped gold bullion to value of $27,323.

Mine closed since 1918 on account of labor shortage.

LAURA MINES, LTD. **MANITOBA**

Inc. in October, 1919. **Cap.,** $2,000,000.

Property located in the Rice Lake district, Manitoba, Can.

MANDY MINING CO. **MANITOBA**

Address: H. C. Carlisle, supt., The Pas, Manitoba, Canada.

Subsidiary of the Tonopah Canadian Mines Co (holds 85% of shares), which is controlled by Tonopah Mining Co. of Nevada, with head office at Bullitt Bldg., Philadelphia, Pa.

From December 1, 1916, to December 31, 1917, the income was $223,055, but expenditures left a deficit of $6,489. During 1918 the income was $537,043, of which $68,199 was profit. Current assets at the end of 1918 were $268,421, and liabilities, including $208,260 loan from Tonopah Mining Co. of Nevada, were $225,321.

Property: at Schist lake, north of The Pas, Manitoba, is developed by 200′ shaft and diamond-drill exploration below this depth. A shoot of high-grade copper ore has almost all been extracted to the bottom level, yielding over 20,000 tons. There remains 200,000 tons of low-grade ore, too poor to mine under present conditions.

Equipment: steam boilers, hoist, tramway.

Production: for 1917 and 1918 the total output was 3,588,000 lb. copper, from 3,335 tons worth $70 per ton in the former year, and 5,904 tons valued

at $88 per ton in 1918. In 1919 company expected to ship 15,000 tons, the total value for 10 months' production was $750,000. Ore is taken by teams and barges to The Pas, 161 miles distant, and from there by rail to Trail, B. C., for reduction.

NORTHERN MANITOBA MINING CO. **MANITOBA**

Address: The Pas, Manitoba.

Officers: H. S. Hohnson, pres.; R. Kerr, sec.

Cap., $1,000,000; par $1.

Is a local enterprise, financed by The Pas people.

Property: 3 gold claims at Herb lake. Developed by 120′ shaft. A one-car shipment in 1918 is said to have given returns of $81 per ton, but work was stopped on account of lack of money.

Equipment: costing $12,000, includes a 40-h. p. boiler, and a compressor.

NORTHERN MANITOBA MINING & DEV. CO. **MANITOBA**

Operated by Canadian Exploration Co., Makeever Bros., 170 Broadway, New York, hold a stock interest.

Property: the Moosehorn and Rex gold claims on Herb lake, via The Pas, northern Manitoba. In August, 1917, an 80′ shaft in the former had opened 30″ of ore, while at 110′ in the latter there was 49″ of $36 ore.

A 40-ton mill erected in 1917 was operated for 3 months and then closed down with total production of $28,000.

Reported late in 1919, that property had been sold.

PAS CONSOLIDATED MINES, LTD. **MANITOBA**

Address: The Pas, Manitoba.

Reported in February, 1919, that company had acquired the Dauphin-Elizabeth mine and would operate it. Makeever Bros., of New York, gave up their option after sinking a 50′ shaft.

STAR LAKE GOLD MINES, LTD. **MANITOBA**

Office: 509 Merchants' Bank Bldg., Winnipeg, Manitoba, Canada.

Officers: W. R. Milton, pres.; J. H. Hicks, sec.; J. W. Harris, treas.; with E. R. Potter and John Smith, directors.

Inc. Nov., 1915, to purchase the property of the Penniac Gold Reef Mines, Ltd. Terms of purchase were as follows: owners agreed to take 333,333 shares of stock and to set aside 33,333 shares for development purposes. Stockholders in the Penniac Mines to receive 200,000 shares and to pay to the Star Lake $25,000 to liquidate liabilities of old company, amounting to $15,000, and leave a surplus for development work. Star Lake Co. agreed to have $100,000 in treasury within 6 months from November, 1915, otherwise vendors could cancel agreement. 125,000 shares offered to public at $1 par.

Cap., $1,000,000; shares $1 par; non-assessable; 500,000 issued. "An extraordinary 'speculative investment' is offered to the public for a limited number of 6% preferred shares at par, to be redeemed later at 15% above par," is the wording of a circular.

Property: 6 patented claims, 200 acres, on Star Lake, eastern Manitoba, said to show a quartz vein in a shear zone of Keewatin conglomerate near a contact between granite and schist. Vein minerals include quartz, gold-bearing pyrite and arsenopyrite. Samples cut for 10 to 15′ across the vein said to carry $3.50 to $5.80 per ton. The Penniac company is reported to have spent $100,000 on development work, consisting solely of test pits and a 90′ shaft, said to disclose two lodes. The main shear zone is said to be 200′ wide, with two main and several lesser parallel quartz veins with strike N. 35-45° E. and dip N. W., all showing gold in payable quantities. Property reported on by R. C. Wallace, University of Manitoba; W. H. Jeffrey, W. J. Tretheway of Toronto, and J. Tait Milliken of Colorado.

Development: by 95′ shaft and 150′ tunnel. Reserves estimated at 3,000,000 tons.

Equipment: includes a 5-ton mill, office and several buildings. Management planned extensive development and banked on platinum content of the ore to make large profits. No recent information, probably idle.

NEW BRUNSWICK

EASTERN CANADIAN COPPER CORPORATION, LTD. **N. B.**

Mail returned 1918, from former address.

Fully described in Vol. XIII.

INTERCOLONIAL COPPER CO. **NEW BRUNSWICK**

Office: P. O. Box 294, Pawtucket, R. I. **Mine office:** Dorchester, Westmoreland county, N. B.

Officers: Darius L. Goff, pres.; T. J. Edwards, sec.; F. J. Powers, treas.

Has been idle several years. Property described in Vol. XIII.

NOVA SCOTIA

BRADFORD MINES, LTD. **NOVA SCOTIA**

Halifax, Nova Scotia.

Officers: E. F. Heifler, pres.; A. E. Abrams, v. p.; v. p.; W. C. Milner, sec.-treas., with Paul J. Engel, Jr., 37 Wall St., New York, and G. J. Partington, Halifax, directors.

Inc. Oct. 3, 1914, in Nova Scotia. **Cap.,** $500,000; shares $1 par; outstanding, 440,000 shares. Transfer office and registrar, Security Reg. & Transfer Co., New York. Listed on New York Curb.

Property: at Sheet Harbor and Tangier, Nova Scotia, contains ore with gold and silver values.

CAPE BRETON COPPER CO., LTD. **NOVA SCOTIA**

Mine near Coxheath, Cape Breton county, N. S.

Cap., $2,000,000.

Property: the old Coxheath mine and adjoining lands, 10 miles from Sidney, Cape Breton, shows several cupriferous veins, of which the principal, averaging 10′ width, traverses felsite and diorite, carrying argentiferous and auriferous chalcopyrite, in a silicious gangue, ore averaging about 4.5% copper. Deepest shaft, 420′. Idle many years.

CHETICAMP COPPER CO., LTD. **NOVA SCOTIA**

Idle. **Office:** 37 Sackville St., Halifax, N. S. **Mine office:** Cheticamp, Inverness county, N. S.

Officers: Edward Staris, pres.; John W. Regan, sec.-treas.; Milton V. Grandin, supt., at last accounts.

Inc. May, 1904, in Nova Scotia. **Cap.,** $3,000,000; shares $1 par, as a merger of the Eastern National Copper Co., Ltd., and 3 other corporations.

Property: 950 acres, freehold, also a 200-acre mill and smelter site, 1,000 acres timber lands, and 200 acres water frontage, with a government license for exploring and locating mines on 50 sq. miles.

Property shows a mineralized zone, in micaceous schist, of 350′ width, traceable 1½ miles, carrying 4 orebodies, of which 3 are developed by a 200′ shaft and by tunnels of 25′, 35′ and 115′, claimed by company to show 250,000 tons of exclusively sulphide ore, averaging 2.5 to 3.5% copper, 18% lead, 30 oz. silver and $2 to $30 gold per ton. Nearest railroad is 38 miles, but mine is only 5 to 6 miles from tidewater. Property considered promising, though estimates of tonnage and values are excessive.

DOMINION MINING CO. **NOVA SCOTIA**

Tangier, Halifax county, N. S. W. J. Prinsk, mgr. Company owns a gold mine at Tangier. Last production reported was 419 tons ore, yielding 57 oz. gold. No recent information.

GOLDENVILLE CONS. MNG. CO., LTD. **NOVA SCOTIA**

Agency: 170 Summer St., Boston, Mass. **Mine office:** Goldenville, Guysboro county, N. S. Can.

Officers: D. E. Makepeace, pres.; E. B. Estes, sec.; J. A. Floyd, treas.;

foregoing, with A. C. Post, W. E. Bremner, G. F. Rooke, T. H. Richardson and H. N. Wright, directors.

Inc. June 16, 1916, in Nova Scotia, as a reorganization of the Goldenville Mining Co., Ltd. **Cap.**, $2,400,000; shares $1 par; 2,000,000 outstanding. Bonds authorized, $60,000, all outstanding.

Property: 501 acres on St. Mary's river, Goldenville, N. S., said to show narrow quartz veins in quartzite, with E.-W. course. Pay ore occurs both as shoots and streaks. Gold is coarse.

Development: by vertical and incline shafts to 750′ depth. Workings total 5,500′.

Equipment: 500-h. p. hydro-electric power plant, 50-h. p. electric hoist, 1,000 cu. ft. compressor, turbo-pump, 40 stamps (20 dropping) using amalgamation. Seems a promising mine, but results are withheld.

Production: 45,388 tons to 1919. No yield given, but recovery is about 90%.

GOLDENVILLE MINING CO., LTD. **NOVA SCOTIA**

Reorganized in 1916 as the Goldenville Consolidated Mining Co., Ltd., which see.

GREAT BRAS D'OR MINING CO. **NOVA SCOTIA**

Baddeck, Victoria county, N. S. **Mine office:** Middle River, Victoria county, N. S. D. J. Patriquin, mgr. Operates a gold mine. Last production reported was 775 tons ore, yielding 262 oz. gold. No recent returns.

LAKE COPPER MINING CO., LTD. **NOVA SCOTIA**

Idle. **Office:** care Dr. H. Mackay, New Glasgow, N. S. **Mine office:** Polson's Brook, Antigonishe county, N. S. A. G. Baillie, gen agt.

Inc. January, 1908. **Cap.**, $2,500,000; shares $1 par.

Property: 6,400 acres, on Polson lake, said to show a vein 5′ thick, traceable a mile and carrying auriferous and argentiferous copper ore. Mine has a 103′ shaft with 554′ of workings.

LOON BROOK MINING CO., LTD. **NOVA SCOTIA**

Office: 1 Leys Ave., Letchworth, Herts, Eng. **Mine office:** Montague, N. S. E. Romilly Smith, mgr.

Operating a gold property and 10-stamp mill with cyanide unit in Montague district, N. S.

Last production reported was 118 tons of ore, which yielded 400 oz. gold. No recent returns.

MONTAGUE GOLDFIELDS, LTD. **NOVA SCOTIA**

Head office: 80 Granville St., Halifax, N. S. **Mine office:** Montague, Halifax county, N. S.

Officers and directors: Jas. Farquar, pres.; E. S. Romilly Smith, gen. mgr.; R. G. Rent, sec.-treas.; A. Gerhardie, supt.

Property: in Halifax county, shows a 4″ quartz vein, between quartzite hanging and slate foot-wall. Ore is free milling. In 1918 a recovery of a little more than 2 oz. gold per ton was being made.

Development: by 300′ shaft. Reported in July, 1919, that 5 new veins had been cut on the 300′ level and that sufficient ore was blocked out to run the 10-stamp mill a year. The present mill will be replaced by a new one.

Examined 1918, by C. A. Burdick.

NOVA SCOTIA MOLYBDENUM CO., LTD. **NOVA SCOTIA**

In 1918 company was operating a molybdenite deposit at New Ross, Lunenburg county, under management of H. C. Burchell of Windsor. Ore occurs in a pegmatite dike and is said to assay ½-1% molybdenum sulphide. Developed by 100′ shaft.

RENFREW GOLD MINES, LTD. **NOVA SCOTIA**

Controlled by M. J. O'Brien, Ltd., Cobalt, Ontario.

SCHEELITE MINES, LTD. **NOVA SCOTIA**

Controlled by M. J. O'Brien, Ltd., Cobalt, Ontario.

TOMMY BURNS GOLD MINES, LTD. **NOVA SCOTIA**

Controlled by Tommy Burns Gold Mining Co. of Ontario. Was a promotion of Pope and Cheppu, who failed, 1917.

Property: 134 acres, ½ mile from Brookfield, the nearest R. R. station, said to show a fissure vein, 2½-3½′ wide, running E.-W., with dip 30°, and traceable at surface for 900′.

Development: by 108′ shaft, sunk on the vein and drifts on the 50′ and 100′ levels.

Equipment: includes a 5-stamp mill, boiler, hoist and pump. A pleasing prospect.

According to T. A. Rickard, who made a report on the gold deposits of Nova Scotia for the Provincial government, none of the Nova Scotia gold deposits can be relied upon to carry their values to any great depth.

No recent information, presumably defunct.

WENTWORTH COPPER CO., LTD. **NOVA SCOTIA**

Idle. **Address:** Wentworth, Cumberland county, N. S.

Inc. 1907, to acquire lands, bought at foreclosure sale, of the Cumberland Copper Co. Company apparently holds property for speculation purposes as no work has been done since purchase.

WEST GORE ANTIMONY CO. **NOVA SCOTIA**

Address: N. O. Carpenter, mgr., West Gore, N. S.

Property: the Rawdon mine, opened 1884, worked intermittently until October, 1914, and regularly since then. Company is closely allied with the St. Helen's Smelting Co., Manchester, England, which refines the product.

The main deposit is up to 4′ wide and has been opened for 200′ on one level. The ore consists of stibnite and native antimony, associated with pyrite, quartz and calcite. Country rock is a soft slate.

Development: by shafts, the main one, 502′ deep, with a 332′ winze below this level.

Production: about 1,200 tons of ore monthly, yielding 110 tons of concentrates containing 38 to 45% antimony. No recent information.

ONTARIO

The mining companies of the Cobalt, Porcupine and Kirkland districts are grouped under those headings. All others are grouped in a general section, which precedes the districts named.

ALEXO MINES, LTD. **ONTARIO**

Address: Porquois Junction, Ontario.

Officers: G. F. Haning, pres.; Maj. E. F. Pullen, v. p.; H. N. Roberts, sec.-treas., with Capt. Frank Pullen, Lt.-Col. C. W. Allen, and F. J. Stewart, directors. Wm. Anderson, mgr.

Inc. January 3, 1913, in Ontario. **Cap.,** $40,000; shares $1 par; 30,005 shares issued.

Property: the Alexo mine, in Dundonald twp., Timiskaming district, discovered in 1908 and active work starting in 1912. The ore, a nickeliferous pyrrhotite, averages 4% nickel and is shipped to the Mond Nickel Company's smelter.

Development: by 400′ shaft, crosscuts and drifts.

Production: 8,618 tons in 1918; total 49,746 to January 1, 1919. About 20 men employed.

ALGOMA CUSTOM SMELTING & REFINING CO., LTD. **ONTARIO**

Idle several years. **Works office:** Thessalon, Algoma, Ont. See Vol. XI, Copper Handbook.

ALGOMA STEEL CORPORATION **ONTARIO**

Subsidiary of the Lake Superior Corporation.

Gen. office: Sault Ste. Marie, Ont. **Secretary's office:** Traders' Bank Bldg., Toronto, Ont. W. C. Franz, pres. and gen. mgr.; Alex. Taylor, sec.

Property: the Helen and Magpie iron mines, old producers, at Michipicoten, Ont., with blast furnaces at Sault Ste. Marie. The Helen, opened in 1899 and developed to vertical depth of 641′, is a steady producer of iron ore, which occurs as goethite, with some hematite.

The Magpie, opened up in 1911, is developed by a 4-compartment shaft to depth of 250′, with main levels at 125′ and 205′. The orebody, mainly siderite, is said to be 50′ wide over a distance of 1,500′ and when roasted makes a fair Bessemer ore.

The Helen high-grade sulphur ore is mixed with Magpie raw ore and roasted, product being a very desirable Bessemer ore, which runs 52% iron and 0.044 phosphorus. Shipments from the Magpie are sent to the Sault blast-furnaces. Employs about 250 men when working to capacity.

ALGUNICAN DEVELOPMENT CO. ONTARIO

Haileybury, Ont., Canada. Holding company of the Jualin-Alaska Mines Co., which see. Also has done development work on a molybdenite property in Brome Twp., Renfrew Co., Ont. Hector Drolet, mgr. at last report.

MAP SHOWING MINING DISTRICTS OF ONTARIO

ALLIED GOLD MINES, LTD. ONTARIO

Address: 55 Yonge St., Toronto; and 1905 Dime Bank Bldg., Detroit, Mich. **Mine office:** Boston Creek, Ontario.

Officers: F. L. Smith, pres., Detroit; Angus Smith, v. p.; A. W. Brechting, sec.-treas., with J. H. Remick and W. H. Muir, directors. F. C. Loring, cons. engr. R. W. Norrington, mgr. Shares offered by R. M. Norrington & Co., 30 E. 42nd St., New York.

Inc. October, 1918, in Ontario. **Cap.**, $2,000,000; par $1; outstanding $1,250,000; non-assassable. Listed on New York Curb. Prices, 1⅛ to 1¼ in 1918. Management states that $30,000 was spent on development in 1918.

Property: 12 claims, 7 patented, 480 acres, in Boston Creek district, Ontario. The company was organized to acquire large acreage of gold-mining land in this area, following the success of the Miller-Independence Mines, which

adjoins on the S. the Renaud-Cullen group of the Allied company. The group is said to have several quartz veins with one well-defined fissure showing almost across the property. This is developed by a 100′ shaft, and diamond-drilling work.

Company also has an option on the O'Donald property, which shows commercial ore at depth, and also on the property of the Boston Creek Mining Co. to the eastward.

Equipment: electric hoist and compressor.

No ore is blocked out as yet; but property is considered a promising prospect fully warranting development.

ALLIE ISLAND COPPER MINE. **ONTARIO**

Office: 225 Water St., Kenora, Ont., Can. Owned by F. W. Moore et al.

Property: 4 claims, the S 777, K. 312, K 314 and K 315, 156.64 acres in all, at the east end of Allie Island, about 15 miles from Kenora.

Geology: claims cover an outcrop of serpentine, or chlorite-schist, carrying small pellets or crystals of native copper. Country rock is dolomite, altered trap and greenstones. Orebody claimed to be ½ mile long, with a maximum width of 700′.

Development: is surficial only, 40 and 20′ pit-holes, showing ore in bottom. Ore said to average 1½% copper. Owners planned development work at last account.

AMERICAN MOLYBDENITE, LTD. **ONTARIO**

Formerly known as the Dominion Molybdenite Co. Property sold to Molybdenum Products, Ltd., which see.

ARGONAUT GOLD MINES, LTD. **ONTARIO**

Address: Royal Trust Bldg., Montreal, Quebec.

Officers: J. H. Rainville, pres.; John W. Morrison, gen. supt.; J. E. Hardman, cons. engr.

Organized 1919, to take over La Mine D'Or Huronia (which see), at Gauthier, Larder Lake district. Reported in November, 1919, that the shaft had been deepened from the 80 to the 200′ level, and the re-modeled stamp-mill put in operation. Electric power is obtained from Associated Goldfields at Larder Lake.

Production: in 1919, was 125.34 oz. gold, valued at $2,619.

ASSOCIATED GOLDFIELDS MINING CO. **ONTARIO**

Controlled by Associated Gold Mines of Western Australia, Ltd.

Office: 306 C. P. R. Bldg., Toronto, Ontario.

Officers: Geo. A. Mackay, pres.; C. G. Daimpré, gen. supt.

Inc. 1914, in Ontario. **Cap.,** $5,000,000; $1 par; 2,500,000 issued.

Property: about 2,000 acres, includes the Harris-Maxwell the Kerr-Addison, and the Reddick mines, now known as Blocks B, C, and D, respectively, located in Larder Lake district, Ontario. Block B mine is opened to the 500′ level, with workings practically all in silicified dolomite. In 1918, 400′ of work was done in this mine; and 700′ in the Reddick. An extensive development campaign is now under way.

Block D, 2 claims, shows alternating lands of dolomite and green schists, the former containing a network of quartz veins some of which show coarse gold. The mine has a shaft 100′ deep with several hundred feet of underground workings and considerable diamond-drill exploration. On the Kerr-Addison only a little surface work has been done. The two properties have been worked in a desultory manner since about 1908.

Equipment: electric power, hoist, 2,700 cu. ft. compressor, 30-stamp mill, etc.

ATLAS GOLD MINES, LTD. **ONTARIO**

Cap., $2,000,000, par, $1. Listed on Toronto Standard Stock Exchange. Shares, 20c. low, 40c. high, 1918; 35c. low, 40c. high in 1919.

Property: 42 acres, and options on 400 acres additional in four separate groups in different parts of the West Shining Tree district, 60 miles S. of Porcupine. Said to show 15 veins, five of which have been stripped and examined.

Veins well defined, and about 2′ in width. Company was planning development in 1919-20.

AURUM MINES, LTD. **ONTARIO**

Office: 420 Bank of Hamilton Bldg., Toronto, Ont., Canada.

Officers: Sir Henry M. Pellatt, pres.; Col. J. B. Miller, v. p.; with W. B. Reid, A. E. J. Blackman and A. H. Jeffrey, directors. C. H. Manaton, sec.; H. M. Asling, treas.

Inc. in Ontario. **Cap.**, $1,500,000; shares $1 par; 800,000 shares outstanding.

Property: 2 patented claims, 80 acres, adjoining the Croesus mine, in Munro Township.

Ore: occurs in quartz and schist veins in basalt, dipping N. W.-S. E.; average value of the gold contents is as yet undetermined. Mine examined by W. J. Trethewey and A. G. Kirby, who recommended, diamond-drilling in attempt to pick up the Croesus vein. No recent returns.

BEAVER AUXILIARY MINES CO. **ONTARIO**

Seventy-five per cent. of company's capitalization is held by Beaver Cons. Mines, Ltd., which see. H. Donaldson, supt.

Property: 120 acres, at Elk Lake, Ont., carries silver ore, mainly of milling grade. **Development:** 330′ main shaft, crosscuts and drifts. **Equipment:** hoist and surface buildings. No work has been done on the property for several years.

BOSTON CREEK GOLD MINES, LTD. **ONTARIO**

Address: Imperial Bank Chambers, N. F. Ont.

Officers: F. M. Richardson, pres.-mgr.; W. B. Albright, v. p.; M. L. Quillman, sec.-treas.

Inc. in 1916 to take over mine from the R. A. P. Syndicate, financed by Sherwin-Williams Paint Co. interests, who spent $250,000 on the property. **Cap.**, $2,000,000; shares $1 par; 1,050,000 shares issued and 999,995 were pooled for two years. Security Transfer & Registrar Co., New York, transfer agents. Listed on New York Curb, and on Toronto Stock Exchange. Shares sold, 13c. low, 39c. high, 1918; 18c. low, 33c. high, 1919.

Property: 21 claims, 100 acres, in Boston Creek township, 45 miles N. W. of Cobalt and 382 miles N. of Toronto and crossed by the T. & N. R. R. Ores: simple gold-quartz, like those of Porcupine, occur in two parallel master veins, 250′ apart. The Kenzie vein is of replacement type in a "pillow lava" or greenstone, a few inches to 5′ wide, showing spectacular free gold in fine grained greenish quartz, with associated iron and copper pyrites, galena and molybdenite.

Development: by 300′ shaft with drifts on vein at 100′, 200′ and 300′ and a winze to 400′ level. Brokers letters claimed $1,500,000 worth of ore blocked out and that the company was sacking high grade ore. Equipment includes gasoline and electric hoists and buildings, etc., for 40-50 men employed.

Property considered good and directors are as high grade as the ore, but the stock offered at 50 cts., boosted to $1.50 and declining to 60cts., June, 1917, is so extravagantly lauded by various brokerage houses as to beget and foster suspicion.

Property will, it is believed, eventually be a milling proposition, ranking well with the various Porcupine companies. Mine was idle for some time on account of disagreement between company and R. A. P. Syndicate, whose shaft the Boston Creek was using. Reported that the two companies would be consolidated.

BOSTON-PARRY SOUND COPPER CO. **ONTARIO**

Mine office: Parry Sound, Parry Sound district, Ont. **Inc.** June, 1908, in Maine. **Cap.**, $1,000,000; shares $1 par. Is a close corporation.

Property: 200 acres, in the vicinity of the Wilcox and McGowan mines. Idle some years, but owners are well-to-do and expect to reopen property some day.

BRITISH-AMERICAN NICKEL CORP., LTD. **ONTARIO**

Office: Citizens Bldg., Sparks St., Ottawa, Ont. **Mine and smelter office:** Nickelton, Sudbury, Ont.

Officers: J. H. Dunn, pres.; W. A. Carlyle, v. p. and managing direc.; W. H. Coade, sec.-treas.; F. J. Brule, chief engr.; E. Hibbert, supt. of mines; E. J. Carlyle, supt. of smelter; R. L. Peek, supt. of refinery; J. H. Gillis, supt. of const.; Frank E. Lathe, chief chemist; T. N. Hay, purch. agt.; R. F. Howard, elec. engr.

Inc. August, 1913, in Canada. **Cap.,** $20,000,000 common stock, all issued; $6,000,000 first mortgage bonds, 6%, all issued; $10,000,000 6% debenture stock authorized, of which $3,500,000 has been issued; $14,000,000 stock and $3,000,000 bonds held by British Government, out of $25,000,000 issued.

Property: in the Sudbury nickel district, Ontario, the Corporation owns 17,590 acres, of which 12,590 acres are within a mineral bearing zone, the balance being non-mineral and required for smelter townsites, etc. Included in the above are the following mines: Murray, Whistle, Wild Cat, Jackson, Nickel Lake group, W. D. 16, Elsie, Gertrude, Victor, Lady Violet and Falconbridge. Lands contain 21 known orebodies, 7 of which have been developed. The company has spent $900,000 on diamond-drilling from 1907 to 1918.

Development: the Whistle mine has been developed and is ready for production, but the Murray mine, having shown a much larger orebody has been selected as the property on which work is to be concentrated. In all, the company has developed by diamond drilling over 18,000,000 tons of ore, 14,000,000 of which is in the Murray mine, about 4 miles N. W. of the town of Sudbury.

Equipment: the surface works at the Murray mine consists of steam hoist, rock crushing and sorting house with a capacity of 200 tons of ore per day, air-compressors, and the usual shops and change-house.

Plans made for the smelter provide for the construction of 2 blast furnaces with hearths 50x360″, 3 Pierce-Smith converters, 13x30′, to be erected in a modern plant with full equipment of cranes, flues, stacks, bins, shops, power house and tramming system, all machinery to be steam driven. An electrolytic refinery, using the Hybinette process for the separation of copper and nickel and the precious metals from the matte, is constructed at Deschemes, Quebec, and will have a capacity of about 10,000 tons nickel per annum. The smelter is at Nickelton, 3 miles N. W. of Sudbury. The new plant was blown-in on January 17, 1920, and 3 days later No. 1 furnace was reducing 660 tons of charge daily. One converter was at work on the 21st.

It is the intention of the management to have all employees reside in the town of Sudbury, and cars or suburban trains will be provided for their transportation. The mines are connected with the Canadian Pacific, the Canadian Northern Ontario and the Algoma Eastern railroads.

BRUCE MINES, LTD. **ONTARIO**

Dead. Mines sold to Mond Nickel Co. in 1915.

CALUMET & ALGOMA MINING CO. **ONTARIO**

Address: Lucas Hermann, sec., 109 Fifth St., Calumet, Mich. Mine near Massey, Algoma, Ont.

Officers: Jos. Vertin, pres.; Chas. Schenk, v. p.; Lucas Hermann, treas.

Inc. 1905. **Cap.,** $1,000,000; shares $5 par, assessable; issued, $100,000, paid in, $1.75. A reconstruction of the Copper Queen Mining Co., Ltd. In March, 1919, had no debts, and had $400 in the treasury.

Property: 957 acres, freehold, shows a 45′ fissure vein, traceable about 3 miles, carrying medium-grade chalcopyrite ore, more or less auriferous, with occasional bornite and malachite, giving assays of 5 to 25% copper. Has 2 shafts, No. 1 being 138′ deep, and 2 tunnels, longest 195′. Lands are heavily timbered and well watered. Idle several years.

CALUMET & MONTANA CONSOLIDATED MINING CO. ONTARIO

Officers at last accounts: H. A. Oswald, Minneapolis, pres.; Jas. A. Patterson, v. p.; John Boyle, sec.-treas.; above with W. W. Sloan, C. H. Collins, Wm. Weichel, directors. Geo. G. Thomas, gen. mgr.

Inc. 1912, in South Dakota. **Cap.,** $5,000,000; shares $10 par; outstanding, 200,000 shares. Annual meeting, second Tuesday in October.

Company is a reorganization of the Calumet & Montana Mining Co., which see. At last accounts the company had one claim of 51 acres in Coleman Town-

ship, Cobalt, Ont., said to show fissure veins in diabase carrying silver ore. Developed by 225′ vertical shaft with 500′ of underground workings.

Reported in 1918, that a new company, Three Star Mining Co., was operating the property of the C. & M. Cons. Mining Co., of which company there is no recent information. Former office was at Cobalt, Ont.

CAMBURN SILVER MINES, LTD. **ONTARIO**

Address: Toronto, Ont.

Inc. in 1919. **Cap.**, $1,500,000; par $1.

Property: company is doing exploratory work in the old Leroy Lake property, Gowganda district.

CANADIAN AMERICAN RESOURCES, LTD. **ONTARIO**

Address: 927 Fifth Ave., New York.

Officers: Alex. Alexander, pres., New York; L. E. Denyes, v. p., Toronto; Dr. R. G. Bogart, sec., Kingston, Ont.; Geo. B. Leighton, treas., New York; with Jacob Ruppert, and Geo. B. Gifford of New York, and S. W. Jenckes, St. Catherines, Ont., directors.

Inc. in Ontario late in 1919. **Cap.**, $50,000,000. Company was organized to aid the development of mining and oil properties.

CANADIAN COPPER CO. **ONTARIO**

Entire stock of company taken over by International Nickel Co. of Canada, Ltd. and company dissolved.

CANADIAN EXPLORATION CO., LTD. **ONTARIO**

Offices: 28 Victoria Sq., Montreal, and Naughton, Ont.

Mine closed and plant sold, property was described in Vol. XIII.

CANADIAN SMELTING & REFINING CO. **ONTARIO**

Out of existence, described in Vol. XIII. Former office, Orilla, Ont.

CANE SILVER MINES, LTD. **ONTARIO**

Company was organized by Toronto interests several years ago, to operate a silver property in Cane Twp., near Kennebeck Station. Reported late in 1918 that company proposed to give a 10-year lease on the property, but original owners were opposed to the plan. A little development has been done.

CATHERINE GOLD MINES, LTD. **ONTARIO**

In October, 1919, company expected to commence sinking a shaft on its property in Catherine Twp., Boston Creek district, which is said to have good surface indications.

CHENEY COPPER CO., LTD. **ONTARIO**

Office: 5 Melinda St., Toronto, Ont.

Officers: D. M. Robertson, pres.; R. P. Gouch, v. p.; G. Taylor, sec.-treas.; preceding with J. S. King, G. P. McCallum, J. L. Coffee and G. Waldron, directors, all of Toronto.

Inc. in Ontario. **Cap.**, $2,000,000; shares $1 par; fully paid and non-assessable. No bonds. No stocks in hands of the public.

Property: 700 acres, of which 400 are held by Crown patent and the balance under Mines Act of Ontario, 28 miles from Thessalon, Ont., on C. P. railway and 40 miles east of Sault Ste. Marie.

Geology: Lands show a series of three parallel veins exposed by outcrops, trenches and open cut for 1½ miles, with width of 4′ to 12′. Strike is north 16° west with dip of 75° to south. Veins are mostly quartz with pockets or lenses of specular iron, iron pyrites and copper minerals.

Development: by a 10′ shaft, crosscuts and surface pits. Property is now idle.

COBALT-FRONTENAC MINING CO., LTD. **ONTARIO**

Address: D. H. Flecher, mgr., Flinton, Ont.

Officers: Geo. W. Millan, pres.; Noah Dyment, v. p.; M. Doyle, sec.-treas.

Property: the Golden Fleece mine, near Flinton. Developed by incline shaft.

Equipment: includes mill and cyanide plant.

Production: in 1919, 15 oz. gold, yielding $300.

COLUMBIA COPPER MINING CO. **ONTARIO**

Idle. Mail returned, 1919, from former address, 510 Chamber of Commerce, Detroit, Mich. Mine near Parry Sound, Ont.

Officers: Dr. A. H. Cote, pres.; Dean S. Fleming, v. p.; S. S. Southerland, sec.; Dr. W. P. Dick, treas.; Alex. Dick, cons. engr.

Cap., $3,000,000; shares $1 par, non-assessable. Authorized, 1910, a $10,000 bond issue.

Property: 200 acres, which adjoins the McGowan claim of the Parry Sound Copper Co., 1 to 2 miles from Parry Sound.

CONSOLIDATED COPPER CO. OF PARRY SOUND. **ONTARIO**

Office: 705 Palladio Bldg., Duluth, Minn. **Mine office:** Parry Sound, Parry Sound district, Ont.

Officers: Robt. Forbes, pres.; Robt. Millard, v. p.; J. G. Harris, sec.-treas.; preceding, with A. C. Le Richeux, Frank Cox, E. E. Rorem, Dr. J. D. Budd and C. J. Jackes, directors.

Inc. February, 1902, in Ontario. **Cap.,** $5,000,000; shares $1 par; issued about $3,100,000. No stock for sale.

Property: 1,500 acres, patented, carry considerable standing timber, in Foley, McDougall, Hagerman and Cowper townships. Part of property formerly was held by Hattie Belle Gold, Copper & Nickel Co. and the Valentine Mica Mining Co.

Geology: contact deposits between slate and quartzite, and fahlbands contain chalcopyrite ore with occasional bornite and chalcocite, mainly low in grade, but with occasional seams of high-grade ore. There are 18 different orebodies, as shown by test pits and stripping, 4 of which are slightly developed. The fahlbands show a width of more than 1,000′, carrying 7 bands of ore, of 200′ estimated aggregate width, amenable to concentration. Ores assay 1.5 to 12% copper, 3 oz. silver, and from a few cents up to $8 gold per ton.

Development: by 180′ vertical shaft, and about 25 pits of 10 to 100′ depth. The Spider Lake mine has a shaft house, and steam hoist good for 500′, with necessary mine buildings. A considerable orebody has been exposed by trenching.

The Lefex mine, about 220 acres, has an iron gossan, carrying up to 2% copper and $2 to $3 gold per ton. A 600-lb. test shipment, from the 65′ level, returned 30% copper, and various samples have shown from 1.5 to 3% nickel, and from nothing to $20 gold per ton.

CORDOVA MINES, LTD. **ONTARIO**

Office: Sun Life Bldg., Toronto, Ont., Canada. **Mine office:** Cordova Mines, Peterboro county, Ont.

Officers: P. Kirkegaard, pres.; Wm. H. Price, v. p.-treas; Edw. Willan, sec., with C. M. Kirkegaard and C. M. Garvey, directors.

Inc. 1911, in Ontario. **Cap.,** $500,000; shares $5; all issued. Company is operated as a close corporation.

Property: 670 acres, owned in fee simple, in Belmont twp., Peterboro county. Ore occurs in veins in diorite which are said to be from 8 to 30′ wide with ore shoots from 50 to 400′ long. The ore consists of quartz, calcite, and iron sulphides, and is estimated to assay about $3.50 gold per ton.

Development: by shafts of 160′, 400, and 500, depth, with a total fo over 6,000′ of underground workings.

Equipment: the ore and shaft-houses and the mill burned March, 1917, were replaced 1918, and a new 30-stamp mill and cyanide plant added. Other equipment includes two 1,500 cu. ft. compressors, hydro-electric power plant developing 900 h. p., pumps and 1,800′ tramway. Up to 1919 mill has treated about 70,000 tons of a total value of $360,000.

CROESUS GOLD MINES, LTD. **ONTARIO**

Office: Room 812, 42 Broadway, New York.

Officers: D. M. Steindler, pres.; H. M. Thompson asst. sec.; S. W. Cohen, gen. mgr.

Inc. September 21, 1912, in Ontario. **Cap.,** $2,000,000; shares $1 par;

200,000 issued; non-assessable. Is a close corporation, whose operations are not published. Stock owned by Dominion Reduction Co.

Property: the Walsh & Dobie claims in Munro township, Ont., Canada.

Geology: quartz vein in diabase. Gold occurs free and in sulphides. Spectacular gold ore exposed on Dobie outcrop was protected by steel plate and locks.

Development: by 350′ incline shaft. Rich ore opened recently at 300′ and 500′. Shaft produced $1,000 for each foot in sinking. Gold is all coarse and free.

Equipment: includes 50-ton mill, with Hardinge mill, picking belt, and amalgamation plates.

Production: mine is said to have produced nearly $1,000,000 in first 6 months' operation. The output in 1918 was 3,124 oz. gold, from 692 tons of ore.

DELORO SMELTING & REFINING CO., LTD. ONTARIO

Address: Deloro, Ont., Can. Toronto office, 200 King St., W.

Officers: M. J. O'Brien, pres.; Thos. Southworth, v. p.; S. B. Wright, gen. mgr.; S. F. Kirkpatrick, cons. metallurgist; F. A. Bapty, sec.-treas.

Company is the successor, 1917, of the Deloro Mng. & Reduction Co., with same officers and management.

Owns a smelting plant and refinery at Deloro. Output consists of bar silver, arsenic, nickel oxide, and cobalt oxide and metal. Also manufactures "stellite," a high-grade cutting metal.

Company aims to finish all products at the Deloro plant. Employed about 250 men at last accounts.

DOMINION MOLYBDENITE CO. ONTARIO

Name changed to American Molybdenite, Ltd., which sold the property to Molybdenum Products, Ltd.

DOMINION NICKEL-COPPER CO., LTD. ONTARIO

Property taken over by British-American Nickel Corporation, which see.

GOLD REEF MINING CO. ONTARIO

Reported November, 1919, that capital would be increased from $1,000,000 to $3,000,000, to provide money for exploration and development, in addition to the present diamond drilling work now being done. Details of organization not available.

HERMINA MINING CO. ONTARIO

Office: 109 5th St., Calumet, Mich. **Mine office:** Massey, Ontario, Canada.

Officers: Edw. J. Hall, pres.; Chas. Schenk, v. p.; Lucas Hermann, sec.; W. B. Anderson, treas.; preceding, with Ole Olson, Frank Schroeder, Paul Tritschler, Geo. E. Perley and T. H. Pollack, directors.

Inc. June, 1903, in Ontario. **Cap.,** $2,500,000; shares $12.50 par: $8 paid and $4.50 assessable. Total assessments to date, $2.35 per share; 71,000 shares issued. Annual meeting, fourth Tuesday in June.

Property: 1,040 acres near Massey, Ont., on which shafts were sunk and ore developed. Company mined a small amount of copper ore some years ago but has been idle since.

HURONIAN BELT CO., LTD. ONTARIO

Office: 310 Dominion Express Bldg., Montreal, Canada.

Officers: F. H. Hamilton, chairman; with E. Turk, E. T. McCarthy, H. B. Hooper, directors.

Inc. March, 1914, in Ontario. **Cap.,** £200,000. Company acquired, in 1914, all the interests of the Huronian Belt Syndicate, Ltd.; controls the North Thompson Gold Mine, Ltd. Also has claims in Northern Ontario and near Great Slave Lake.

The Siberian Syndicate, Ltd., of England, has a substantial holding in this company and in a report states that over 100,000 tons of ore had been developed above No. 5 level in its Porcupine property. No recent information, probably idle.

INTERNATIONAL MOLYBDENITE CO., LTD. ONTARIO

Address: J. L. Murray, Renfrew, Ont., pres.; G. P. Grant, mgr.

Has a mine and 100-ton plant for concentrating molybdenum-bearing ore near Renfrew; also a refinery at Orillia for making molybdenum compounds. Electric furnaces are used.

Production: in 1916, was 24 tons of molybdenite recovered from 2,350 tons of ore, which averaged 1.3% MoS_2. The plants of this company and of the Tivani Electric Steel Co. at Belleville, produced 149,000 lb. of ferro-molybdenum, valued at $348,775 in 1917.

INTERNATIONAL NICKEL CO. ONTARIO

General office: Constable Hook, Bayonne, N. J. **Executive office:** 43 Exchange Place, New York.

Officers: E. C. Converse, chairman of the board; W. A. Bostwick, pres.; R. C. Stanley, 1st v. p.; J. L. Ashley, sec.-treas.; E. F. Wood, cons. engr., with W. N. Cromwell, A. Jaretzki, W. E. Corey, A. Monell, A. D. Miles, Wm. T. Graham, W. H. Brownson, Charles Hayden, Thomas Morrison, and S. Prosser, directors.

Inc. September, 1912, succeeding International Nickel Co. and Colonial Nickel Co., owns entire stock of the Canadian Copper Co., which owns the great nickel-copper mines and smelters of Sudbury, Canada.

Cap., $8,912,600, 6% non-cumulative preferred stock, $100 par, and $41,834,600 common stock, $25 par. The authorized share capital is $12,000,000 and $50,000,000, respectively.

Stock is listed on the New York Stock Exchange. Bankers Trust Co., New York, transfer agent. Guaranty Trust Co., New York, registrar. Shares: 27 low, 35 high in 1918; 20⅝ low, 33⅞ high in 1919.

Comparative Statements of Income Account and Balance Sheets years ending March 31:

Year	Total Income	General Expenses	Taxes	Depreciation	Mineral Exhaustion	Net Profits
1919.....	$11,211,521	$750,336	$2,214,027	$1,337,644	$986,884	$5,922,630
1918.....	16,181,501	610,024	3,590,836	984,000	855,553	10,129,988
1917.....	16,979,608	801,498	628,873	936,000	1,039,941	13,557,970
1916.....	14,340,966	870,860(a)	.....	1,721,828(b)	.....	.....
1915.....	7,230,760	449,319	68,055	730,000	385,315	.....
1914.....	6,566,787	376,665	61,147	641,915	687,395	.....
1913.....	6,929,107	477,862	64,445	553,449	498,472	.....
1912.....	5,088,966	217,778	4,775	497,520	139,782	.....

(a) Includes taxes; (b) includes mineral exhaustion.

	Balance for Dividends	Preferred Dividends (6%)	Common Dividends	%	Balance to P. & L.
1919....	$5,922,630	$534,756	$4,183,460	10	$1,204,414
1918....	10,129,988	534,756	7,530,228	18	2,065,004
1917....	13,557,970	534,756	10,040,304	24	2,982,910
1916....	11,748,279	534,756	9,431,803	—	1,781,720
1915....	5,598,071	534,756	4,753,937	12	309,778
1914....	4,792,665	534,756	3,803,150	10	454,759
1913....	5,020,305	534,755	3,491,049	10½	994,501
1912....	3,581,960	534,729	2,143,412	13	903,709

A 10% stock dividend was paid November 1, 1915.

Assets: March 31, 1919, were $62,911,884, which included properties, $49,372,158, compared with $66,545,682 and $48,352,171 respectively, March 31, 1918.

The net quick assets, or excess of current assets over current liabilities, amounted to $9,260,627 on March 31, 1919, compared with $10,008,370 on March 31, 1918, and $14,707,348 on March 31, 1917.

Dividends: as in above table. The distribution on common stock was passed in June, 1919, breaking a continuous record dating back to 1909.

Report for first quarter of present (1919) fiscal year shows an operating income of $1,012,855, with net profit of $174,929, after taxes, depreciation, and

all other deductions; deducting the preferred dividend of $133,689, left a balance of $41,240, or only 2c. a share for the $41,834,600 outstanding common stock. Report for 6 months ended September 30, 1919, shows surplus, after charges, Federal taxes and preferred dividends, of $510,602, equivalent to 30c. per share, compared with $2.04 in corresponding 6 months of 1918. For the 9 months ended December 31, 1919, net profits were $1,799,957, compared with $5,072,458 in this period of 1918.

Copper-nickel properties consist of mines with an estimated developed reserve of 20,000,000 tons, smelting plants at Copper Cliff, Canada, handling 3,500 tons daily, separating and refining plants at Constable Hook and Camden, N. J. Company also absorbed the Orford Co., Anglo-American Iron Co., Vermillion Mining Co., American Nickel Works, Nickel Corporation of Great Britain, and the Société Minière Calédonienne.

Property: company is the world's largest producer of copper nickel ores and copper nickel matte. Ore was discovered 1884, mining commenced 1886, and smelters were started in 1888. It consists of about 18,000 acres, mostly on the south range of the Sudbury nickel belt. The ore consists of a mixture of chalcopyrite, pyrrhotite and pentlandite in a norite gangue. The ore may be massive sulphides, as in the Creighton mine, or disseminated sulphides scattered through the gangue, as in Crean Hill mine. For geology, see Eng. & Min. Jour., Vol. 101, No. 19.

Total production is obtained from Creighton and Crean Hill mines, 8 and 19 miles from Copper Cliff.

The Creighton mine has 3 incline shafts with vertical depth of 1,000'. Open pit mining was practised until 1912, when underground stoping began. The mine is developed to the 12th and partly developed to the 16th level.

The No. 3 incline shaft, with 5 compartments, handles the entire output. No. 2 shaft being used for handling men and supplies only. Tramming on the main levels is by electric locomotives, with 4-ton cars.

Primary crushing of ore is done underground. The crusher is the jaw type, 42x30" and is set at 6". Shafts are equipped with electrically-driven hoists operating in balance, mechanical appliances being in use for quick loading of skips. All buildings are of concrete, steel and brick, fireproof construction.

Secondary crushing is carried out in the ore-house, which has a capacity of 500 tons per hour, followed by screening and hand sorting on picking belts. Concrete bins of 3,000 tons capacity are situated under the picking belts.

The electric hoist is operated on the Ilgner system, hoisting 9-ton skips at 2,500' per minute. The mine has 4 compressors, 3 of 5,000 cu. ft. capacity, and one of 2,500 cu. ft., sufficient for 175 drills. Production is 3,500 tons per day.

The Crean Hill mine, about 2 miles east of the Victoria, has an inclined 4-compartment shaft, 780' deep. The production is about 450 tons daily.

Surface equipment includes rock-house for crushing and sorting ore, power house, workshops, warehouses, etc.

No. 2 mine at Copper Cliff, is developed to a depth of 860', and produced about 200 tons of sorted ore per day. Equipment is similar to that at Crean Hill. The total output of ore in 1918 was 1,230,509 tons.

A quartz quarry about 15 miles south of Copper Cliff produces silica for fluxing, during the summer months, and is so arranged to provide storage for the crushed quartz need in the winter.

The International through the Huronian Co., a subsidiary, has a hydro-electric plant at High Falls, 30 miles from Copper Cliff, utilizing an effective head of 85', which yields about 10,000 k. v. a. The current is transmitted at 35,000 volts.

Ore from the Crean Hill mine goes to the smelter; that from the Creighton mine to the roast yard about 13 miles from Copper Cliff, in part to the smelter. The yard is about 7,500' long and contains space for 122 roast beds, using wood as fuel. Ore is re-loaded by steam shovel, taken to the smelter, and dumped into bins.

The blast furnace building contains 8 furnaces, 5 of which are 4' 2"x18' deep, a 3' 6" jacket having been inserted between the upper and lower tiers to lower the settlers sufficiently to receive molten converting slag.

The charge of raw and roasted ores is practically self-fluxing, but about 11.5% coke is used. The slag carries about 32.5% silica. This matte averages 24% CuNi.

The reverberatory department contains a fine grinding plant, 4 Wedge roasters and 2 reverberatories, one working. The ore is ground in ball mills and roasted in Wedge furnaces. The reverberatory furnace smelts about 500 tons in 24 hours. It burns pulverized coal, crushed so that 75% will pass 200 mesh and is blown in by fan blast; about 100 tons a day is consumed. Matte averages 23% CuNi.

Matte is blown in 5 basic converters of the horizontal type, exactly as in the conversion of copper matte, but is stopped as soon as the iron is eliminated. Final product contains 24% copper, 55% nickel, and 0.5% iron. Slag contains 28% silica, and 4% copper-nickel, most of it recovered in settlers. Matte is cast into iron molds, broken up, and treated in The International company's Canadian refinery at Port Colborne, Ontario, and at Bayonne, N. J.

The Port Colborne refinery, near the Lake Erie entrance of the Welland Canal, erected at a cost of $5,000,000, produces 15,000,000 lb. of nickel and 8,000,000 lb. of copper yearly. The plant finished in June, 1918, is described in Eng. and Mining Journal, March 8, 1919.

The year ended March 31, 1917, was the company's most profitable year; since that time earnings have rapidly fallen. Demand ceased when the Armistice was signed and operations were cut to ⅓ normal.

JAMES ROBERTSON, LTD. **ONTARIO**

Succeeded by Kingdon Mining, Smelting & Mfg. Co., Ltd.

KENYON COPPER MINES, LTD. **ONTARIO**

Option on property of Massey Station Mng. Co. held in 1917, was not exercised. Company probably inactive.

KINGDON MINING, SM. & MFG. CO., LTD. **ONTARIO**

Office: P. O. Box 1704, Montreal, Quebec.

Officers: C. M. Robertson, pres.; J. J. Milne, sec.-treas.; A. G. Munich, man. dir.

Cap., $750,000. No bonded debt or liabilities.

Property: the Galetta or Kingdon mine on Chats island, in the Ottawa river, 5 miles E. of Amprior, Ont., formerly operated by Jas. Robertson, Ltd. The mine has a 10′ fissure vein in a fault fissure in schistose rocks. Ore is schist containing grains, clusters and crystal aggregates of galena in crystalline calcite and barite.

Development: by new shaft 300′ deep with over 600′ of work on No. 2 and 3 levels.

Equipment: includes a concentrator and a small lead smelter blown-in October, 1916, which was turning out 15 tons of lead daily at last accounts. There are 65 men employed under C. M. Thompson. (For geology, etc., see Trans. A. I. M. E. October, 1917, "Lead Mng. & Sm. at Galetta, Ont., by W. E. Newman.)

KING EDWARD MINE **ONTARIO**

Owned by J. S. Dobie and Mary C. Dobie, Thessalon, Ont..

Property leased to the National Mines, Ltd.

LA MINE D'OR HURONIA, LTD. **ONTARIO**

Address: Three Rivers, Quebec.

Officers: Chas. Lafond, pres.; P. V. Ayotte, v. p.; A. Lebrun, sec.-treas.; E. H. York, gen. mgr.

Property: 4 claims, 177 acres, in McVittie Twp. and in Gauthier Twp. Swastika district, Ont., Can., 18 miles from Dane, shows narrow quartz veins in greenstone cut by quartz-porphyry dikes.

Development: by 3 shafts, 102′, 75′ and 45′ deep, a 300′ tunnel and about 1,000′ of workings.

Equipment: includes 15-stamp mill and hydro-electric plant. Power is transmitted to the mine from the Goldfields mine at Larder Lake. The mill ran part of 1916, with a total gold production of $9,165. Operations were

resumed late in 1918. A new company, Argonaut Gold Mines, Ltd (q. v.), recently organized to take over the property, has reconstructed the mill.

MAPES-JOHNSTON SILVER MINES CO. **ONTARIO**

Dead, and property acquired by Brant Mines, Ltd.

MASSEY STATION MINING CO. LTD. **ONTARIO**

Office: 801 Dominion Bank Bldg., Toronto. Mine near Massey, Ont.

Officers: Wallace Nesbitt, pres.; S. H. P. Pell, v. p.; Britton Osler, sec.; preceding, with Robt. Means Thompson and Miss I. M. Innes, directors.

Inc. April 24, 1901, in Ontario. **Cap.,** $300,000; shares $100 par; non-assessable; fully issued. Company is said to have expended about $300,000 on development and equipment.

Property: 840 acres, crown granted, including 480 acres timber land, in Salter township, Sudbury district, about 3 miles from a railway.

Geology: the tract is covered by steeply dipping beds of quartzite and schist, crossed by a mineralized zone a mile long. This contains lenticular deposits of quartzose material containing disseminated particles of copper glance, bornite, and in depth chalcopyrite. The two lenses developed are 10′ wide, and the 50,000 tons of ore developed is said to assay 3 to .5% copper, with $1 to $2 gold per ton. See Lincoln, in "Eng. & Min." Jour." of August 4, 1917.

Development: by shaft 600′ deep and several levels. Also 150′ tunnel.

Equipment: includes a 200-h. p. steam and electric plant, with 2 Lidgerwood hoists, a 6-drill compressor and 15 buildings.

A 50-ton experimental mill was built, using the Elmore vacuum oil flotation process, with Blake and centrifugal crushers and 3 Jenckes and Wilfley tables was built ten years or so ago, but failed to make expenses. Property closed down in 1909 owing to failure of mill to make expenses.

Property was under option to the Kenyon Copper Mines, Ltd. (which see), at the beginning of 1917, but the property reverted to the owners. The ore can undoubtedly be treated by flotation methods, but needs development of larger reserves.

MATACHEWAN GOLD MINES CO. **ONTARIO**

Address: T. J. Flynn, mgr., Fort Matachewan, Ont.

Inc. Oct. 17, 1918, in Ontario. **Cap.,** $4,000,000.

Property: the Otisse gold mine in the Matachewan area, Ontario, on which work was resumed 1919, but 1,000′ of new work being done on the 170′ level and some ore found.. A new shaft was started at a point 1,000′ from the other one. All work save drilling was suspended in December.

McGUIRE KIRKLAND GOLD MINES, LTD. **ONTARIO**

Address: 157 Bay St., Toronto, Ont.

Inc. March 3, 1919, in Canada.

The prospectus issued by the company gives the charter but has very little other information. Original incorporators were Lena Adams, bookkeeper; Mary Winnifred Hunt, stenographer; K. A. McRae, engineer; Vera Marion Gray, teacher; Mabel Gray, teacher, and Edward Martin, inspector, all of Toronto. The first three are directors.

Company was organized to purchase 3 mining claims in Larder Lake district for 150,000 shares.

METALS CHEMICAL, LTD. **ONTARIO**

Address: Welland, Ont. J. H. Charles, mgr.

Inc. Jan. 3, 1918, in Ontario. **Cap.,** $1,000,000.

Operates a plant for the treatment of cobalt ores, near Welland.

Equipment: includes two blast-furnaces, two roasting furnaces, one reverberatory furnace, 22 leaching vats, 12 filter-presses, one crystallizing plant, 2 bag-houses. Electric power is used. Company employs 85 men. Output is silver, arsenic, oxides of cobalt and nickel, and various cobalt and nickel salts. No figures are available.

MILLER INDEPENDENCE MINES, LTD. **ONTARIO**

Address: Germantown, Ohio; and Boston Creek, Northern Ontario.

Officers: Geo. J. Miller, pres. and mgr.; Wm. Stroop, v. p.; Dr. Rettick,

treas.; with J. C. Shaexer, Geo. Ozios, Judge Brown of Dayton, Ohio, J. A. Read, Adam Begard, and Frank Groch, directors.

Inc. November 17, 1915, in Ontario. **Cap.**, $500,000; increased to $700,000 in 1918; par; 650,000 shares outstanding.

Property: 160 acres in the Boston Creek district.

Geology: the vein cuts through fine grained "pillow" lava and hornblende schist with a feldspar-porphyry dike on the hanging wall. The ore is white quartz, containing specks of pyrite, galena and telluride of gold. Reserves: not extensive but of good grade.

Development: by 400′ shaft to be developed to 600′ at last report. A new vein was cut on the 250′ level.

Equipment: includes a mill, recently enlarged to 75 tons daily capacity, using Grooch flotation unit, 5-drill compressor, 4 boilers, 2 hoists, etc. Electric power is used.

MOLYBDENUM PRODUCTS, LTD. **ONTARIO**

Address: Room 24, No. 34 Victoria St., Toronto. **Mine address:** Wilberforce, Ont.

Officers: W. J. L. McKay, pres.; J. L. Gray, sec.; with P. J. Dwyer, directors.

Property: purchased from American Molybdenite, Ltd., is at Wilberforce, Ont., said to have large body of ore, assaying 0.7% molybdenum, which is mined and treated in 200-ton mill.

MOND NICKEL CO., LTD. **ONTARIO**

Secretary's address and sales office: D. Owen Evans, 39 Victoria St., London, S. W., England. **Mine office:** Coniston, Ontario. **Refining works:** Clydach, Glamorganshire, Wales.

Directors: R. L. Mond, chairman; Bernard More, gen. mgr.; Sir E. J. Griffith, Saxton W. A. Noble, Sir Robert Hadfield, Emile S. Mond, Dr. Carl Langer, Robt. Mathias and Sir Edmund Walker, C. V. Corless, Canadian mgr.; Oliver Hall, mines supt.; A. Sharp, supt. Garson mine; J. F. Robertson, supt. of smelting works.

Inc. September 20, 1900, in Great Britain. **Cap.**, £3,400,000, including £500,000 in 7% cumulative pref'd shares; par £1; £2,000,000 non-cumulative 7% preferred shares of £1 par, and 900,000 common shares £1 par. Original capital, £600,000, increased July, 1908, to £850,000; in £500,000 cumulative 7% preferred shares, £5 par; £300,000 ordinary shares, £1 par, and £50,000 deferred shares, £1 par; totaled issued capital £750,000. Reorganized July 22, 1914, with authorized capital of £2,400,000, in shares of £1; 500,000 being in 7% cumulative preferred shares; 1,000,000 in 7% non-cumulative preferred shares, and 900,000 ordinary shares increased 1918 to present capital.

Dividends: 7% has been paid regularly on preferred shares; dividends on ordinary shares; 6% in 1905; 10% in 1906; 12½% in 1907; 15% in 1908, 1909 and 1910; 16¼% in 1911 and 1912; 21¼% in 1913; 35% in 1914; 20% in 1915 and 1916, on new capital; 20% less tax in 1917; interim of 1s per share. less tax; final of 3s per share free of tax in 1918; interim of 1s per share free of tax to May 1, in 1919.

Dividends: on former deferred shares were 18% in 1906; 33% in 1907; 48% in 1908, 1909 and 1910; 55% in 1911 and 1912; 85% in 1913.

Net profits: £111,320 in 1909; £114,107 in 1910; £140,803 in 1911; £146,650 in 1912; £191,047 in 1913; £248,088 in 1914; £285,282 in 1915; £306,460 in 1916; £327,248 in 1917; £531,845 in 1918. Reserve fund in 1918 was £450,000; cash balance £34,888.

Property: over 14,000 acres in the Sudbury district, and mining rights on about 12,000 acres near to and including Bruce Mines, about 29,000 acres in all. In the Sudbury district the Levack, Garson, Victoria, Worthington, Bruce copper-quartz mines are worked. The Blizzard, Frood Extension, Kirkwood and North Star are held in reserve. The Bruce mine is opened by several shafts producing quartzose-copper ore, used as flux in the converters.

Development: the Levack mine, purchased in 1913, is opened by a 5-compartment inclined shaft, 590′ deep, with 7 levels. In 1918, ore had been developed on 5 levels, and proved to a depth of 1,400′; reserves estimated at 6 to 8,000,000 tons of ore.

The Garson mine has a 3-compartment 1,000′ shaft. Diamond drilling has proved ore to 1,300′ depth.

The Victoria for a long time the company's chief producer is the deepest mine in Canada. At last accounts the 3-compartment shaft had reached the depth of 2,600; and was being sunk to 3,000′ depth.

The orebody at the Worthington mine, 750′ deep, is a mixture of very high-grade ore and rock, which is close sorted. The orebody is a brecciated basic dike and not typical of the Sudbury deposits. (For geology see Economic Geology, Vol. X, No. 6.)

The North Star shaft is 400′ deep. The Blezard mine was worked by open-pits.

The Frood Extension mine has a 4-compartment shaft, 1,000′ deep, levels at 400, 750, and 900′. The main orebody lies at 1,000′ depth. Work at this mine was stopped when the war started.

The copper-nickel ratio in the ore from these different mines varies widely.

Smelter: the 1,500-ton smelter at Coniston, Ont., 7 miles E. of Sudbury, was blown-in May 15, 1913. It has 4 blast furnaces, 50x240″, and 4 Pierce-Smith basic converters with shells 10′ in diameter and 25′ 10″ long. Ores are smelted in blast furnaces and matte bessemered to a rich matte containing 41% copper, 41% nickel, 17% sulphur, and less than 1% iron. This product is shipped to the company's refinery at Clydach, in Swansea Valley, South Wales, where the metals are separated and the nickel is refined by the Mond process.

Refining works: at the Clydach works the matte is dead-roasted and treated with dilute sulphuric acid, which permits the extraction of about 65% of the copper and 2% of the nickel. The residue, after drying, assays 45 to 60% nickel, and is treated in charges of 500 kgs. with water-gas, in a reduction tower, at a temperature of about 300° C. This tower has shelves and the ore is moved from shelf to shelf by automatic rakes, the lower shelves being cooled. After treatment in the reduction tower the charge is transferrd to a volatilizing tower and treated with carbon monoxide at a temperature of about 100° C. The residue therefrom is returned to the reducing tower and the charge goes forward and back between the 2 towers for 10 to 15 days, and when 60% of the nickel has been volatilized, as nickel carbonyl, the residue of the charge is returned to the roasting furnace. The nickel carbonyl is treated in a decomposing apparatus, wherein the metal is recovered in granules, assaying 99.4 to 99.8% nickel, and the copper is turned out as bluestone, of which the company markets considerable quantities for use in agricultural purposes.

All the Canadian plants are up-to-date and operated electrically by power from 3 hydro-electric plants, 2 of which are the property of the Lorne Power Co., a subsidiary of the Mond Nickel Co. The growth of the company's operations within the past several years has been phenomenal.

Production: the mine output for 1911 was 163,352 tons, 117,658 tons in 1912, 408,638 tons in 1915, 382,913 tons in 1918. Production is not reported, but unofficial estimates four years ago placed the annual output at about 4,000,000 lb. fine copper and 5,000,000 lb. nickel, with a possible maximum production of 10,000,000 lb. copper and 15,000,000 lb. nickel.

MURRAY-MOGRIDGE MINES, LTD. **ONTARIO**

Is a reorganization of the Murray-Mogridge Co. The shareholders of old company received 1,928,870 shares of new stock and New York interests took 200,000 shares, at $1 a share, the proceeds to be used to pay off all obligations and to give funds for the development. Reported in November, 1919, that $100,000 had been paid in.

Property: at Wolfe Lake, near Bourkes' Siding on the T. & N. O. Ry.,

has several gold quartz veins which have been under development by a 200′ and another 100′ shaft, for several years.

NATIONAL MINES, LTD. **ONTARIO**

Operating under lease, the King Edward mine, which see. Development underway at 1,000′ depth and flotation plant erected to treat ore and tailings. No recent information.

NICHOLS CHEMICAL CO., LTD. **ONTARIO**

Subsidiary of General Chemical Co.

Office: 222 St. James St., Montreal, Canada.

Officers: E. S. Pincott, mgr.; H. V. Smythe, mine supt.

Property: the Northern Pyrites mine on Vermillion Lake at North Pines, Ont., Canada, shows veins averaging 45′ in width for 1,000′ in length, with strike N. E. and dip 55° N. W. Mine said to have the largest pyrite deposit under development in Canada.

Equipment: includes 2-mile Leschen aerial tram, Lambert hoist, compressor and concentrating mill. Shipments to the United States are made via Graham on the Grand Trunk Pacific R. R. and the Great Lakes. Employs 130 men. Company does not publish financial or statistical reports.

About 95,000 tons of pyrite produced in 1915; 103,337 tons in 1918. Work resumed in Oct., 1919, after having been shut down. Reported in November, 1919, that an ore dock costing $100,000 would be built on the Mission River at Fort William, Ont., to handle the pyrites from North Pines, and also from the output of a pyrite property at Mokoman, 30 miles W. of Port Arthur.

NORTHERN PYRITES CO. **ONTARIO**

Property owned by the Nichols Chemical Co., which see.

ORE CHIMNEY MINING CO., LTD. **ONTARIO**

Office: 100 Clyde Block, Hamilton, Ont. **Mine office:** Northbrook, Frontenac county, Ont.

Officers: A. E. Fletcher, pres.; F. E. Misener, v. p.; O. E. Dores, sec.-treas.; preceding, with C. H. Siple, S. G. McKay, H. A. Baldwin, R. W. Thomas, Chas. Zinn and S. A. Fletcher, directors. W. G. Anderson, gen. mgr.

Inc. October 11, 1909, in Ontario. **Cap.,** $1,200,000, in 3,000,000 shares; par 40c, non-assessable. Increased April, 1918, from $600,000. Annual meeting, last Tuesday in October. The property was bought for 850,000 shares of stock.

Property: about 1,200 acres, in the Eastern Ontario mining district, 50 miles from Kingston and about 11 miles from Kaladar, the nearest C. P. R. R. station. Claims show conglomerate, quartzite and schist, reported to have a vertical interbedded, jasper vein, of the so-called "iron formation" 2′ to 18′ wide on the surface, with hornblende schist on the hanging to N. E. and conglomerate and quartzite to S. E., and a basaltic footwall. In 1918, company acquired the Big Dipper mines a gold property of about 1,240 acres.

Development: by 403′ shaft, with total workings of 2,000′. Crosscut at 400′ is reported to have disclosed a vein of sulphide ore carrying galena and chalcopyrite with gold-silver values.

Equipment: includes three 100-h. p. tubular boilers, two 1,000 cu. ft. compressors, a hoist, 20-stamp mill with amalgamating plates, tables and a magnetic separator. The mill capacity is about 200 tons a day. No ore was mined in 1918, as an electric plant was under construction.

ORE EXTENSION MINING CO., LTD. **ONTARIO**

Address: Vineland, Ont., Canada.

Officers: David Fretz, pres.-mgr.; S. Spiece, v. p.; Geo. Laws, sec.-treas., with J. O. Moore and S. R. Lupton, directors, at last report.

Inc. November 1, 1913, in Ontario. **Cap.,** $1,500,000; shares 50c par.

Transfer office: 354 Hudson St., Buffalo, N. Y. Annual meeting, 2nd Thursday in January.

Property: 167 acres at Northbrook, Lennox and Addington counties, Ontario, said to show gold-silver-lead-zinc-copper ore, in six veins, from a few feet to 40′ wide, in diorite and schist. Developed by a shaft 53′ deep. A prospect.

PARAGON-HITCHCOCK MINES, LTD. ONTARIO

Address: Collingwood, Ont., Canada. **Mine office:** Wabun, Ont.

Officers: Donald McKay, pres.; W. R. Hitchcock, v. p.; David Melville, sec.; W. T. Herrington, treas.; E. H. Hitchcock, C. W. Pitt, W. A. Hamilton, R. Fregehen, J. P. Welsh and T. R. Gilpin, directors.

Inc. February 12, 1917, in Ontario. **Cap.**, $1,100,000; shares $1 par; 200,000 issued, non-assessable.

Property: 4 claims in Tudhope Twp., Ont., near rail and 2 claims 4 miles away.

Geology: the Hitchcock property is a heavily-timbered, low-lying tract, with diabase showing as the only rock exposure. Four well-defined silver-bearing veins can be traced through this exposure, one of which is opened by a 200′ shaft, with a drift said to show native silver.

Reported October, 1919, that two drifts were being driven on the 200′ level of the Paragon shaft one of which showed native silver ore.

Equipment: boiler, steam hoist, and compressor, pump, and camp accessories.

PARRY SOUND COPPER MINING CO., LTD. ONTARIO

Office: 500 Germania Life Bldg., St. Paul, Minn. **Mine office:** Parry Sound, Ont.

Officers: Frank Johnson, pres.; Otto Monson, sec.-treas.; preceding, with John Ogren, A. Linderholm and F. X. Benning, directors.

Inc. March 23, 1899, in Ontario. **Cap.**, $5,000,000; shares $1 par; issued, $4,500,000. Liabilities are given at $45,000 floating indebtedness. Annual meeting, second Tuesday in August.

Property: the McGowan and Wilcox mines, 10 claims, 1,000 acres, one-half freehold and one-fifth held subject to a $3,000 mortgage, on the eastern shore of Georgian bay.

The Wilcox mine has 4 parallel veins in a width of about a quarter mile, with a 145′ shaft on a 20′ vein in granite-gneiss, traceable 1,000′, carrying auriferous and argentiferous bornite, assaying 2.8 to 11% copper. There also is an opencut, 20x150′, 18′ deep, showing 3% chalcopyrite ore.

The McGowan mine has shafts of 100′, 100′ and 250′, and a 150′ crosscut tunnel, showing bornite and occasional chalcopyrite, with quartz gangue. A smelter shipment of 240 tons of selected ore returned 17% copper and $5 per ton in combined gold and silver.

Equipment: includes a 10-stamp mill, hoisting machinery and several buildings. Idle, but management plans further work.

The Wilcox mine reported sold September, 1917, for $30,000. No later information.

PATRICIA SYNDICATE ONTARIO

Formerly the Boston Hollinger, is controlled by Chas. O'Connell and Montreal interests. The 80 acres at Boston creek has been under development since October, 1917. Main vein of bluish quartz said to be 2 to 4′ wide, and developed to a depth of 200′. Ore which is free-milling is said to assay $20 to $22 gold per ton, and is treated in a 40-ton mill with a 92% recovery, but has been idle during winter months due to lack of fuel.

PITTSBURGH & NORTHERN ONTARIO EXPL. & DEV. CO. ONT.

Head office: Toronto, Ont.

Cap., $100,000; par $10.

Company was incorporated about August, 1919. Details of organization and holdings not yet obtainable.

PROSPECTOR'S DEVELOPMENT CO., LTD. ONTARIO

Incorporated August 1919, by John B. Holden of Toronto; Harry Oakes, pres. of Lake Shore mine; H. H. Johnson, of the Tough-Oakes; Wm. Wright, and others.

Cap., $2,000,000; par $1. No promotion issued, all shares remaining in the treasury.

Company plans the systematic development of promising mining properties in Northern Ontario, aiding prospectors to do preliminary development.

R. A. P. GOLD MINING CO. **ONTARIO**

Head office: Toronto.

Cap., $2,000,000; par $1.

This company was incorporated about September, 1919, further details not available, but evidently a reorganization of the syndicate of same name, which sold part of its property to the Boston Creek Gold Mines Ltd., and was reported, 1918, to be considering a merger with that corporation.

RAPP MINING DEVELOPMENT & PROSPECTING CO. **ONTARIO**

Address: Boston Creek, via Krugersdorf on the Ont. Northern Ry.

Property: the original "find" at Boston Creek shows a gold-bearing quartz vein on which shaft has been sunk.

Equipment: includes hoist, compressor, etc. No recent information. See R. A. P. Co.

REEVES-DOBIE MINES, LTD. **ONTARIO**

Address: Marton H. Jacobs, Gowganda, Ontario.

Inc. June, 1917. **Cap.**, $2,000,000; $1 par.

Property: at Gowanda. Operated to 100′ depth with over 700′ of workings. Six men employed at mine, 1919, and a mill was to be purchased.

ROMINCO MINES CO. **ONTARIO**

Organized, 1919, to operate the Big Four group of claims in the Gowganda district of Ontario. Details not available, but the statements issued led to strongly unfavorable comment in a well-known mining journal.

SUPERIOR COPPER CO., LTD. **ONTARIO**

Office: Sault Ste. Marie, Ont. **Mine office:** Superior Mine, via Algoma Central Railway, Algoma, Ont.

Officers: G. R. Nicholson, pres.; C. H. L. Jones, v. p.; Emory W. Clark, sec. and treas., at last accounts.

Inc. September 13, 1901, in Ontario. **Cap.**, $3,000,000; originally $1,500,000; increased, 1903, to $2,000,000, and again July 29, 1907; shares $10 par; issued, $2,402,160. The company was organized with non-assessable stock, but a special act of the provincial parliament of Ontario rendered the stock assessable. Total assessments to December 31, 1910, were $132,080.52. Security Trust Co., Detroit, registrar and transfer agent. Annual meeting, second Thursday in June.

Property: 11 claims, crown granted, 800 acres, in an unorganized mining district of Algoma, shows granite and chlorite schist carrying fissure veins of 10′ and 70′ estimated average widths, traceable 7,000′. The quartz veins carry chalcopyrite with a little chalcocite, estimated by the management to average 4% copper, 1 oz. silver and 40c gold per ton.

Development: amounting to 1,233′, includes a 400′ shaft and 949′ tunnel with 5 shallow shafts, a 189′ tunnel and many surface cuts.

Mine is reported to show 4,000 tons of ore on the dump, with 140,000 blocked out, apparently a serious over-estimate.

Equipment: includes a 150-h. p. steam plant, 12-drill compressor, engine house, changing house, boarding house, machine shop, smithy, office, store and dwellings, and a 50-ton concentrator.

The mine has been idle since December, 1908.

SWEDISH-CANADIAN GOLD MINING CORPORATION **ONTARIO**

Address: Mine Centre, Northern Ontario.

Property: the Foley mine, 6 miles S. of the Canadian National Railroad, acquired in December, 1919.

Development: by 1,000′ of shaft work with 2,000′ drifts and crosscuts, is said to have developed a large tonnage of $14 ore.

Equipment: includes 20 stamp mill with cyanide plant; a 1,600′ aerial tram to be constructed early in 1920.

SYMMES-YOUNG SILVER MINES, LTD. **ONTARIO**

Head office: Toronto, Ont.

Cap., $2,000,000; par $1.

Company was incorporated in August, 1919, but details not yet ascertainable.

TASH-ORN MINES, LTD. **ONTARIO**

Office: 1009 Calvert Bldg., Baltimore, Md.

Officers: Jos. Castelber, pres.; L. H. Nachman, v. p.; L. B. Bernei, sec.; J. L. Orn, treas.

Inc. August 2, 1916, in Ontario. **Cap.,** $3,000,000; par $1; 2,454,929 shares issued. U. S. Corporation Co., New York, transfer agent. Listed on New York Curb.

Property: at Tashota and Kowkash, Ont., where the discovery of rich gold ore in 1917, was followed by a boom.

TAYLOR MOLYBDENITE MINE **ONTARIO**

Property in Renfrew county is owned and operated by A. M. Taylor, who has shipped ore that assayed 5.3 to 6% molybdenum. A concentrator treats the lower grade ore making an 86% product, with a 92% recovery.

THREE STAR MINING CO. **ONTARIO**

Reported in 1918, to be developing the property formerly worked by the Calumet & Montana Cons. Mining Co., which see. No recent information.

THUNDER MINING CO., LTD. **ONTARIO**

Address: Dominion Reduction Co., Cobalt, Ont. Julius Cohen, mgr.

Inc. October 7, 1916, in Ontario. **Cap.,** $2,000,000; shares $1 par; 1,610,000 issued. Entire capitalization owned by the Dominion Reduction Co. (66%), Kerr Lake Mining Co (22%) and Wettlaufer-Lorrain (12%).

Property: the St. Anthony Gold Mining Co.'s ground at Sturgeon Lake, Ont. Considerable development was done and ore milled in 1918.

TIP TOP MINE **ONTARIO**

Address: Col. S. W. Ray, owner, Port Arthur, Ont. Mine near Kashaboiwe, Thunder Bay district, Ont.

Property: 4 claims, freehold, 336 acres, 6 miles by rail S. W. of Kashaboiwe station, Canadian Northern railway. The claims are near Round Lake, and show schist quartzite and greenstone of Keewatin age, cut by quartz porphyry dikes. The ore occurs in lenses 5 to 40′ wide, in the felsite and quartz porphyry. One body of chalcopyrite and pyrite ore, stoped for 8 to 25′ wide and 70′ long, yielded 4,000 tons of ore said to have averaged 5.3% copper.

Development: by 208′ incline shaft, dipping 70° N. with workings on 4 levels. This work is estimated to show 45,000 tons of ore, of 4 to 6% copper.

Equipment. includes a 150-h. p. steam plant, with 50-h. p. hoists, and a 6-drill air compressor. See Ontario Bureau of Mines Report, 1911, p. 209. Idle in 1918 and 1919.

TISDALE GOLD MINING CO., LTD. **ONTARIO**

Inc. October, 1910, in Ontario. **Cap.,** $500,000 shares $5 par. See Dobie Mines, Ltd.

TWO LAKES COPPER MINING CO., LTD. **ONTARIO**

Idle. **Office:** Oil City, Pa. **Mine office:** Sowerby, Algoma, Ont.

Officers at last report: Dr. E. L. Dickey, pres.; S. F. Amsler, v. p.; D. G. Bailey, sec.; J. C. Wilkins, treas.; F. W. Bailey, gen mgr.; preceding, with J. W. Russell, C. W. Coulter, G. W. Freeman and Edw. Schwabenbake, directors.

Inc. October 12, 1906, in Ontario. **Cap.,** $500,000; shares $1 par; non-assessable; issued, $270,000. Annual meeting, first Tuesday in November.

Lands: 8 claims, 1 fractional, 300 acres, freehold, including the Robinson and Tupper mines, 8 miles from Thessalon, and 4 from a railway. The property shows pre-Cambrian slate, conglomerate and greenstone, carrying a number of fissure veins, 3 of 2 to 10′ estimated average width, carrying

sulphide ores of about 4.5% copper, with small quantities of silver and gold.

Development: by shafts of 50′, 25′ and 10′.

Equipment: includes a 60 h. p. boiler and 35 h. p. hoist. At last reports the management was planning further development as soon as the financial situation improved, but is apparently still adhering to a once popular "watchful waiting" policy.

WACHMAN MINING CO., LTD. **ONTARIO**

Office: Dryden, Ont. **Cap.,** $500,000.

Company was organized in 1918, by Robert Wachman, 4439 So. Michigan Bldg., Chicago, Ill., to acquire 2,100 acres of mineral lands at Contact bay, Vermillion lake.

Main vein of tract is said to be traceable 2,640′, and to show silver and free milling gold ore for a length of 400′.

In November, 1919, 60 men were employed in building camps and sinking, as company planned sinking three 800′ shafts during the winter, and erection of a 20-stamp mill.

WASAPIKA GOLD MINES, LTD. **ONTARIO**

To be reorganized in 1920 with capital of $6,000,000; $1 par.

Address: Isbell, Plant & Co., Standard Bank Bldg., Toronto, Ont.

Cap., $1,000,000; shares $1 par. Listed on New York Curb as a prospect.

Officers: Geo. R. Rogers, pres. and mgr.. F. M. Connell, v. p.; with J. Lahay and Geo. A. Young, directors.

Property: the Ribble claims, 120 acres and 3 more optioned (1919), near Wasapika lake, West Shining Tree district, in the Sudbury division, Ont., 25 miles from rail. Examined in March, 1917, by G. R. Rogers, who reports the main vein to lie between andesite and rhyolite porphyry. Ore is gray quartz impregnated with iron pyrite, with some free gold. The vein exposed for 1,800′, "averages 5 ft. 1 in." in width; a 7′ width sampled in shaft at depth of 50′ assayed $11.20. R. E. Hore, says: the quartz veins in the Wasapika are narrow, a foot or two being a good width, but the ore is not all vein quartz, but largely silicated rock. The Ribble or main vein is developed by a shaft 200′ deep, sunk in the hanging wall, the showing on the 100′ level warranted sinking shaft to 200 feet. A 150-ton mill is planned.

WEST TREE MINES, LTD. **ONTARIO**

Officers: Senator Geo. W. Fowler, pres.; C. S. Corson, v. p.; Gidson Grant, sec.-treas.; with W. D. McKay, W. J. J. Butler, Geo. R. Rogers, and A. E. Way, directors.

Inc. in Ontario. **Cap.,** $3,000,000; par $1; treasury 1,000,000 shares. Dealt in on New York Curb, shares sold 15c low (November), 37c high, June, 1919.

Property: 4 claims, 183 acres, in Macmurchy Twp., Sudbury district, Ont., adjoins Wasapika Mines, 60 miles S. of Porcupine district. Prospectus issued states that there are 15 veins on the property, all with free gold showing in the quartz.

Development: three 50′ shafts, with 10,000′ of stripping. Shaft sinking in progress October, 1919.

Property: is an attractive prospect that requires further development to prove its real value.

WHITE RESERVE MINING CO., LTD. **ONTARIO**

Address: 802 Lumsden Bldg., Toronto.

Officers: J. A. McAndrews, pres. and mgr.; A. E. Marks, v. p.; with S. B. Playfair, directors, Dan McDonald, supt., Cane P. O., Ont.

Inc. June 17, 1914, in Ontario. **Cap.,** $1,000,000; par $1; outstanding 700,000 shares. Traded on Toronto exchange. Shares sold at 20c, 1919.

Property: 3 claims, 2 patented, 130 acres, in Twp. of Whitson, Maple Mt. district, and 40 acres, in Twp. of James, both said to show fissure veins in diabase; silver, cobalt and nickel ore, occurs in shoots of variable size and with a wide range of value.

Development: several shafts, deepest 140', and total workings of 1,000'. No ore is mined as work is confined to development and exploration in order to block out ore reserves.

Equipment: includes an I-R hoist, and a 9-drill compressor.

COBALT DISTRICT.

ADANAC SILVER MINES, LTD. ONTARIO

Office: Excelsior Bldg., Toronto. **Mine address:** Cobalt, Ont., Can.

Officers: R. A. Cartwright, pres.; Alex. Faskin, v. p.; M. R. Cartwright, treas. and managing director; with E. M. Campbell, and C. L. Sherrill, directors; Jas. Aitcheson, sec.

Inc. March, 1915, in Ontario. **Cap.,** $3,000,000; $1 par.

A merger with the Victory company to form a $3,000,000 corporation, Adanac to get $1,000,000 in shares, will take place in 1920.

Property: in Coleman Twp., Cobalt district, Ont., adjoins the Temiskaming, showing smaltite, niccolite, and a little silver.

Development: by 400' shaft. Work now concentrated on 310' level, where high-grade ore was found. Diamond-drilling from the 310' level was commenced in December, 1919. Property is in the prospect class.

ALADDIN COBALT, LTD. ONTARIO

Liquidators: Frank F. Fuller, sec., 638 Salisbury House, London Wall, London, E. C., England and R. Simpson, Toronto. **Mine address:** Cobalt, Ont.

Directors: D. H. Herbert, chairman, Lt. Col. Chas. Gold, Capt. C. R. E. Jorgensen, and S. B. Peech.

Registered April 23, 1913. Acquired all the capital of the **Aladdin Cobalt Co., Ltd.,** registered in Canada with a capitalization of $500,000, shares $5 par. Canadian shareholders received 5 fully-paid £1 shares for every two $5 shares held. Controls Chambers Ferland Co.

Cap., £500,000; shares £1 par; 499,993 shares issued. Stock is to be listed on Toronto Exchange. Balance sheet for fiscal year ending April 30, 1916, shows expenditures, £12,432 and a deficit of £28,758.
$5 shares held.

Chambers Ferland Co.

Address: 58 Wellington St., Toronto.

Inc. 1908 in Ontario. **Cap.,** $2,500,000; par $1. Is practically an operating subsidiary of A. C. Co., Ltd.

Company to be absorbed by Kirkland Lake Prop. Ltd. in 1920, shareholders given 7 Aladdin shares for 2 K. L. Prop., i. e. 100 Aladdin shares entitle holder to 28 4/7 new company shares, the fraction payable in cash amounting to 20 shillings.

Aladdin Cobalt Co., Ltd.

J. A. McVichie, mgr.

Dividends: ½% January 24, 1916; 2% February 28, 1917, none reported since. The total is $48,000.

Property: the Chambers Ferland mine at Cobalt, Ont., supposed to have the extension of the Nipissing vein system. Company also controls the Burnside property at Kirkland Lake. The Chambers-Ferland had 125 acres, but in December, 1919, sold 23 to the Northern Concentrator Co.

Ore: silver in veins of calcite. Property supposed to have good chances of becoming a large producer, but the output has been comparatively small.

Development: work on the whole had been disappointing up to 1918, when 1,300' of work on the 275 and 425' levels was done, opening $150,000 worth of new ore.

Equipment: new equipment installed includes double-drum hoist, 125-ton crusher, 125-h. p. boiler, ore bins and an ore house with engine.

Production: for fiscal year ending April 30, 1916, amounted to 72,363 oz. Estimated production from May 1, 1916, to September 30, 1916, amounted

to 390,523 oz. In 1918 the yield was 107,445 oz. from 3,175 tons of 18.3 oz. ore and 40 tons of high-grade ore. Shipping steadily to Northern Customs Concentrator in 1920.

BAILEY COBALT MINES, LTD. **ONTARIO**

John L. Woods, pres.; Floyd Weed, supt.

Inc. August 15, 1906, in Ontario. **Cap.**, $5,000,000, shares $1 par. Trust & Guarantee Co., Ltd., Toronto, Can., transfer agt. and registrar. In 1914 company, being deply in debt, including about $90,000 owing to E. A. Benson, former president, a permanent liquidator was appointed. A Protective Committee was formed by Buffalo stockholders to guard their interests. It is said that E. A. Benson, former president, and other promoters issued 4,250,000 shares of stock to themselves, retaining 750,000 in the treasury for financing the property. This promotion stock, it is claimed, was disposed of, and the treasury stock remained unsold, with the foregone result of such practice. Company now in hands of liquidators.

Reorganization Committee: because of the bankrupt condition of the company and appointment of liquidators by Supreme Court of Ontario, the following consented to act as a committee and prepare the plan for reorganization: Albert G. Wheeler, Jr., chairman; Wm. E. Stevenson and H. S. Langdon, with Walter Laier, sec., 22 William St., New York. Lawyers' Title Insurance & Trust Co., New York, is depositary.

Reorganization plan: as finally worked out, provides that the liquidators transfer the Bailey mine and its assets to a new company, to be known as the Bailey-Northern Customs, Ltd. Holders of existing stock consenting to plan shall receive one share of new stock for each ten shares of old. The capitalization of the new company to be $1,250,000, with $50,000 in the treasury.

The proceedings brought by the Protective Committee of Buffalo against the former directors of the Bailey Company in Canada resulted in a default judgment being obtained against all of the directors who are Americans. The Buffalo committee requested the liquidators to institute like proceedings in the United States.

Judgment obtained by E. A. Benson for the $90,000 due him was purchased by the Profit Sharing Construction Co. of New York and the Reorganization Committee, headed by A. G. Wheeler, Jr., negotiated with the Profit Sharing Construction Co. as the owner of the judgment, for the purpose of bringing about a reorganization. The Buffalo Protective Committee opposed this action, which is responsible for the delay.

Property: 38 acres, adjoining the Penn Canadian mine in Coleman Twp., Nipissing district. Several veins have been opened up, from which shipments have been made at different times. Developed by shaft. Lowest workings on the fifth, or 280′ level. In 1913 underground work totaled 1,370′.

Property in charge of caretaker since 1914.

Ten years of litigation was settled in favor of majority shareholders, February, 1920.

BAILEY-NORTHERN CUSTOMS, LTD. **ONTARIO**

Recently incorporated to operate the property of the Bailey Cobalt Mines, Ltd., which see.

BEAVER CONS. MINES, LTD. **ONTARIO**

Lumsden Bldg., Toronto, Ont. **Mine office:** Cobalt, Ont.

Officers: F. L. Culver, pres.; F. C. Finkenstaedt, v. p.; H. E. Tremain, sec.-treas.; preceding officers, Wm. T. Mason, F. L. Lovelace, W. E. Stevenson, F. B. Mercer and H. L. Churchill, directors; L. W. Ledyard, supt., c/o Beaver Mine, Cobalt.

Inc. February, 1907. **Cap.**, $2,000,000; shares $1 par, fully paid, all issued. Union Trust Co., Toronto, and Security & Registrar Co., New York, transfer offices. Annual meeting in April. Stock listed on Toronto Stock Exchange.

Comparative General Balance Sheet, years ending February 28:

Assets.

	1919	1918	1917
Cash	$29,198	$15,702	$151,890
Supplies	20,049	24,733	15,255
Ore and bullion on hand	34,096	54,355	63,876
Beaver Aux. Mines, Ltd., stock	143,250	143,500	143,500
Kirkland Lake Gold Mining Co.	370,958	398,940	88,698
Beaver Mine	1,000,000	1,000,000	1,000,000
Buildings and timbering	93,984	89,990	83,577
Plant and equipment	118,861	118,561	118,976
Development	82,934	82,934	82,934
Discount on shares	863,973	863,973	863,973
Other	315,384	105,306	168,140
Total	$3,072,687	$2,897,994	$2,780,819

Liabilities.

	1919	1918	1917
Capital stock	$2,000,000	$2,000,000	$2,000,000
Depreciation	141,515	130,241	118,376
Profit and loss balance	901,645	744,276	639,822
Accounts payable, etc.	29,527	23,477	22,621
Total	$3,072,687	$2,897,994	$2,780,819

Ore sales, actual, were $341,380 in 1918; $295,878 in 1917; $423,587 in 1916.

Dividends: $60,000 in 1914; $120,000 in 1915; $60,000 in 1916; none since 1916. The total is $650,000.

Property: 2 claims, patented, 60 acres, in Coleman Twp., Cobalt district, adjoining the Temiskaming mine, and 120 acres, James Twp.; also owns approximately 7/8 of entire stock of Kirkland Lake Mining Co., Teck Twp., which see, and a ¾ interest in the Beaver Auxiliary Mines Co.

Ore: silver, cobalt, and arsenic in narrow calcite veins, in diabase and the Keewatin formation. Ore occurs as high-grade in pockets and shoots, or as milling ore.

Development: by 1,650′ vertical shaft, which encountered the diabase-Keewatin contact at a depth of 1,570′. During 1918, underground work totaled 1,441′, compared with 4,952′ in 1917. Naturally, war conditions prevented normal working.

The high-grade ore on the 1,600′ level was the deepest occurrence of such ore at Cobalt. In 1919, management reported that high-grade ore had been found on the 200, 600 and 700′ levels.

Equipment: includes a 150-ton concentrator, giving an extraction of about 80%, blacksmith shop, dwellings, etc.

Production:

Year	Tons Milled	Tons Concts.	Oz. Ag. in Concts.	Total Oz. Ag. Prod.	Earnings
1918	.....	...	.....	385,043	$393,386
1917	.....	...	.....	372,973	354,341
1916	34,766	394	340,549	566,964	499,690
1915	30,093	474	349,900	746,310	351,124
1914	26,724	348	415,707	900,000	158,465
1913	25,256	324	379,764	762,699	168,630

In December, 1919, the president stated that the net profit was between $2000 and $3000 daily.

BRANT MINES, LTD. **ONTARIO**

Address: W. M. Macdonald, mgr., Gowganda, Ontario.

Officers: J. C. Cohoe, pres.; E. L. Goold, v. p.; O. Hall, sec.-treas.,

with F. L. Mapes, W. H. Whittaker, C. W. Leeming and C. H. Waterous, directors.

Inc. 1917, in Ontario. **Cap.**, $1,500,000; shares $1 par; 1,000,000 issued.

Property: 87 acres, formerly owned by the Mapes-Johnston Silver Mines Co., in Meickle township, Silver Lake district, and near the Miller Lake-O'Brien mine.

Development: by 350′ shaft and other workings. On 320′ level, ore assaying 2,000 oz. silver per ton was reported as being mined.

Equipment: includes hoist, compressor, machine-drills, and accessories.

Shares quoted at 57c early in Nov., 1917. No recent information.

BUFFALO MINES, LTD. **ONTARIO**

Office: 14 Wall St., New York. **Mine office:** Cobalt, Ont., Canada. Is a subsidiary of Mining Corporation of Canada.

Inc. 1906. in Ontario. **Cap.**, $1,000,000; shares 75c par; reduced, 1918, to $500,000, 50c par. Planned Nov., 1919, to reduce capital to $150,000, 15c par. Listed on Toronto Exchange. U. S. Mortgage & Trust Co., transfer agent. Transfer offices: Imperial Trust Co., Toronto, and U. S. Mortgage & Trust Co., New York. Registrar, Imperial Trust Co., Toronto. Annual meeting in June.

The Buffalo has been one of the largest producers in Cobalt, its yearly output having been as much as 2,000,000 oz. While the greater part of the high-grade ore has been mined, a large tonnage of low-grade ore is left, which can be worked at a good profit. Nov., 1919, control (70%) of company was purchased by the Mining Corporation of Canada.

Income Statement, years ending April 30:

	Total Income	Net	Dividends	Surplus	Total Surplus
1920	.....	.....	$350,000	.....	.....
1919	$674,678	$171,239	.....	.....	$636,194
1918	831,286	264,282	.....	.....	687,240
1917	...376,465	36,583	.....	.....	669,177
1916	439,757	231,344	.....	230,920	610,889
1915	372,260	79,690	50,000	27,158	379,968
1914	858,825	386,990	660,000	270,218*	352,810
1913	1,258,864	891,193	650,000	233,450	623,028

* Deficit.

Balance sheet for year ending April 30, 1919, showed assets of $1,189,262, which includes cash, ore and bullion, $430,249; U. S. and Canadian bonds, $75,000; plant and equipment, $154,372; mining rights, $407,092. Liabilities include notes and accounts payable, $32,146.

Property: the Buffalo mine with 40 acres of ground in the town of Cobalt.

Development: by vertical shafts with 21,916′ of drifting on veins and stope work at 3,670,242 cubic feet.

Ore reserve on May 27, 1919, was 20,600 tons of broken ore in the stopes, assaying 11 oz. Milling ore is not developed for measurement, but with the broken ore will give about one year's mill supply. There are also 33,000 tons of tailings assaying 6.5 oz. per ton.

Production, years ending April 30:

Year	Tons Milled	Oz. Ag. per ton	% Rec.	Tons Cyanided	Oz. Ag. per ton	% Rec.	Total Product Oz. Ag.
1919	30,572	.....	.....	.....	.....	.....	625,786
1918	28,481	.....	.....	.....	.....	.....	767,740
1917	14,452	.....	.....	3,038	.....	.....	394,587
1916	30,079	19.80	.....	8,078c	25.46	.....	684,274
1915	51,667	19.50	72.22	8,385	9.86	82.26	822,791
1914	77,616	25.31	76.14	13,388	10.13	77.80	1,637,809
1913	55,783	45.83	82.64	10,320	15.45	74.70	2,235,853

In year ending April 30, 1919; the mill also treated 77,239 tons of sand tailings; in 1918, 88,534 tons; in 1917, 35,507 tons.

(c) Treated by flotation, not cyanidation.

CANADIAN MINING CORPORATION, LTD. **ONTARIO**

Liquidator: V. Layman, Balfour House, Finsbury Pavement, London, E. C. England.

Company, at last account, was in process of voluntary liquidation, shareholders to receive for each £1 share, a fully paid $5 share of the Mining Corporation of Canada, which see.

Dividends: 2½% Nov. 25, 1914; 2½% March 31, 1915; 2½%, interim, Oct. 14, 1915.

CARIBOU COBALT MINES CO. **ONTARIO**

Offices: 61 Broadway, New York, and Cobalt, Ont.

Officers: Herman Cook, pres.; F. M. Loper, v. p.; E. H. Westlake, sec.-treas., with J. H. Sussman and Sam A. Lewisohn, directors.

Inc. September 29, 1913, in Maine. **Cap.,** $1,000,000; shares $1 par, all outstanding, of which 837,498 shares were owned by the Kerr Lake Mining Co., Aug. 31, 1915. Listed on New York Curb. The Caribou Cobalt Mines Co. owns the entire capital stock of Cobalt Comet Mines, Ltd., which is the operating company. Dividends to April, 1917, totaled $175,000.

CART LAKE SILVER MINES, LTD. **ONTARIO**

Idle. No recent information.

Operated the Gould lease on Cart Lake during 1914 with a production of 150,000 oz. silver. Production for 1915 not available. Ore came from the extension of the Seneca-Superior vein.

Development: in 1914 amounted to 1,003'. No. 2 shaft is 195' deep with 400' of workings on the 185' level, at last accounts.

CASEY-COBALT MINING CO., LTD. **ONTARIO**

Office: Balfour House, Finsbury Pavement, London, E. C., Eng.

Officers: Col. Sir A. C. F. Fitz-George, chairman of directors; R. F. Eden, sec.

Inc. in April, 1917, in England, to acquire 99,995 fully-paid shares of $1 each, being the entire issued capital, with the exception of 5 shares of the Casey Cobalt Silver Mng. Co., Ltd., of New Liskeard, Ont. Consideration was 199,993 in fully-paid shares, vendors agreeing to provide £15,000 working capital. **Cap.,** £244,950; par £1. Company paid total dividends of $203,249 to end of 1914.

Balance sheet for 1918 showed total assets of £245,995, which included, aside from the Casey Cobalt Silver investment, cash £682.

CASEY-COBALT SILVER MINING CO., LTD. **ONTARIO**

Head office: 15-20 Traders Bank Bldg., Toronto. **Mine office:** New Liskeard, Casey Township, Ont.

Officers: W. R. P. Parker, pres.; J. P. Watson, v. p., with G. M. Clark, Capt. R. E. G. van Cutsem and Lieut. Graeme Watson, directors. John W. Shaw, mine engr. Company controlled by the Casey Cobalt Mng. Co., Ltd.

Property: originally 40 acres in Harris Twp., and the Casey-Cobalt mine in Casey twp., 9 miles N. E. of New Liskeard. In 1918 practically all work was done on the property of Casey-Harris Mining Co., Ltd., of which company Casey Cobalt Silver Mining Co. owned a half interest. Since 1918 all the available ore of the two properties has been milled and operations have ceased. The only work now being done is on the property of the Harmak Mining Co., which lies S. of the Casey. Operations are charged for at cost, the Casey company to receive 10% of the Harmak Company profits for a number of years.

Equipment: includes hoist at 375' shaft, compressor and mill erected in 1918.

CASTLE MINING CO. **ONTARIO**

Property operated by Trethewey Silver-Cobalt Mine, Ltd.

CHAMBERS FERLAND MINING CO., LTD. **ONTARIO**

See description under Aladdin Cobalt, Ltd.

COBALT COMET MINES, LTD. **ONTARIO**

Office: 61 Broadway, New York, and Cobalt, Ont. Same officers as

Caribou Cobalt Mines Co., which company owns the entire capital stock of Cobalt Comet Mines, Ltd.

Inc. April 16, 1913, in Ontario. **Cap.**, $1,000,000; shares $5 par; all outstanding. Annual meeting, 2nd Thursday of Feb.

Property: 2 part claims, patented, in Coleman Twp., Temiskaming mining district, formerly known as the Drummond mine.

Ore: Fissure veins, contain shoots of variable widths of rich silver ores whose minerals are native silver and cobalt-nickel sulpharsenides.

Development: by two shafts, 100′ and 200′ deep.

Equipment: includes an air hoist, electric pump, compressed air and electric power.

Production: Practically all ore in sight has been removed and future earnings depend on further discoveries of ore. Low-grade ore is treated by the Dominion Reduction Co.; high-grade ores are shipped. Mine yielded 203,777 oz. in 1916. No recent production reported.

COBALT PROVINCIAL **ONTARIO**

Cobalt, Ont. Adjoins Nipissing. Reopened Sept., 1917, by John Redington, who is sinking a shaft on a vein at S. W. end of tract. Reserves estimated at 148,000 oz. silver. At last account, July, 1919, was planning to increase mill capacity to 100 tons daily. Stock formerly listed on New York Curb.

COBALT REDUCTION CO., LTD. **ONTARIO**

See Mining Corporation of Canada, Ltd.

CONIAGAS MINES, LTD. **ONTARIO**

Offices: St. Catherines, Ont., and Cobalt, Ont.

Officers: R. W. Leonard, pres. and gen. mgr.; Alex. Langwell, v. p.; with R. P. Rogers, F. J. Bishop, R. L. Peek, F. D. Reid and W. D. Woodruff, directors; J. J. Mackan, sec.-treas.

Inc. November 24, 1906, in Ontario. **Cap.**, authorized and outstanding $4,000,000; $5 par. Toronto General Trusts Corp., transfer agt. Annual meeting in December. Listed on Toronto Stock Exchange and New York Curb. Share prices $1.45 low, $3.67 high 1918; $2.40 low, $3.15 high 1919.

Owns 2,495 shares of the $100 stock of the Coniagas Reduction Co., Ltd., which handles this company's product; also 137 preferred and common 137 shares, par $100, of Elec. Steel & Eng. Co., Ltd. Company has $700,000 in Canadian Victory Loan bonds.

Income Account, Fiscal Years Ending October 31:

Year	Gross income	Net income	Dividends and bonuses	Surplus for year
1919	.....	.....	$100,000(c)	.....
1918	$1,017,212	$610,045	500,000	$25,045
1917	1,065,745	641,334(a)	300,000	.....
1916	1,192,424	840,791	600.000	240,791
1915	1,013.513	658,730	600,000	58.730
1914	1,407.877	968,387	1,320,000	351,613(b)
1913	2,186.664	1,693,583	1,640,000	53,583
1912	2,172,967	1,676,953	1,440,000	236,953

(a) Before providing for business profits, war tax, or income tax. (b) deficit. (c) Feb. 1, 1920.

Balance sheet as of Oct. 31, 1918, showed assets, $5,786,702, which includes Coniagas mine, $3,985,700. Agaunico mine, $3,655; Maidens McDonald property, $72,000; Montgomery Maiden property, $65,000; machinery, plant, buildings and real estate, $132,049; Coniagas Reduction Co., Ltd., stock, $249,400; cash in bank and on hand, $553,767; accounts receivable, $510,206, which includes ore account, $458,773, and general $50,582. Liabilities include surplus of $1,533,326. At end of Oct., 1919, current assets were $652,838, and liabilities $204,092. Reserve for depreciation was $255,000.

Dividends: to 1919, company had distributed $9,240,000, of which $7,200,000, or 180% of capital, was paid as dividend, and $2,040,000, or 51%, as bonus.

Property: the Coniagas mine, 40 acres on the townsite of Cobalt, Coleman Twp. In 1915 the company purchased 198 acres of Lot 15, Con. 1, Bucke Twp., known as the Agaunico mine, in which considerable development work was done a few years ago on a promising vein of cobalt and nickel ore. No work is now being done save on the Ankerite property in Deloro Twp. The Coniagas mine contains a large number of small but very rich veins carrying silver with small amounts of nickel, cobalt and arsenic. Bought Maidens McDonald property, adjoining the Ankerite, for $20,000 in September, 1917.

Development: totaled 33,735′ of underground workings on October 31, 1918. New work for year ending Oct. 31, 1918, amounted to 1689′. Development work was confined to following small stringers and exploration on all levels and driving numerous crosscuts through unexplored ground. No important new orebodies were developed during the year, though considerable tonnage of low-grade ore was disclosed.

Ore reserves: management states that extent of low-grade ore is very difficult to determine, but estimates of F. D. Reid, mine engr., indicate that a 3-year supply is available. The company also has 155,000 tons of tailing sand and 40,000 tons of slime tailings which contain 782,900 oz. of silver.

Equipment: complete, including a 60 stamp mill handling 160 tons daily and a cyanide plant, built to treat about 6 tons daily of low-grade concentrate from canvas tables and the decomposed gouge from the mine, but shutdown in November, 1917, as canvas tables were discarded and Callow flotation cells substituted.

During year ending Oct. 31, 1918, mill treated 68,597 tons ore, or an average of 3.38 tons per stamp per 24 hours, compared with 60,929 tons, an average of 3.07 tons per 24 hours for the previous year. Mill heads average 15.94 oz. silver per ton, compared with 18.56 oz. for the previous year, and 25.76 oz. the year before that.

In 1918 a total of 529 tons concentrate was shipped that average 1164 oz. silver per ton, and 867 tons of low-grade slime of 244.8 oz. per ton.

The number of men employed in mine and mill is about 100.

Production, years ending October 31:

Year	High-grade ore, tons	Tons Concts.	Cost per Oz. silver Cts. (a)	Cts. (b)	Ounces Silver	Price, Oz. Silver Cts.
1919.....	...	.....	.....	....	940,267	106.00
1918.....	63	1,396	33.87	7.98	824,264	94.14
1917.....	124	742	21.36	4.31	1,344,267	79.89
1916.....	193	648	15.24	4.27	1,773,286	63.11
1915.....	267	607	13.62	3.25	2,002,053	49.25
1914.....	485	688	12.44	3.58	2,497,394	56.75
1913.....	735	1,034	8.76	4.32	3,252,566	60.55

(a) includes all expenses except shipping, smelting, refining and marketing charges which are under (b).

Total production of mine to Oct. 31, 1918, amounted to 26,254,260 oz.

Ore and concentrates are treated by the Coniagas Reduction Co., Ltd., which see below.

Coniagas is one of the big producers of Cobalt, having yielded over 26,000,000 oz. of silver and paid $9,240,000 in dividends and bonuses in 13 years.

Coniagas Reduction Co., Ltd.

Entire stock issue owned by the Coniagas Mines, Ltd., except 6 shares issued to directors to qualify.

Inc. in Canada. **Cap.,** $250,000; shares $100 par.

Owns a smelter and refinery at Thorold, Ont. R. L. Peek, supt.

During fiscal year ending Oct. 31, 1918, company shipped 2,390,737 oz. silver, and treated 2282 tons ore, dry weight. Company produces silver, arsenic, and the oxides of cobalt and nickel.

CROWN RESERVE MINING CO., LTD. ONTARIO

Offices: Dominion Express Bldg., Montreal, Quebec, 18 Toronto St., Toronto, Ont.; and Cobalt, Ont.

Officers: John W. Carson, pres. and man. dir.; W. I. Gear, 1st v. p.; J. G. Ross, 2nd v. p.; C. A. Smart, J. W. Ross, A. G. Gardner, R. W. Reford, F. S. Meighen, Ziba Gallagher, and C. C. Dickson, directors; Jas. Cooper, sec.-treas.; John Reid, asst. sec.-treas.; S. W. Cohen, con. engr.; H. W. Darling, field engineer.

Inc. January 16, 1907, in Canada. **Cap.**, $2,000,000; $1 par; outstanding, Jan. 1, 1918, $1,999,957, of which $231,143 is held by trustees for the benefit of the company and bears no dividends. Crown Trust Co., Montreal and Toronto, transfer office and registrar. Annual meeting, fourth Wednesday in January. Listed on Montreal Stock Exchange. Dealt in on Toronto Exchange and on New York and Boston curbs. High 60c. low 25c. in 1919; 31 high, 16½c. low in 1918.

Dividends: 20% in 1908; 71% in 1909; 60% in 1910-12; 48% in 1913; 24% in 1914; 8% in 1915; 5% in 1916; total dividends to Jan. 1, 1917, $6,190,849, or 335% on the outstanding capital. None paid in 1917 or 1918.

Balance sheet for 1918 showed assets of $2,551,580, which includes mining lands, plant and equipment, $2,030,369; supplies, $3,339; ore in transit and on hand, $31,976; cash, $74,578; investments in other companies and properties, $391,002; accounts receivable, $20,316. Liabilities showed accounts payable, $3,916; and surplus of $547,707.

Income Account Essentials—years ended December 31:

	Ore Sales	Oper. Exp.	Net Earnings	Other Income	Total Income	Div.	Year's Surplus	Total Surplus
1918.....	$198,011	$191,256	$6,755	$3,361	.....	.....	$10,117	$547,707
1917.....	265,155	182,582	82,573	73,920	.....	.....	8,178	781,765
1916.....	193,240	190,267	2,973	145,414	148,387	88,440	59,947	770,534
1915.....	339,425	326,189	13,236	178,578	191,814	106,128	22,227	793,938
1914.....	740,093	536,314	203,799	147,832	351,611	424,515	†72,904	771,712
1913.....	1,056,272	555,296	500,976	*318,213	819,189	795,966	23,223	84,461
1912.....	1,692,061	583,315	1,108,746	9,084	1,117,830	1,061,288	56,541	821,393
1911.....	1,833,517	677,681	1,155,836	10,318	1,166,154	1,061,288	104,865	764,852
1910.....	1,757,824	592,082	1,165,742	6,258	1,172,000	1,061,288	110,712	659,986

* Includes $144,000 (1913, $308,877) profit on Porcupine Crown, Ltd., investment.
† Deficit.

Property: original holdings at Cobalt consist of 23 acres in Kerr Lake, developed by the Crown Reserve mine, which has been one of the heaviest producers in Cobalt. The company co-operated with the Kerr Lake Mining Co. in the draining of Kerr Lake, but the results were disappointing to Crown Reserve in that no new valuable veins were found. The pumping out of the lake made it possible to obtain ore containing over 2½ million oz. silver, which otherwise could not have been extracted, and the small veins discovered, not in themselves of great importance, were sufficient to pay for the whole cost of the operation. Total amount of mud and water removed to Jan. 1, 1916, was about 700 million gallons.

The Crown Reserve Co. owns 60% of the stock of the *Porcupine-Crown Mines, Ltd.*, from which it received $144,000 in dividends in 1915. This mine was closed down in July, 1918, on account of abnormal conditions, but operations will be resumed. It is estimated to have $500,000 in ore reserves. Company owns jointly with Kerr Lake Mining Co., Ltd., the Drummond Fraction property from which it received a profit of $9,844 in 1916; no work was done on this property in 1918. Also operates the Silver Leaf mine of the Silver Leaf Mining Co., Ltd. In 1918, one ton of high grade and 2,216 tons of milling ore were shipped from the Silver Leaf. The company closed down the Reward mine in California, in 1918, and dropped the Walsh and Alice options.

Development: in 1918 amounted to 2,500′, making 38,144′ to date. In 1919 company purchased 2 claims in Larder Lake area which are said to have promising showings. Development work in the unexplored east end of the property cut 4″ of rich ore on the 150′ level in December, 1919.

A large section of the old workings is to be reworked by quarrying.

Production, years ended December 31:

Year	Ore Prod. Tons	Silver Prod. Gross Oz.	Gross Value	Net Value	Per Ounce Gross Cents	Per Ounce Cost Cents	Per Ounce Profit Cents
1917....	.....	329,670	.....	.....	.....	.....	.....
1916....	.....	274,470	$193,240	$191,822	70.40	69.30	1.10
1915....	94.10	657,395	344,596	339,425	52.40	45.01	7.39
1914....	307.70	1,425,320	740,093	722,873	51.92	28.95	22.97
1913....	312.60	1,766,678	1,056,271	1,040,117	59.45	23.02	36.43
1912....	512.00	2,714,766	1,692,060	1,638,191	62.32	14.02	48.30
1911....	1,048.59	3,430,902	1,833,516	1,751,300	53.46	10.67	42.79
1910....	2,753.00	3,248,196	1,757,824	1,633,716	54.10	11.97	42.13
1909....	3,093.00	4,034,325	2,080,156	1,895,484	51.56	10.31	41.25
1908....	650.78	1,798,954	910,350	854,788	50.64	7.50	43.13
Totals	8,772.77	19,960,676	$10,608,109	$10,067,722	54.78	15.73	39.05

The future of the Crown Reserve Mining Co. depends upon its ability to acquire new properties. It was in following this policy that in 1915 it exercised an option on the property of the Globe Cons. Mining Co. in Trinity county, Cal. (see Globe Cons. Lease, Inc.), but as results were not satisfactory, work was stopped. An option on gold claims in the Boston Creek district of Ontario was given up, owing to poor developments. About 90% of the shares in the Reward mine, Inyo county, Cal., was purchased, but work there was stopped in 1918.

DOMINION REDUCTION CO., LTD. **ONTARIO**

Offices: Cobalt, Ont.

Officers: D. M. Steindler, pres.; Mortimer B. Davis, v. p.; H. M. Thompson, sec.-treas., with A. A. Allen and L. L. Steindler, directors. Albert Wood, supt.

Inc. 1912, in Ontario. **Cap.**, $2,000,000; shares $1 par; $1,600,000 outstanding. Nearly all stock is held by the directors.

Company took over the Nova Scotia mill at Cobalt. Mill has 40 stamps, and treats custom ore, including low-grade ore from the Kerr Lake and Crown Reserve mines, with which the mill is connected by an aerial tram. All ore is purchased outright and reduced to bullion; payment is made in cash or in bullion. Company also owns and operates the property of the *Croesus Gold Mines, Ltd.*, in Munro Twp., 50 miles E. of Porcupine; has an interest in the St. Anthony, or Thunder mine, at Sturgeon Lake, and operates the Nova Scotia mine.

FOSTER MINING CO. **ONTARIO**

Owns the Foster mine at Cobalt, closed down for several years, reopened 1918, by lessees, C. L. Campbell of Montreal, and W. Fairburn. Reported in 1919, that high-grade ore had been cut, and 20 men were working under H. G. Carmichael, manager.

GENESEE MINING CO., LTD. **ONTARIO**

Head office: Cobalt, Ont. **Executive office:** 442 Powers Bldg., Rochester, N. Y. L. F. Steenman, mgr.

Officers. C. F. Wray, pres.; C. F. Crandall, v. p.; Alexander Russell, sec.-treas.; L. F. Steeman, gen. mgr., with A. H. Dewey, C. D. Van Zandt, R. H. Gorsline, J. G. Comerford and G. H. Welch, directors.

Inc. 1915, in Ontario. **Cap.**, 1,000,000 shares; $1 par.

Company has a 6 years lease on the U. S. claim, north of the north claim of the Chambers-Ferland. Property was idle 6 years, but developments in the Chambers-Ferland have given hope to the Genesee management.

Development: 572′ shaft, with 1,450′ of workings on 500′ level. Two veins of low-grade ore are said to have been cut.

GLEN LAKE COBALT MINES, LTD. **ONTARIO**

Mail to company returned, 1918; probably idle.

Inc. July 9, 1914, in Ontario. Had a lease on the Foster mine of the

Foster Cobalt Mng. Co., Ltd., about 40 acres on and under Glen Lake, Ont. An oreshoot, small but high-grade, was found on the 50′ level in March, 1916. A long crosscut was run from the old Foster shaft out under Glen Lake to within 40′ of the Bailey line. The management expected to run another crosscut parallel to the Bailey line with the hope of finding extension of the Bailey veins.

Company operated mine on a royalty basis paying 15% for 200 oz. ore and under, and 25% for higher grade ore.

HARGRAVE CONSOLIDATED **ONTARIO**

A merger of the Hargrave Silver Mines and Reliance companies in December, 1919. Capital is $2,500,000, of which $1,000,000 goes to the former and $800,000 to the latter company. Shares $1 par.

HARGRAVE SILVER MINES, LTD. **ONTARIO**

Company merged, December, 1919, with Reliance Co., to form Hargrave Consolidated, with same capital as H. S. M. Ltd., but free of debt.

Office: Excelsior Life Bldg., Toronto, Ont. **Mine address:** Cobalt, Ont.

Officers: Geo. H. Sedgwick, pres.; Jas. Ritcheson, sec.; J. T. Shaw, mgr.

Inc. 1908, in Ontario. **Cap.,** $2,500,000; shares $1 par; all issued. Stock listed on New York Curb and in Toronto. Shares sold 2½c low, 8½c high in 1919, and 2½ to 12c in 1918.

Property: 40 acres in Porcupine district and 40 acres in Cobalt district, adjoining the Kerr Lake mine on the east and on the south, and said to carry the extension of the Kerr Lake No. 3 vein. Drifting on this vein reported to have disclosed ore assaying 5,000 oz. silver per ton.

Development: by two shafts connected on the 255′ level with approximately 1 mile of lateral workings.

Under former management property is credited with production of 500,000 oz. silver. Shipping about 1,000 tons of dump ore to the Dominion Reduction Works, October, 1917.

Cobalt mine was closed down at the end of 1913 after a report made by the former manager, who stated that all known orebodies had been exhausted down to 375′ depth. After three years, in January, 1917, when silver prices rose to 70c, mine was reopened and some very rich ore found at 75′, 375 and 250′. In 9 months of 1918 about 600′ of work was done, and 21 tons of ore shipped returned 15,694 oz. of silver, valued at $13,343.

HUDSON BAY MINES, LTD. **ONTARIO**

Office: New Liskeard, Ont.

Officers: F. L. Bapst, pres.; A. A. McKelvie, v. p.; F. L. Hutchinson, sec.-treas.; with Thos. McCamus, H. P. Burgard, W. H. Kinch, and C. L. Sherrill, directors. C. C. Sherrill, mgr.

Inc. July 16, 1909, in Ontario, as an operating subsidiary of the Temiskaming & Hudson Bay Mining Co. **Cap.,** $3,500,000 shares $5 par, outstanding September 1, 1915, $3,200,050. Control **Dome Lake Mining & Milling Co., Ltd.,** through ownership of 1,596,545 shares. Traded in on Toronto Stock Exchange.

Balance sheet for year ending August 31, 1918, shows assets of $3,429,782 which includes: mining claims, at Cobalt, $2,953,228; at Gowganda, $44,900; claims in Teck & Lebel twp., $18,193; plant concentrator and equipment, $45,798; accounts receivable, $150,112; ore on hand, $14,100; 894,045 shares Dome Lake M. & M. Co. stock, $187,506; stock of Mines Water Supply Co., $2,943; cash $11,926. In fiscal year ending August 31, 1919, net profits were slightly over $3,000, and ore reserves estimated to contain 100,000 oz. of silver. Liabilities show: bills and accounts payable, $94,672; wages due, $2,425, capital stock, $3,200,050.

Receipts in 1918 were $129,861: ore sales giving $124,839. Expenditures were $97,458, leaving a profit of $32,402, plus balance of $100,233 from 1917, a total of $132,636.

Dividends: total to 1919 was $778,909, last one of 2½% paid August 31, 1913.

Property: 9 claims, 340 acres, at Cobalt. No. 1 mine was re-opened in June, 1916, and stoping operations started. Several promising veins have been found carrying good silver value, and are being further developed. The Temiskaming & Hudson Bay was finally absorbed in 1919.

New work for 1918, totaled 564′, compared with 1,652′ in the previous year.

Ore reserves on August 31, 1918, were estimated at 4,774 tons broken ore with silver content of 24,600 oz.; and 7,450 tons of ore in sight, with 35,550 oz.

No work was done on the Gowganda property in 1918, or at Camp No. 2, or at Kirkland Lake. Company acquired additional interest in the Ferguson mine, now owning two-thirds. Property adjoins the Lake Shore mine on the east, and is one-half mile west of the Tough-Oakes mine. For work done at the Dome Lake M. & M. Co., Ltd., see under Porcupine district in this volume. In March, 1920, it was decided not to spend any more money on the Dame Lake.

Equipment: complete mining machinery and a stamp mill.

Production, years ending August 31:

	Tons Milled	Oz. silver per ton	Recovery %	Cost per ton—Mining	Cost per ton—Milling	Silver cost per Oz., Cts.
1918.....	20,540	9.51	72.02	$2.13	$2.36	62.57
1917.....	18,247	17.3	83.2	2.59	2.09	43.57

KENEBEC SILVER MINES, LTD. ONTARIO

Mail returned, 1919, from former address, W. H. Jeffrey, mgr., Temiskaming district, via Cobalt, Ont.

Development: on the Veteran claim, 2 veins have yielded some high-grade silver ore. Ore occurs in Keewatin formation.

Equipment: includes boilers, hoist, and 5-drill compressor. No recent information; probably idle.

KERR LAKE MINING CO. ONTARIO

Reorganized, November, 1917, into Kerr Lake Mines, Ltd., of Ontario. which see.

KERR LAKE MINES, LTD. ONTARIO

A reorganization, November, 1917, of the Kerr Lake Mining Co., of New York. Owns entire capital stock of Kerr Lake Mining Co., Ltd. The change was made to eliminate the expenses and taxes of the New York holding company.

New York office: 61 Broadway. **Mine office:** Cobalt, Ont.

Officers: Adolph Lewisohn, pres.; Sam. A. Lewisohn, v. p.; E. H. Westlake, sec.-treas.; with J. H. Susmann, J. Parke Channing, D. M. Steindler, J. J. Steindler, and Wm. B. Joyce, directors. Mine manager, H. A. Kee.

Inc. 1917, in Ontario. **Cap.,** $3,000,000; par $5. Reduced September, 1919, to $2,400,000; par $4. Bankers Trust Co., New York; Federal Trust Co., Boston; Trust and Guarantee Co., Ltd.; Toronto, transfer agents; Equitable Trust Co., New York; Old Colony Trust Co., Boston; Union Trust Co., Ltd., Toronto, registrars.

Balance sheet of August 31, 1919, show assets: $3,039,591, which includes Kerr Lake Mining Co., Ltd., $2,400,000; 150,000 shares, 5c a share, of Wettlauffer Lorrain Silver Mines, Ltd.; $7,500; U. S. Liberty Bonds, $630,136; cash $1,956. Liabilities include, capital stock $3,000,000; Kerr Lake Mining Co., Ltd., $9,000; other $30,591; total, $3,039,591.

Income account shows dividends received from Kerr Lake Mining Co., Ltd., $653,000; interest $4,641; a total of $657,641. Expenses were $35,488; dividends paid $600,000; balance forward, $22,153.

Dividends: paid by predecessor and present companies totaled $8,910,000 to January, 1920; 20% yearly has been paid since 1911.

Kerr Lake Mining Co., Ltd.

Office: 61 Broadway, New York. H. A. Kee, gen. mgr., Cobalt, Ont. Entire stock issue owned by Kerr Lake Mines Ltd., of Ontario.

Balance sheet of August 31, 1919, shows assets: $2,885,032, which includes mining property, ore on hand, sold and in transit, $320,285; cash, $787,522; investments in Canadian and U. S. bonds, $1,647,544; Kerr Lake Mine Ltd., $9,000; other $40,680. Liabilities: 400 shares of capital stock at par, $100, $40,000; accounts payable, $6,366; accrued wages, $1,030; reserve for outstanding liabilities and taxes, $301,017, leaving a surplus balance of $2,436,619 after payment of $653,000 in dividends.

Total proceeds from ore sales in 1918 were $1,637,144. Operating expenses include $257,626 for production and development, $133,270 for shipment and treatment, $41,510 for general expenses, $13,275 written off on property acquired, estimated for taxes, $123,291. Operating profit for the year was $956,258.

Dividends: to August, 1918, amounted to $7,717,000. Payments are at the rate of $1 per share annually.

Property: one patented claim and two fractional claims, 57 acres in Coleman Twp., Nipissing district, Cobalt, Ont.

Geology: for description of these features see Nipissing Mines Co. The ore occurs in small vertical fissure veins in Huronian slate and conglomerate, both veins and ore being of the character typical of the Cobalt district. The ore-shoots vary from a few feet to 400′ in length and occur in an area of about 8 acres.

Development: to depth of 475′ by several vertical shafts, deepest 487′, with a total of 56,921′ of underground workings. New development for the fiscal year, 1919, amounted to 2,382′, compared with 3,088′ in 1918. Later work has failed to find new veins of importance.

To test the ground below the diabase the winze was sunk on the Keewatin vein to a depth of 150′ below No. 6 level, or 475′ below the surface. The winze is entirely in the Keewatin formation below the diabase contact, and 3 levels driven from the winze show the vein to be weak and less mineralized as it leaves the contact, confirming the general belief that commercial ore is probably confined to the diabase near or above the contact.

Ore reserves: on September 1, 1919, approximated 300,000 oz. silver, in the high-grade and 200,000 ounces in the low-grade milling ore, compared with 1918 reserves of 639,800 oz. silver in milling ore, and 997,500 oz. in high-grade ore.

Equipment: includes 12-drill air compressor, 10x12 Jenckes hoist, sorting and jigging-plant of 125 tons daily capacity, fully equipped machine shop and a pot melting furnace to melt the rough metallics into bullion, installed in 1915.

Production: for year ended August 31, 1919: 259 tons of ore averaging (with bullion), 3,323 oz. silver, 274 tons averaging 391 oz., 30 tons averaging 644 oz., and 28,362 tons of mill ore containing 17.30 oz. silver per ton. Shipping ore yielded 989,673 oz. The total was 1,482,649 oz. silver. In addition there was produced 90,586 lb. cobalt, and 137 lb. mercury. Cost of production was 40.81c. per ounce. Total production for previous year was 2,582,993 oz. silver, at a cost of 24.74c per oz., 199,331 lb. cobalt, and 545 lb. mercury. In October, 1919, production amounted to 112,000 oz. silver.

Ore reserves are approaching exhaustion, but during 1920 the company will explore and develop the areas in the immediate vicinity of the main vein system by systematically crosscutting from the walls of old stopes at favorable horizons.

LA ROSE CONSOLIDATED MINES CO. ONTARIO

Dissolved in 1918, La Rose Mines, Ltd., assuming liabilities and assets of the holding company.

LA ROSE MINES, LTD. ONTARIO

Office: 260 St. James St., Montreal, Quebec.

Officers: D. Lorne McGibbon, pres.; Shirley Ogilvie, v. p.; S. J. Le Huray, sec.-treas., with E. W. Nesbitt, Edwin Hanson, David Fasken, V. E. Mitchell, W. M. Dobell and W. A. Black, directors. G. C. Bateman, gen. mgr.

Inc. in Ontario. **Cap.,** $7,500,000; shares $5 par reduced November, 1917, to $1,500,000, par $1. Bankers Trust Co., New York, and Royal Trust Co., Toronto and Montreal, transfer agents. Guaranty Trust Co., of New York, registrars..

Company owns **Lawson Mines, Ltd.,** and **Violet Mg. Co.,** also 97,269 shares 90% of **University Mines, Ltd.**

The report of La Rose Mines for the year ended December 31, 1918, shows: Total receipts, $319,289; cost of mining and all other expenses, $273,745, leaving net profit for year, $45,544, carried to balance sheet. Dividend of $30,000 was paid in 1918. The balance sheet at end of 1918, shows:

Balance sheet as of Dec. 31, 1918.

Assets: total $2,017,530, which includes: mines, mining claims, etc. (including 97,260 shares of stock in University Mines, Ltd.), $1,456,151; advances to Univ. Mines, Ltd., $27,903; buildings and equipment, $49,760; supplies, $113,079; cash in banks, $195,288; call loans, $58,245; Victory Loan investment, $100,000.

Liabilities: capital stock $1,500,000; surplus, $456,046; reserve, Univ. Mines, Ltd., $27,903, accrued expenses on ore, $13,441; accounts payable, $16,303; unpaid payroll, $3,837.

Dividends: total to 1919, $7,505,410. La Rose Cons. Mines Co. during its existence paid $5,911,640.

Property: 6 patented claims, 359 acres, in Nipissing district, Cobalt, Ont., includes the La Rose, Princess, Lawson, University, and Fisher-Eplett mines all practically worked out, and the Violet mine which adjoins the O'Brien on the east. In 1918, new work in the La Rose totaled 438′, but no new ore was found. Work was discontinued in 1914 on the Princess and Fisher-Eplett claims as extensive development work failed to find new orebodies. In 1918, investigation of old workings on first level of Princess mine disclosed some ore in the walls of stopes, which was mined and company unwatered second level for same purpose. The Violet shaft, sunk in 1917, is 415′ deep, and its levels cut several veins, some with milling ore and a little high-grade ore. A boundary dispute with the O'Brien company was dismissed late in 1919, with costs assessed to the O'Brien.

Equipment: complete and modern in all respects.

Production: total to 1919, 38,238 tons of high-grade ore and concentrates from milling ore, yielding 24,484,052 oz. silver with net smelter returns of $12,606,235.

Year	Prod. Oz. Silver	Net Value	Cost Prod. per oz., c.	Net Sell. Price per oz., c.	Net Profit	Dividends	Surplus
1918.....	288,556	$268,525	87.17	99.83	$45,544	$30,000	$456,046
1917.....	437,338	328,751	68.64	82.94	71,372	320,000	509,927
1916.....	740,065	449,734	46.39	64.89	164,774	333,000	.....
1915.....	1,135,142	526,996	31.64	50.88	230,662	436,000	.....
1914.....	1,368,247	637,555	37.20	53.92	217,979	918,000	.....

La Rose is a liquidating property unless new properties are acquired.

LAWSON MINES, LTD. ONTARIO

Subsidiary of the La Rose Cons. Mines Co., Ont.

LORRAIN CONSOLIDATED MINING CO. ONTARIO

Officers: D. M. Steindler, pres.; J. Cohen, mgr.; J. G. Harkness, supt., Cobalt, Ont., Canada.

Mark Harris & Co., Standard Bank Bldg., Toronto, Can., are underwriters of 250,000 shares of stock.

Property: at Cobalt is said to show a vein 5-8″ wide of calcite and smaltite on which 260′ shaft has been sunk. At about 65′ vein dipped out of shaft but it was again found at 263′. No commercial ore encountered yet.

Development: work in progress, 1917, but stock is considered a speculation pure and simple. No later information, probably idle.

McKINLEY-DARRAGH-SAVAGE MINES, LTD. **ONTARIO**

Offices: Trusts & Guarantee Bldg., Toronto; and Cobalt, Ont. Treasurers office: 100 Sibley Block, Rochester, N. Y.

Officers: J. R. L. Starr, pres.; Thos. W. Finucane, v. p.; Harper Sibley, treas., with H. W. Sibley, Jas. S. Watson, T. R. Finucane, and G. L. Thompson, directors; J. H. Spence, sec., Toronto; A. G. Beckwith, asst. treas.; T. R. Finucane, gen. mgr.

Inc. 1906, in Ontario. **Cap.**, authorized $2,500,000; issued, $2,247,692; shares $1 par. Traded on New York Curb. Prices 46c. low, 75c. high in 1919.

Comparative General Balance Sheet:

Assets.

Year	Mine and Plant	Savage Mine and Plant	Bennett Claim	Current	Inv. etc.	Total
1918.....	$2,171,247	.....	.....	$454,615	$56,872	$2,682,734
1917.....	2,199,449	.....	.....	398,660	11,849	2,609,958
1916.....	1,381,560	$686,055	$100,000	455,073	6,600	2,628,333
1915.....	1,385,728	689,104	100,000	444,166	7,731	2,626,729
1914.....	1,402,798	694,168	100,000	447,852	7,716	2,652,534

Liabilities.

Year	Capital Stock	Surplus	Reserve Govt. Tax	Current	Total
1918.....	$2,247,692	$281,197	$22,535	$131,310	$2,682,734
1917.....	2,247,692	242,514	30,000	89,752	2,609,958
1916.....	2,247,692	264,943	17,500*	98,197	2,628,333
1915.....	2,247,692	280,299	2,500	96,238	2,626,729
1914.....	2,247,692	313,935	4,000	86,907	2,652,534

* Includes $15,000 for contingencies.

Statement of financial position of company as of December 15, 1919, showed: cash and bonds in bank, $331,409; ore in transit and at smelter, $86,500; ore ready for shipment, $76,086; total, $493,995.

Comparative Statement of Operations:

Year	Gross Oper. Profit	Deductions	Net Oper. Profits	Interest	Total Net Profits
1918.....	$342,167	$46,505	$295,662	$13,056	$308,719
1917.....	299,126	43,977	255,150	4,645	259,795
1916.....	304,637	28,967	275,670	6,634	282,304
1915.....	260,424	28,991	231,433	5,224	236,657
1914.....	328,850	30,876	297,974	9,678	307,652
1913.....	816,025	53,098	762,927	8,560	771,487

Dividends: 2% in 1907; 9% in 1908; 10% in 1909; 15% in 1910; 50% in 1911; 50% in 1912; 32% in 1913; 18% in 1914; 12% in 1915, 1916, 1917, 1918 and 1919. Total, 256%, or $5,686,735 to January 1, 1920. Present rate of 3% quarterly yields 20% on current price of stock.

Property: 1 claim, 40 acres, the McKinley-Darragh mine at southern end of Cobalt lake; 1 claim, 40 acres, the Savage mine, on the east side of Cart lake; 40 acres in Bucke Twp., the Bennett claim. The McKinley-Darragh, which adjoins the Nipissing and La Rose holdings, has been the most important producer. Deepest workings are at 400′, where the contact with the Keewatin formation is exposed.

Development: work in McKinley amounted to 8,200′ in 1918, the largest footage of any year. This large amount of exploration was responsible for the increased costs, but it served to find several payable orebodies. Several small veins were developed in the lower levels of the mine, but no large orebodies of importance were found. There is only a small area of favorable ground on the lower levels yet to be explored. The Savage is practically worked out.

Ore reserves: estimated January 1, 1919, to contain 852,754 oz. of silver; compared with 1,076,182 oz. January 1, 1918, and 1,714,302 oz. January 1, 1917. Reduction in reserves is due to exhaustion of the Savage mine.

Costs at the McKinley-Darragh mine:

		Costs			
Year	Tons Milled	Mines	Mill	Mktg.	Total
1918	67,020	$2.75	$1.53	$1.19	$7.36
1917	68,142	2.47	1.33	1.06	6.93
1916	62,676	1.98	0.95	1.08	5.15
1915	50,912	1.78	0.93	1.01	4.71
1914	45,098	2.22	1.44	1.70	6.99
1913	48,761	2.44	1.39	1.88	7.37

Extraction on all ore milled was 86.9% in 1913; in 1914, 85.1% on McKinley ore and 64.1% on Savage ore; 80.9% in 1915; 86.98% in 1917; 87.23% in 1918.

Production:	Ounces Silver Shipped			Cost	Profit
Year	McK.-D.	Savage	Total	per oz.	per oz.
1918	886,398	.....	.....	$0.6842	$0.3130
1917	1,020,545	.....	.....	0.5052	0.3268
1916	1,055,996	.....	.....	0.4073	0.2664
1915	803,717	256,419	1,060,136	0.2871	0.2210
1914	1,051,925	208,121	1,260,046	0.3130	0.2310
1913	1,672,431	556,066	2,228,497	0.2230	0.3690

Output in 1919 was valued at $815,902. Total silver shipped to end of 1919 was about 18,900,000 oz.

Future of McKinley-Darragh-Savage has been brightened by developments at depth, and property may continue dividends for some time yet, as the old mill tailings are now being treated in an oil flotation plant installed 1919-20.

MERCER SILVER MINES, LTD. ONTARIO

Offices: 103 Bay St., Toronto and Cobalt, Ont.

Out of business, described in Vol. XIII.

MILLER LAKE O'BRIEN MINE ONTARIO

Address: M. J. O'Brien, principal owner, Cobalt, Ont.

Operating officials: J. G. Dickenson, mgr.; B. C. Crowe, mine supt.; J. Cumings, mill supt.; Alex. Starke, sec-treas.

Property: has been one of the leading silver producers in the Gowganda district. Vein said to be 10′ wide and to contain five 5″ streaks assaying 3,000 oz. silver per ton. Developed by shafts; No. 2, the deepest, 450′, at last account.

Equipment: includes hoists, 20-drill compressor, and a mill; a hydro-electric plant between Gowganda and Burke lakes is equipped with 2 turbines and a 900 h. p. generator.

Production: figures not available, but reported to be 631,671 oz. in 1918.

MILLERETTE SILVER MINING CO., LTD. ONTARIO

Controlled by M. J. O'Brien, Ltd., Cobalt, Ont. No information is available.

MINING CORPORATION OF CANADA, LTD. ONTARIO

Office: Bank of Hamilton Bldg., Toronto. **Mines and works:** Cobalt, Ont.

Officers: Sir H. M. Pellatt, pres.; J. P. Watson, 1st v. p.; W. P. P. Parker, 2nd v. p.; with G. M. Clark, R. E. G. van Cutsen, D'Arcy Weatherbe, J. G. Watson, directors. W. W. Perry, sec.; C. E. Watson, mgr., Cobalt; M. F. Fairlie, mill mgr. Scott Turner, cons. engr.

Inc. March 20, 1914. **Cap.,** $2,075,000; shares $1 par; all issued; 1,911,319 shares were held by the Canadian Mining Corp., Ltd., in liquidation.

Capital increased to $8,300,250, shares $5 par, in 1917. Traded in on Toronto Stock Exchange, shares sold, $2.12 low, $4 high in 1918; $1.50 low, $2.50 high in 1919.

April 1, 1914, the Mining Corp. of Canada acquired the mining properties formerly operated by the Cobalt Townsite Mng. Co., Ltd., Cobalt Lake

Mng. Co., Ltd., City of Cobalt Mng. Co., Ltd., and the Townsite Extension Mines, Ltd., total area, 183½ acres, at Cobalt. In 1915, the property of the Little Nipissing Mining Co., 40 acres, was acquired. On January 1, 1917, business and assets of Canadian Mng. Corp'n. were acquired.

Owns entire capitalization, $250,000, of Cobalt Reduction Co., Ltd., operating a 300-ton mill and 140-ton cyanide plant.

In November, 1919, company bought control (70%) of the Buffalo Mines Co.

Comparative Balance Sheet, years ending December 31:

Assets.

	1918	1917	1916
Cash in banks and office	$300,823	$1,032,815	$846,368
Ore in transit and on hand	144,954	867,869	715,834
Due from smelters	89,665	100,961	73,993
Treasury bills and war loans	1,517,805	1,154,816	943,843
Bonds, Province of Ontario	101,574	.....	.....
Demand loans	18,064	104,941	60,638
Accounts received	117,318	235,922	96,947
Debentures — Can. Industrial Minerals, Ltd.	86,000	.....	.....
Buildings, equipments, stores, etc.	291,564	305,725	350,056
Due by Cobalt Red. Co., Ltd	373,177	.....	.....
Shares, Cobalt Red. Co., Ltd	249,083	249,083	249,083
Optional and other properties, etc.	330,035	114,462	41,049
Russian prospects	240,471	200,216	97,640
Mining rights	7,553,124	7,553,123	1,327,874
Total	$11,413,657	$11,919,933	$4,803,425

Liabilities.

	1918	1917	1916
Capital stock	$8,300,250	$8,300,250	$2,075,000
Profit and loss account (balance at credit)	3,025,347	3,448,377	2,447,583
Accounts, dividends, taxes, royalties pay	88,060	171,306	180,197
Casey Cobalt Silver Mng. Co., Ltd.	.....	.....	100,645
Total	$11,413,657	$11,919,933	$4,803,452

Comparative Profit and Loss Account, years ending December 31:

	1918	1917	1916
Balance forward from preceding year	$3,448,378	$2,447,583	$1,167,376
Profit at mines	990,473	2,604,434	1,913,880
Other income	273,031	326,387	230,575
Total	$4,711,882	$5,378,404	$3,311,831
Office expenses, salaries, etc.	69,897	109,413	60,462
Government royalties, taxes, etc.	267,847	264,317	233,162
Dividends and bonuses	1,348,791	1,556,297	570,624
Total	$1,686,535	$1,930,027	$864,249
Balance to balance sheet	$3,025,357	$3,448,377	$2,447,582

Dividends: in 1916, 25% and 2½% bonus; in 1917, 18¾%; in 1918, 16¼%; in 1919, 37½%. The total is $4,876,756.

Property: the City, Cobalt Lake, Little Nipissing, and Townsite Silver mines at Cobalt, Ont. The second named was exhausted and closed at end of 1918. The Townsite at the end of 1918, had but 205,000 oz. silver in its ore reserves; exploration work has been finished on this property.

Geology: ores occur in narrow calcite veins in Huronian conglomerate and Keewatin formation. The high-grade ore in 1918 assayed 1953 oz. silver per ton, the milling ore, 35 oz. silver per ton, and average of total ore treated was 41 oz. per ton.

Development: vein 32 of the City mine yielded most of 1918 production; reserves have been increased by the discovery that in some stopes the silver content extends out into the wall rock. There is little virgin ground left on the property, but exploration is vigorous; that of 1918 totalled 6,540', at cost of $16.52 per foot. Total openings are over 22 miles. Mining costs were $7.30 per ton in 1918; $4.74 in 1917, and $3.87 in 1916. Exploration of new areas in the other mines should reveal orebodies, but the Townsite is near exhaustion.

Ore reserves: at end of 1918 were 314 tons of rich ore, containing 391,450 oz. of silver, and 29,257 tons mill ore containing 849,111 oz., a total of 29,571 tons with 1,240,550 oz. silver, compared with 31,364 tons and 1,545,370 oz. in 1917; and 64,751 tons and 3,235,000 oz. in 1916. Tailings contain 1,000,000 oz. additional, which will be retreated.

Company examined 164 properties in North America during 1918, 90 in 1917, and 65 in 1916. Two are now being developed in British Columbia, which see under company's name. Exploration was also started at Butte, Ontario, searching for radium ore.

In the Casey district, Ontario, the company is developing the Nelson and other claims. A separate company controlled by the Corporation operates a fluorspar property near Madoc, in eastern Ontario. In 1917 an option was closed on a quartz gold property in the Yenesei district of Siberia, after considerable development had been done, but due to the political condition of the country the mine was closed temporarily. The company also plans to develop a large coal field at tidewater in the Far East, and is negotiating for a lead-zinc silver mine there. Properties in China, Mexico and South America have also been examined.

Production: ore is treated at the Cobalt Reduction Co.'s plant.

Year	Tons ore treated	Oz. Silver per ton	Extraction per cent	Total Oz. silver Rec.	Total costs per ton	Total costs per Oz.
1918(a)	42,482	41.01	95.71	1,667,344	$24.51	60.96c
1917	84,085	56.49	94.43	4,485,541	19.26	36.11
1916	114,392	42.29	92.14	4,457,440	13.43	34.46
1915	132,879	37.86	90.72	4,563,957	10.15	29.57

(a) does not include 17,632 tons tailing treated with a total silver recovery of 40,908 oz., or 57.04%.

Total production, to 1919, totals 29,204,217 oz.. The company is one of the largest silver producers in Canada. Its 3 Cobalt properties are nearing exhaustion, but under present management there seems little doubt that other good properties will be acquired and the company continue paying dividends. Reported in November, 1919, that company had purchased control (70%) of the Buffalo Mines, Ltd.

NIPISSING EXTENSION MINES, LTD. **ONTARIO**

Officers: A. J. Young, pres.: W. E. Stevenson, v. p.; with Albert Loening; J. W. Pickup, and Abbott Kimball, directors. E. H. Birkett, mgr.

Inc. 1919, in Ontario. **Cap.,** $3,000,000, issued $2,000,000.

Company has purchased property formerly owned by **Nipissing Ext. Mng. Co.,** 40 acres in Peterson Lake area of Coleman Twp., also property once owned by **Farah Mng. Co.;** this has been unwatered and development resumed.

NIPISSING MINES CO. **ONTARIO**

Company's assets and business acquired in September, 1917, by the Nipissing Mines Co., Ltd., of Ontario. Nipissing Mines Co., described in Vol. XIII.

NIPISSING MINES CO., LTD. **ONTARIO**

Company took over assets and business of the Nipissing Mines Co., of Maine, which controlled the Nipissing Mining Co., Ltd., which see.

Head office: Excelsior Life Bldg., Toronto, **New York office:** 165 Broadway.

Officers: E. P. Earle, pres.; Alex. Fasken, sec.; P. C. Pfeiffer, treas. **Directors:** E. P. Earle, W. H. Brouse, R. T. Greene, David Fasken, August Heckscher, John H. Block and R. B. Watson.

Inc. September, 1917, in Ontario. **Cap.,** $6,000,000; par $5; all issued. Transfer agents; Bankers Trust Co., New York, Old Colony Trust Co., Boston; and Toronto General Trusts Corp., Toronto. Registrars: Liberty National Bank, N. Y., State Street Trust Co., Boston, and Toronto General Trusts Corp., Toronto. Listed on Boston Stock Exchange, New York Curb and on Toronto Stock Exchange.

Nipissing Mines Co., Ltd. is a holding company, owning the entire stock of the Nipissing Mining Co., Ltd.

Annual report, December 31, 1919, shows total receipts $1,845,100, including $1,845,000 dividends on stock of Nipissing Mining Co., Ltd.; total disbursements were $1,838,405, including $1,800,000, paid in 4 quarterly dividends (30%). Assets, January 1, 1920, were $6,609,973, including capital stock of The Nipissing Mining Co., Ltd., $6,000,000; dividend receivable from The Nipissing Mining Co., Ltd., $600,000; cash $9,973.

Dividends: 46 paid by Nipissing Mines Co. (Maine Corp.) 1906-1917, was 269%, or $16,140,000. Ten paid by Nipissing Mines Co., Ltd. (Ontario Corp.), 1917-'19, 80%, on $4,800,000, making a total of 349%, equal to $17.45 per share, or $20,940,000. Distributions in 1920, to April 20, 15%, or $900,000.

Nipissing Mining Co., Ltd.

Head office: Excelsior Life Bldg., Toronto. **New York office:** 165 Broadway. **Mine office:** Cobalt, Ont., Canada.

Entire stock issued owned by Nipissing Mines Co., Ltd.

Officers: David Fasken, pres.; E. P. Earle, v. p.; with John H. Black, R. T. Greene and R. B. Watson, gen. mgr., directors; Alex. Fasken, sec.; P. C. Pfeiffer, treas.; Hugh Park, mgr.; J. Johnston, mill mgr.; J. J. Denny, metallurgist.

Inc. 1904, in Ontario. **Cap.,** $250,000; shares $100 par; all issued.

Comparative General Balance Sheet:

Assets.

Year	Property and Equip.	Investm's.	Ore and Bullion	Other Current	Total
1919.....	$364,226	$178,755	$1,093,111	$3,975,227(f)	$5,611,321
1918.....	629,203	380,000	1,496,784	2,237,006(e)	4,742,994
1917.....	662,741	529,123	1,320,839	1,368,866(d)	3,881,569
1916.....	652,605	279,123	1,198,473	962,072(c)	3,092,273
1915.....	689,974	33,430	944,932	784,892(a)	2,453,228
1914.....	746,887	69,520	1,129,539	416,350(b)	2,362,296

Cash, (a) $776,854. (b) $391,292. (c) $952,082. (d) $1,364,458. (e) $2,233,526. (f) $2,036,563.

Liabilities.

Year	Capital Stock	Accounts Payable	Accrued Expenses	Dividends Payable	Surplus	Total
1919.....	$250,000	$365,834	$22,535	$600,000	$4,372,952	$5,611,321
1918.....	250,000	398,954	52,337	600,000	3,441,702	4,742,994
1917.....	250,000	271,157	28,814	600,000	2,731,599	3,881,569
1916.....	250,000	195,515	36,632	610,000	1,980,126	3,092,273
1915.....	250,000	103,909	13,058	300,000	1,786,261	2,453,228
1914.....	250,000	190,522	18,998	300,000	1,602,776	2,362,296

Comparative Income Account:

Year	From Ore	Total	Cost Production	Net Profit	Dividends	Surplus
1919.....	$3,752,084	$3,856,458	$1,080,208	$2,776,250	$1,845,000	$4,372,952
1918.....	4,040,446	4,119,568	1,475,832	2,525,104	1,815,000	3,441,702
1917.....	3,756,890	3,828,311	1,129,408	2,686,472	1,935,000	2,731,599
1916.....	3,027,669	3,076,228	1,024,745	2,028,866	1,835,000	1,980,126
1915.....	2,222,256	2,256,432	815,005	1,441,427	1,220,000	183,485
1914.....	2,516,065	2,558,733	971,112	1,587,621	1,235,000	343,715

Dividends: paid to April 20, 1920, a total of $21,840,000, equal to 364%.

Property: 8 claims, 846 acres at Cobalt, Ontario, Canada, has over 100 fissure veins, from ½" to 12' in width, occurring in Huronian conglomerate or Keewatin formation. The ore carries silver, with cobalt, arsenic, nickel and mercury.

Development: total work in 1919 amounted to 7,717', compared with 7,815' in 1918. There are 10 working shafts on the property. The lowest, or No. 64 shaft is 1,003' deep; work there in 1919 gave no ore. Since the beginning of 1919, several orebodies have been found, all of which have proved up well. Shaft 73 produced most of the ore mined during 1918. Shaft 63 was pumped out in 1918 and work resumed on the Little Silver veins. In 1919, tunnel 96 opened No. 99 and 109 veins, which are narrow, but very rich.

Ore reserves: January 1, 1920, were 116,061 tons, assaying 54.8 oz. silver per ton, or 6,354,656 oz. in all, compared with 6,005,135 oz. in 1918.

Early in 1919, the company acquired an interest in 1,000 acres oil land, 20 miles S. E. of the Burkburnett oil pool, in Clay county, Texas. Drilling was started in May, and by March, 1920, a depth of 2,500' was reached.

Equipment: includes a mill for high-grade ore, closed down August, 1918, on account of the high price of mercury; a 40-stamp mill for low-grade ore, cyanide plant, air compressors, power house, hoists, tramway, etc. A flotation plant of 10 Callow cells treats tailings.

Production: Year	Ore, tons	Silver per ton, oz.	Total silver, oz.	Sell. price, cts.	Cost per oz., cts.
1919.....	66,354	49.9	2,905,474	113.71	35.61
1918.....	81,257	44.2	3,701,416	99.14	39.02
1917.....	74,187	61.6	4,212,248	83.19	25.12
1916.....	77,915	53.9	4,044,668	68.79	24.14
1904-1919....	.....	....	56,023,955	.....	.....

Nipissing is the largest company and has most extensive holdings of any company in the Cobalt district.

NORTHERN CUSTOMS CONCENTRATOR, LTD. ONTARIO

Office: 702 Excelsior Life Bldg., Toronto, Ont.

Officers: A. J. Young, pres.; C. J. Booth, v. p.; L. O. Walton, sec.-treas.; C. J. B. Armstrong, supt.; F. J. Bourne, man. dir., and cons. engr.

Cap., $250,000; 248,008 shares issued.

Company operates a 200-ton, 80-stamp concentrating mill north of La Rose mine, at Cobalt, Ont.; also has a lease on part of Silver Leaf mine and in December, 1919, acquired 25 acres from the Chambers Ferland company. Work is to be started on 425' level between Nipissing and La Rose. In 1918 the plant treated 457,719 tons containing 505,203 oz. of silver.

The South Easter Mining Co., British Columbia, is a subsidiary of this company.

O'BRIEN MINE, THE ONTARIO

Owned and operated by M. J. O'Brien, Ltd., Cobalt, Ont.

Staff: J. C. Dickenson, mgr.; D. W. McLeod, mine supt.; M. R. O'Shaughnessy, mill supt.; A. D. Campbell, engineer; A. E. McKee, sec.-treas.

Property: 15 claims, patented, 560 acres, privately owned at Cobalt and Gowganda, Ont. The O'Brien mine has been a steady silver producer for many years and is reported to have 5 years ore reserves in sight in 1919. In a dispute with La Rose Consolidated the court dismissed the action.

Ore: occurs in conglomerate, Keewatin and diabase and contains silver, cobalt, arsenic, nickel and copper.

Development: by 6 shafts to depth of 800′, with 10 miles of crosscutting, raising, drifting and winzing.

Equipment: includes 200-ton concentrator and cyanide mill.

Production: 1,237,345 oz. of silver shipped from 51,892 tons of ore in 1914; and 1,137,000 oz. from 65,000 tons in 1918.

Company is also operating the **Miller Lake O'Brien** mine and **Millerette Silver Mining Co., Ltd.**, at Gowganda, Ontario; the **Scheelite Mines, Ltd.**, at Moose River, and the **Renfrew Gold Mines, Ltd.**, at Renfrew, Nova Scotia; the **Storm Cloud** mine near Senator, Hassayampa district, Arizona; also property in Missouri and Mexico. All of these will be found described in the section devoted to the state named.

OXFORD COBALT SILVER MINES, LTD. **ONTARIO**

Address: Woodstock, Ont.

Officers: A. H. Wilson, pres.; J. R. Shaw, v. p.; Geo. F. Mohon, sec.; with J. W. Russell, and A. T. McNeil, directors. E. A. Rea, treas.; J. W. Russell, mgr., Woodstock, Ont.

Inc. 1919, in Ontario. **Cap.**, $1,000,000; par $1; outstanding 300,000 shares; non-assessable.

Property: 2 claims, 41 acres, in Temiskaming mining district, Ont., shows fissure veins containing silver, cobalt, and nickel. Assessment work only had been done to July, 1919. Company said to plan further development.

PALMER-PAINE MINING CO. **ONTARIO**

Address: Gowganda, Ont. N. R. Morrison, supt.

Organized, 1919, to operate the T. C. 177 claim near the Miller Lake-O'Brien mine, which was formerly operated by the T. C. 177 Mining Co. Several veins are said to have been opened to a depth of 200′ and low-grade silver ore found, though but little ore of commercial grade has been found.

PENN CANADIAN MINES, LTD. **ONTARIO**

Office: 1011 Chestnut St., Philadelphia, Pa. P. G. Grant, 52 Broadway, New York; and Cobalt, Ont.

Officers: Wm. J. Haines, pres.; R. B. Haines, sec.-treas.; with J. D. Haines, E. C. R. Laidlaw, S. D. Wright, A. S. Elliott, directors; B. Neilly, supt., at last accounts.

Inc. April 24, 1912, in Ontario. **Cap.**, $1,500,000; $1 par; 1,349,705 issued.

Dividends: $175,461 to end of 1917.

Property: the Cobalt Central Silver mine at Glen Lake, in Cobalt district.

Development: by 22,152′ of drifts, crosscuts, raises and winzes. About 800′ of diamond-drilling was done to May, 1916.

Equipment: includes mill with 6 Wilfley tables, ball mills, and a 75-h. p. motor. The mill treated 24,510 tons of ore during fiscal year ending April 15, 1915, and shipments to American and Canadian smelters amounted to 448 tons. The output in 1918 was 29,910 tons of ore. Company is a close corporation which does not make production figures public.

PETERSON LAKE SILVER COBALT MINING CO., LTD. **ONTARIO**

Offices: 909 Excelsior Life Bldg., Toronto and Cobalt, Ont.

Officers: W. A. Lamport, pres.; with D. E. Kennedy, C. B. Powell, M. G. McLean, W. G. H. Browne, J. E. Carter, Max B. Borg, I. L. Ernst, and C. M. Nickel, directors. P. M. Goff, sec.-treas.; C. E. Filteau, mgr.

Inc. 1906, in Ontario. **Cap.**, $3,000,000; issued 2,426,282, shares $1 par. Trust & Guarantee Company, Ltd., Toronto, transfer agent. Listed in Toronto and on New York Curb. Annual meeting 3rd Monday in May.

Comparative General Balance Sheet: (year ending April 30)

Assets.

	Property	Dev. Expl.	Plant	Supplies	Current	Total
1919	$2,309,323	$136,666	$43,654		$ 5,159	$2,494,802
1918	.....	.....	.....		.....	.....
1917	2,309,323	136,666	15,382		49,934	2,510,780
1916	2,309,323	136,666	16,897		223,920	2,686,807
1915	2,463,507	136,666	19,701		177,033	2,642,723

Liabilities.

	Capital Stock	Current	Surplus	Total
1919	$2,401,820	$13,395	$79,587	$2,494,802
1918	2,401,802	....	.....	.....
1917	2,401,820	1,234	107,726(a)	2,509,546
1916	2,401,820	7,610	277,377	2,686,807
1915	2,401,820	8,690	232,213	2,642,723

(a) Profit and loss.

Comparative Income Statement:

	Royalties on Ore	Misc. Inc.	T'l Expend.	Total
1919	$15,877	$4,996	$16,913	$3,959
1918	.....	....	.....	.....
1917	9,940	5,210	58,705	43,555*
1916	296,498	6,685	89,892	213,291
1915	191,156	9,826	60,557	140,424

*Net loss.

Dividends: fiscal year ending April 30, 1915, No. 1 to 4 inc., $168,127; April 30, 1916, No. 5 to 8 inc., $168,127, No. 9 to 11 inc., $126,096. Last one, Jan. 2, 1917. Total is $462,063.

Property: 224 acres underlying Peterson Lake at Cobalt, almost surrounded by holdings of the Nipissing Co. The most important lease was that of Seneca-Superior, now exhausted. Company operated the Mercer, Reliance and Peterson Lake mines, the last named in the Nova Scotia section. All leases given by company have now expired.

Development: the Peterson Lake area has been prospected through shafts No. 2 and 3 and the Nova Scotia territory opened up; several veins have been found here, but to date commercial ore has not been found in paying quantities. During the year new work totaled 3,556'.

Production: in 1913, 1,230,732 oz. silver; in 1914, 1,608,550; in 1915, 2,230-295; in 1916, 11,204 oz.

The company's property has been well prospected in Nova Scotia territory, but the Little Nipissing & Susquehanna tracts are promising and a large part of the company's ground under Cart Lake is still unexplored.

Mine was practically closed down from February to April, 1917, when entire management changed.

Two years' litigation between the company and the Dominion Reduction Co., resulted in a recent judgment by the Supreme Court of Canada awarding to the company the 250,000 tons of slime in Peterson Lake, derived from the company's ore, and valued at $1,473,186. In December, 1919, No. 2 shaft was being unwatered and exploratory work started.

PITTSBURG AND LORRAIN SYNDICATE **ONTARIO**

J. A. Rice, mgr. **Property:** the Currie Mine, adjoining the Wettlaufer, in South Lorrain, Ontario, Canada, said to show rich silver ore in pockets.

Development: is by shaft, to 300' level. Diamond-drilling to 900' depth, 1917. Leases the Wettlaufer 25-ton mill, increased daily capacity to 40 tons in 1919. Mill at present is retreating old tailings.

RIGHT OF WAY MINES, LTD. **ONTARIO**

Office: Central Chamber, 46 Elgin St., Ottawa, Ont.

Officers: C. Jackson Booth, v. p.; E. A. Larmouth, sec.-treas.; directors. A. H. Angus, mine mgr.

Inc. September 11, 1909, in Ontario. **Cap.**, $2,000,000; shares $1 par; outstanding $1,685,500. **Transfer office** 46 Elgin St., Ottawa, Ont. Annual meeting in February.

Shares selling around 5c per share, 1916, sold in the boom days as high as $10.50. The company has paid 66½% on the old capital of 500,000 shares and the new capital of 2,000,000 shares.

Annual report for 1918 shows gross receipts $48,089; operating expenses $45,835, leaving a net profit of $2,254. Adding the previous balance, etc., there was available $5,873. Depreciation and general expenses reduced this to $515.

Dividends: $252,825 to March, 1917.

Property: 3½ acres adjoining La Rose mine at Cobalt, and mining rights 3½ miles of the right-of-way of the T. & N. O. Railway. The mine produced a large amount of silver for a few years, though for the past four years but little rich ore has been found.

Development: to a depth of 465'.

Production: in 1918 was 162 tons of high-grade ore, concentrates, and metallics returning $50,384. In 1917, 186 tons ore were produced with a value of $54,441.

SENECA SUPERIOR SILVER MINES, LTD. **ONTARIO**

Dead; described in Vols. XII and XIII.

SHAMROCK CONSOLIDATED MINES, LTD. **ONTARIO**

Dead. See Vol. XIII. Formerly operated Shamrock mine.

SILVER LEAF MINING CO., LTD. **ONTARIO**

Inc. 1906, in Ontario. **Cap.**, $5,000,000; shares $1 par. Owns the Silver Leaf mine, adjoining the Crown Reserve property at Cobalt. Mine is operated by Crown-Reserve Mining Co., Ltd., which see.

TEMISKAMING & HUDSON BAY MINING CO., LTD. **ONTARIO**

Company dissolved 1919, former address New Liskeard, Ont., Can.

Officers: F. L. Bapst, pres.; A. A. McKelvie, v. p., with T. McCamus, S. S. Ritchie, W. H. Kinch, Chas. L. Sherrill, F. L. Hutchinson, sec.-treas., above are directors. D. A. Mutch, mgr.

Inc. July 29, 1903, in Ontario. **Cap.**, $25,000; shares $1 par; outstanding $7,761 Annual meeting, last Tuesday in October. Company is a holding corporation, whose operating company is the Hudson Bay Mines, Ltd., which in turn controls Dome Lake Mining & Milling Co., Ltd.

Balance sheet for year ending Aug. 31, 1918, shows: assets $2,812,001, which includes stock of Hudson Bay Mines, Ltd., 546,000 shares, $2,730,000; cash, $1,166; Hudson Bay Mines, Ltd., accounts receivable, $76,075; Gowganda claims, $4,500; furniture, $260. Liabilities include: outstanding capital stock, $7,761; balance, loss and gain account, $2,804,240.

Dividends: during 1915-'16 one 300% dividend was paid, bringing total dividends paid since incorporation to 1915 to 25,000%, or $1,940,250. Operations are described under titles of the subsidiary companies.

Assets of T. & H. B. distributed and charter surrendered in 1919, shares of H. B. M. Co. held by T. & H. B., distributed pro rata to shareholders.

TEMISKAMING MINING CO., LTD. **ONTARIO**

Office: Standard Bank Bldg., Toronto. **Mine office:** Cobalt, Ont., Can.

Officers: J. P. Bickell, pres.; W. J. Sheppard, v. p.; with Geo. E. Drummond, W. Linton, Geo. N. Miller, H. D. Symmes, J. B. Tudhope, directors. M. P. Van der Voort, sec.; P. W. Cashman, treas.; L. J. Pashler, asst. treas.; Wm. Cooper, mgr.

Criticism of the mine management and dissension among the shareholders culminated when H. B. Wills, a broker, and M. Morgenstern, a shareholder accused the management of distorting facts in reports to shareholders. As a result of these charges an examination of the mine was made by Balmer Neilly of the Penn-Canadian mines, who estimated 11,572 tons of positive ore broken, or 4,000 tons less than official reserves. As certain shareholders still doubted the correctness of these estimates, Douglas Mutch of the Hudson Bay mine was employed to sample the mine. He

estimated reserves of 10,816 tons of ore, containing 393,800 oz. silver. Exploration of the lower contact at 1,600′ in depth was unsatisfactory and results generally do not warrant further expenditure.

Inc. 1906, in Ontario. **Cap.**, $2,500,000; shares $1 par; non-assessable; all issued. Union Trust Co., Toronto, transfer agent; Chartered Trust & Executive Co., Toronto, registrar. Annual meeting first Monday in February. Listed on Standard Stock Exchange, Toronto. Shares 24½c low, 35½c high in 1918; 30c low and 52½c high, 1919.

On December 28, 1917, a shareholders' meeting authorized the purchase from **Beaver Consolidated Mines,** of 871,525 shares of **Kirkland Lake Gold Mining Co.,** at 40c a share. This is half the Beaver Company's interest. Money for development work at Kirkland to be advanced equally by both companies. This deal is said to have been blocked by two shareholders.

Company controls the Wright-Hargraves Mines., Ltd., at Kirkland Lake, developed by 425′ shaft. A 110-ton mill to be erected.

Dividends: 15% in 1908; 6% in 1909; 11% in 1910; 9% in 1911; 12% in 1912; 3% in 1913; none in 1914; 3% in 1915; 9% in 1916; and 12% in 1917; 3% in 1918; nil in 1919; 2½% in 1920; a total of $2,175,000. Earnings were $295,252 in 1919; and surplus on mining account was $70,448, compared with $135,394 the previous year. The total surplus at end of 1919 was $864,016. Earnings in 1919 were small, as mill ran but 44% of the time.

For 1918 the following figures have been reported: current assets, $870,-114, which includes $700,000 in Victory bonds; profit, $135,395; earnings, $425,014, of which $368,724 came from ore sales; operating expenses, $261,-801; total assets, $3,893,463, of which $2,427,802 is in properties.

Comparative General Balance Sheets:

Assets.

	Current	Property	Const'n	North Dome	Hospital	Total
1917...	$835,342	$2,427,802	$104,183	$321,684	$2,120	$3,850,116
1916...	579,599	2,427,802	259,168	320,408	2,120	3,589,097
1915...	462,488	2,581,884	105,192	320,408	2,120	3,472,091
1914...	83,501	2,560,658	104,616	317,908	2,120	3,070,923

Liabilities.

	Cap. Stock	Depreciation	Profit & Loss	Current	Total
1917....	$2,500,000	$101,377	$814,557	$36,655	$3,850,116*
1916....	2,500,000	75,591	671,000	19,978	3,589,097*
1915....	2,500,000	49,674	896,860	25,556	3,472,091
1914....	2,500,000	23,747	527,996	17,059	3,068,802

* Includes $322,528 contingent a/c re North Dome property and Cobalt mines hospital shares.

Comparative operating account:

	Receipts	Expenses	Profits	Cash Assets
1917.....	$875,782	$331,440	$544,342	$507,158
1916.....	708,877	355,987	352,870	579,599
1915.....	732,263	262,471	469,731	462,487
1914.....	146,649	228,071	*81,422	85,621
1913.....	438,455	320,881	117,574	196,920

* Deficit.

Property: in which the company is directly or indirectly interested—Daile claims, 20 acres; Gans property; McDonald claims, 40 acres in North Cobalt; Peterson claims, 40 acres; Osland claim, 40 acres each in McCool, Cook, and Barnet townships; the Morrison claims, commonly called the Red Jacket, and the North Dome property, in the Porcupine mining division. The Red Jacket was leased in 1916 to a syndicate which unwatered it.

Ore: high-grade silver, containing arsenic and smaltite. Oreshoots occur in veins where they cut contact of the Keewatin formation with a diabase sill. Pay ore is found in shoots.

Diamond-drilling has proved that another contact occurs below the diabase sill at a depth of about 2,000′

Ore reserves: estimated February 7, 1918, at but 829 tons containing 31,641 oz. silver. The report of the manager at that date stated future possibilities of the property depend on finding ore in the Gans lot above the sill, or on the Temiskaming and Gans lots below the sills.

Development: by 1,600′ vertical shaft and 4,000′ of workings.

Equipment: includes a compressor for 20 drills, a Nordberg hoist with 6′ drums and capacity of 2,500′. Electric power is hydraulically generated. The 40-stamp mill is equipped with concentrating machinery and handled 150 tons of low-grade ore a day until compelled to close, 1918, owing to inability of mine to furnish over 40 tons ore daily. Reported that an important orebody had been opened on the 500′ level in 1919.

Production: 11,300,000 oz. of silver from 246,000 tons to end of 1918. The yield in 1918 was 420,076 oz.; in 1919, 243,037 oz. silver.

TRETHEWEY SILVER-COBALT MINE, LTD. **ONTARIO**

The Trethewey mine was acquired January, 1920, by the Coniagas company for $100,000.

Office: 1601 Royal Bank Bldg., Toronto. **Mine office:** Cobalt, Ont.

Officers at last accounts: S. R. Wickett, pres.; J. B. Tudhope, v. p.; with Gordon Taylor, J. B. Bickell, W. J. Sheppard and T. E. Leather, directors; L. J. Pashler, sec.-treas.; I. S. McReavy, mgr.

Inc. 1906, in Ontario. **Cap.,** $2,000,000; $1 par; non-assessable; outstanding, $1,000,000. No bond issues. Annual meeting, February. Toronto General Trust Corporation, transfer office. C. E. Robin, registrar. Listed on New York Curb. Shares 30c. low, 52½ high, 1919.

Reported that 1918 net value of year's production was $250,534; operating cost, $147,166; operating profit, $103,368. Current assets, $171,600, and current liabilities, $20,000. Company bought 370,000 shares of Castle Mining Co. stock, and $78,230 was spent on property in 1918.

Dividends: total 133% to January, 1919.

Property: one patented claim, 40 acres, Coleman township, Cobalt district; also owns control in Rochester Mines, Ltd., of Cobalt. Ore deposits yield silver and cobalt and occur between conglomerate and diabase. Pay ore occurs in shoots. At Gowganda company is opening the Castle mine, and had spent $80,000 to end of 1919.

Development: by vertical shaft, greatest depth 250′, and total linear extent of workings 25,650′. The limited productive area of the property, about 6 acres, to a depth of 250′, is practically worked out. In 1918, production came from walls of old stopes, was very low grade, and only made profitable by high price of silver. Estimated ore reserves at end of 1918, contained 159,172 oz. compared with 264,044 oz. the previous year, a decrease of almost 40%.

Equipment: compressors, hoists and other necessary mining machinery, besides a 30-stamp concentrating mill with a capacity of 100 tons daily. A 100-ton flotation plant has recently been erected to treat slime dumps which contain 65,000 tons of 4.7 oz. material. Several months' operation said to have shown a profit of $1.50 per ton.

Production: in 1918, the mill treated 24,514 tons ore at a cost of $2.21 per ton.

The Castle property at Gowganda, acquired in 1918, is next to the Miller-Lake-O'Brien, and a level at bottom of the 380 ft. shaft is said to have as good values as the vein cut on the level above. The Major property at Gowganda was optioned in 1919, and a lease also taken on 112 acres under Miller lake.

UNIVERSITY MINES, LTD. **ONTARIO**

Is a subsidiary of the La Rose Consolidated Mines Co., which see.

WETTLAUFER-LORRAIN SILVER MINES, LTD. **ONTARIO**

Office: 61 Broadway, N. Y. **Mine office:** South Lorrain, Ont.

Officers: H. Lockhart, Jr., pres.; D. M. Steindler, v. p.; E. H. Westlake, sec.-treas.; the foregoing, and T. L. Herrmann, J. H. Susmann, W. J. Ma-

gavern, Wm. J. McWhiney, J. L. Mitchell and Herman Cook, directors. H. A. Kee, mgr.

Inc. November, 1908, in Ontario. **Cap.**, $1,500,000; $1 par; non-assessable; outstanding, 1,416,590 shares. Annual meeting, fourth Monday in January. Bankers' Trust Co., New York, and Trust & Guarantee Co., Ltd., Toronto, transfer offices; Security Transfer & Registrar Co., New York, registrar. Listed on New York Curb.

Balance sheet, Dec. 31, 1918, showed total assets, $1,520,180, which includes mine property, $1,383,112; U. S. Liberty bonds, $60,390; cash, $22,719.

Operations ceased in 1913, owing to exhaustion of ore, and efforts to find other bodies in the property practically abandoned.

During recent years the company's properties were operated under a lease to the Comfort Mining & Leasing Co., Ltd. In Sept., 1917, the Pittsburg Lorrain Company leased the mine, paying $2,210 in royalties in 1918.

WRIGHT-HARGRAVES MINING CO. **ONTARIO**

Property owned by Temiskaming Co., which see.

KIRKLAND LAKE DISTRICT

BALDWIN GOLD MINING CO., LTD. **ONTARIO**

Address: 301 Dominion Bank Bldg., Toronto. W Wilson, mgr., Mileage 167, T. & N. O. Ry. Kenogami Lake, Ont.

Officers: F. W. Tanner, pres.; F. W. Gates, v. p.; J. A. Cherry, sec.-treas.; with H. J. Dudley and Jas. Gorrie, directors.

Inc. January, 1917, in Ontario. **Cap.**, $2,500,000; par $1; outstanding, 1,805,000 shares. Listed on Toronto Exchange, but no quotations given in published lists for 1919.

Property: 160 acres, in Eby Twp., Kirkland Lake mining district. Gold was discovered on tract in 1910 and property bought in 1917 from Mr. Jas. Gorrie for 1,500,000 shares. Ore occurs in quartz veins.

Development: on one vein includes a 200′ shaft, with 500′ of workings, said to expose ore of "large amount but not estimated."

Equipment: includes a hoist and compressor. Property is a prospect undergoing development; Tanner, Gates & Co., of Toronto, are helping finance the company.

BOURKES MINES, LTD. **ONTARIO**

Address: J. J. Byrne, mgr., Bourkes, Kirkland Lake, Ont.

Cap., $2,500,000; $1 par.

Property: the south half of Lot 9 in second concession of Benoit Twp., at Bourke's siding, N. W. of Kirkland Lake, developed by 200′ shaft and 1,500′ of workings. A 28″ gold quartz vein exposed at 200′ depth.

Equipment: 80-h. p. steam boiler, 210 cu. ft. compressor, 2 Jenckes hoists; a mill being planned and buildings for 50 men.

BURNSIDE GOLD MINES, LTD. **ONTARIO**

Address: Charles Richardson, mgr., Kirkland Lake, Ont.

Inc. July, 1913, in Ontario. **Cap.**, $3,000,000.

Is a subsidiary of the Kirkland-Lake Proprietary, Ltd. Owns 3 claims adjoining the Tough-Oakes gold mine at Kirkland Lake.

Mine was operated in 1918 by the Aladdin Cobalt M. Co.

In 1918, development was resumed and shaft No. 2 was sunk to 420′ depth on vein No. 3; high values were found on the 120′ level. A 30-ton mill started operating in Feb., 1919. A consolidation with Kirkland Lake Proprietary, Ltd., and Tough Oakes was planned.

CANADIAN-KIRKLAND GOLD MINES **ONTARIO**

Address: George Tough, sec., Haileybury, Ont.

Property: 4 claims at Kirkland Lake shows a number of promising veins on which development work was started in 1917. Crown Reserve Mining Co. acquired control and started work in May, 1919.

ELLIOTT-KIRKLAND GOLD MINES, LTD. **ONTARIO**

Address: Kirkland Lake, Ont.

Officers: S. H. Worth, pres.-treas.; R. H. Lyman, v. p. and mgr.; W. A. Gordon, sec.; with John M. Wood and E. W. Kearney, directors.

Inc. December, 1916, in Ontario. **Cap.**, $2,000,000; par $1. Traded on Toronto Stock Exchange.

Property: 2 gold-bearing claims, 85 acres, at Kirkland Lake, developed by a 520′ shaft and extensive diamond drilling. As commercial ore was not found on the lower levels, work was stopped temporarily in 1919.

Equipment 60-h. p. boiler, hoist, compressor, and quarters for 18 men.

GRANBY-KIRKLAND GOLD MINES, LTD. **ONTARIO**

Head office: Toronto, Ont. E. Croteau, supt.

Cap., $2,000,000; par $1.

Property: 2 claims, 85 acres, in twp. of Lebel, 1 mile N. E. of Tough-Oakes mines, on which trenching has disclosed 3 promising veins. Company plans sinking shaft.

HUNTOON-KIRKLAND CO. **ONTARIO**

Cap., $1,500,000. Traded in on Toronto Exchange.

Reported, Oct., 1919, that company had given an option on 500,000 treasury shares at 20c. each—the money to be used for further development. The property was idle during the war.

KIRKLAND LAKE EXPLORATION, LTD. **ONTARIO**

Office: Pinners Hall, Austin Friars, London, Eng.

Officers: C. H. Villiers, pres.; H. J. Hollingsworth, and R. D. La Bere, directors. E. C. Wheater, sec.

Inc. January, 1914, in England, to acquire mining properties in Ontario, Canada. **Cap.**, £150,000; shares £1 par; 26,000 issued. On June 30, 1916, assets included stocks and bonds at cost, £10,320; interest in the Kirkland Lake district, £1,650. Organization expenses, £5,498; exploration, etc., £12,-001; cash, £116.

Property: in Swastika district, near Porcupine, Ontario, Can., and an interest in claims adjacent to the Tough Oakes mine. Is a holding company, inactive during the war.

KIRKLAND LAKE GOLD MINING CO., LTD. **ONTARIO.**

Is a subsidiary of Beaver Cons. Mines, Ltd.

Address: 810 Lumsden Bldg., Toronto, Ont. **Mine office:** Kirkland Lake, Ont.

Officers: F. L. Culver, pres.; J. H. Black, v. p.; R. Graham, sec.-treas.; H. E. Tremain, asst. sec.; with Wm. T. Mason, directors.

Cap., $2,000,000; $1 par; 1,743,050 shares are owned by Beaver Cons. Mines, Ltd. Shares 91c. low, $1.26 high, in 1918; 92c. low, $1.08 high, 1919, on Toronto Curb.

Property: 362 acres in the Kirkland Lake district. Development work has been confined to one claim on a vein which has been traced 1,400′ on surface and proved on 7 levels underground.

Development: by a 700′ shaft (No. 2), with levels 100′ apart. The third level shows from 5 to 12′ of ore, assaying $7 to $12.80 per ton. The ore shoot is 160′ long on the third and 220′ on the fourth level, and the high values continue down to the 700′ level. The 3-compartment main shaft near center of property connects with No. 2 shaft. Workings total 5,210′, but no stoping has as yet been done.

Equipment: includes steam plant, electric motors, double-drum hoist, a 12-drill and smaller compressors and a 150-ton mill, completed in 1918, with an 8′ Hardinge mill, Dorr classifier, tube mill and 15 solution tanks. Mill was operated until labor troubles caused a 4 months' shutdown in 1919. Operation resumed Dec., 1919.

Production: in 1919, 11,324 tons of ore yielding 2,675.05 oz. gold and 378.9 oz. silver, of a total value of $56,262, representing a recovery of $4.97 per ton.

KIRKLAND LAKE PROPRIETARY, LTD. **ONTARIO**

Office: J. J. Sneddon, sec., Finsbury Pavement House, London, E. C. 2, Eng.

Directors: H. G. Latilla, chairman; A. Burt, J. D. G. Simpson and G. F. Wyatt.

Inc. November 27, 1913, in England. **Cap.,** £200,000; shares £1 par; 100,000 issued and fully paid. Last annual meeting was held Oct. 17, 1918.

Company's assets are share holdings in the following companies: Tough Oakes Mines, Ltd.; Burnside Gold Mines, Ltd.; Sylvanite Gold Mines, Ltd.; Teck-Hughes Gold Mines, Ltd., and Sudbury Syndicate, Ltd.

Balance sheet Aug. 31, 1918, shows general expenses, £22,696; cash, £86; debtors, £35,566; loans and interest, £34,202; shares and interests in properties at cost, £111,492.

A merger with Aladdin Cobalt, Ltd., and through it with A. C. Co., Ltd., and Chambers Ferland Mining company, was made in 1920; see Aladdin Cobalt, Ltd.

KIRKLAND-PORPHYRY GOLD MINES, LTD. **ONTARIO**

Address: Kirkland Lake, Ont.

Officers: Henry Cecil, pres.; M. P. Vandevoort, sec.-treas.; with A. R. Porter, B. P. McAvoy and Wm. Linton, directors; J. C. Houston, mgr.

Inc. in Ontario. **Cap.,** $3,000,000; par $1; 1,623,005 shares issued. **Bonds:** $540,000 outstanding of an authorized issue of $800,000.

Property: 9 claims, 3 patented, approximately 360 acres, at Kirkland Lake, formerly operated by Orr Gold Mines, Ltd. The tract is said to show porphyry cut by quartz veins with N. 60° E. strike and dip of 75° S. E. Ore occurs in shoots up to 12′ in width, assaying about $13 gold per ton.

Development: by 400′ vertical shaft, with 800′ of workings. Management claimed ore reserves of 65,000 tons, valued at $800,000, and to have spent $120,000 on the property in 1918.

Equipment: includes hoist, compressor, and electric power. Plans building a cyanide mill. Company in liquidation, Nov., 1919.

KITCHIGAMI GOLD DEV. CO. **ONTARIO**

Officers: John Daniell, pres., Calumet, Mich.; John MacRae, v. p.; Chas. Chynoweth, sec.; Jas. T. Fisher, treas.

Inc. 1915, in Arizona. **Cap.,** $300,000; shares $2 par; 100,000 shares subscribed at 25c.

Property: 160 acres, Gordon McGuire claims, on Goldfish lake, Morisette township, Ont., Kirkland district, adjoining the Goldfish Lake Gold Mine Co. Ground acquired on advice of Chas. W. Botsford, E. M.

Some diamond-drilling was done in 1916, without important results.

LA BELLE KIRKLAND MINES, LTD. **ONTARIO**

Property: the Gibson group of claims at Goldfish Lake, Kirkland Lake district, Ont., said to show molybdenite and gold ore in Keewatin formation. Developed to depth of 350′ by shafts and crosscuts, showing several 2′ stringers of high-grade ore. Diamond drilling totaling 5,000′ is said to indicate ore to 700′ depth.

Equipment: includes compressor and hoist good for depth of 1,000′.

Suspended operations, July, 1917, pending financing. Plans were on foot in 1919, to sell treasury stock and resume operations.

LAKE SHORE MINES, LTD. **ONTARIO**

Address: Kirkland Lake, Ont.

Officers: Harry Oakes, pres. and man. dir.; A. G. Slaght, v. p.; C. E. Wettlaufer, 2nd v. p.; Dr. W. P. St. Charles, treas.; with Louis Oakes, W. H. Wright, and A. E. Wende, directors. Kirkland Securities, Ltd., sec.; R. C. Coffey, mgr.

Inc. February 25, 1914, in Ontario. **Cap.,** $2,000,000; par $1. Trusts and Guarantee Co., Ltd., Toronto, transfer agent and registrar. Traded in on Toronto Exchange. Price record, 91c. low, $1.26 high in 1918; 92c. low and $1.08 high in 1919.

Balance sheet, Nov. 30, 1918, shows assets of $1,462,023, which includes cash, $49,417; other current, $137,579; buildings and equipment, $160,564; property, development and organization expenses, after charging off $90,000 as a provision against exhaustion, $1,112,632; exploration, $1,831. Current liabilities were $84,841; capital stock, $1,332,203; surplus for year, $44,978.

At end of 1919 current assets were $112,620; current liabilities, $41,947; income, $307,531; operating expenses, $209,258. The profit of $98,273 was reduced to $38,273 by deductions for ore exhaustion.

Dividends: 4 quarterly dividends of 2½% paid to October 25, 1919, a total of $200,000.

Property: the Lake Shore gold mine, on Kirkland Lake, adjoins the Teck-Hughes on the east.

Development: 400′ shaft and several thousand feet of workings. In the year ending Nov. 30, 1918, new work totaled 2961′, of which 1141 was on No. 1 vein, and 1920′ on No. 2 vein; 80% of all drifting was on ore of milling grade. The ore contains gold telluride, and the shoots persist in both size and value to the 400′ level. New work in 1919 amounted to 1,864′, with 6,035 tons of $32.60 broken ore in reserve.

Equipment: includes 7-drill electrically-driven compressor, fully equipped shaft-house, heating plant, continuous decantation cyanide plant, with a capacity of 60 tons daily.

Production: the mill started operating March 8, 1918, and during the remainder of the year treated 14,948 tons of ore, recovering $24.76 per ton. with a total bulion production of $370,128. Expenses were $139,096, leaving a profit of $234,978, before making the $90,000 provision for exhaustion. In May, 1919, production amounted to $42,136 from the treatment of 1,750 tons of ore, a recovery of $24.08 per ton. In the following month, the mine closed down, and the pumps were pulled, allowing it to fill with water, as a result of a labor strike which lasted several months. Production resumed November, 1919, and shaft deepened to 600′. The output in 1919 was $294,514 from 11,907 tons of $24.67 ore.

MINAKER KIRKLAND GOLD MINES, LTD. ONTARIO

Address: G. A. Bagshaw, Haileybury; and T. J. Flynn, mgr., Kirkland Lake.

Inc. in Ontario. **Cap.,** $1,500,000; $1 par.

Officers: G. A. Bagshaw, pres; Frank L. Mapes, v. p.; F. Haak, sec.-treas., both of Rochester, N. Y.; with Edward Moir, Marcelles, N. Y., and John Kavanagh, Rochester, directors.

Property: four claims, adjoining the Lake Shore on the S., is said to show a number of gold bearing veins, on one of which a shaft has been sunk to depth of 175′, with drifting in progress on 150′ level.

ONTARIO-KIRKLAND GOLD MINES, LTD. ONTARIO

Address: Haileybury, Ont.

Officers: Frank Huth, pres.; Walter E. Hurd, v. p.; with Ralph Hurd, A. J. Balton, Henry Haertel, Wm. H. Meyer and H. S. Sonder, directors. W. A. Gordon, sec.; M. A. Riley, treas.. Ralph Hurd, mgr., Haileybury, Ont.

Inc. 1918, in Ontario. **Cap.,** $1,500,000; par $1; outstanding 965,006 shares. By Dec., 1919, 400,000 treasury shares had been sold to provide cash for development work.

Property: 2 patented claims, 88½ acres, S. E. of Lake Shore mine, Kirkland Lake, Ont. Ground shows gold bearing quartz veins in porphyry and conglomerate.

Development: by 300′ vertical shaft, and two levels. **Equipment:** includes a 50-h. p. electric hoist. Reported that a 100-ton mill would soon be added.

ORR GOLD MINES, LTD. ONTARIO

Address: Kirkland Lake, Ontario, Canada.

Inc. 1917. **Cap.,** $3,000,000.

Owns or did own the Orr group under option to Kirkland-Porphyry Gold Mines Ltd., 1917-1919. Conflicting reports regarding ownership were current in 1919.

SYLVANITE GOLD MINES, LTD. ONTARIO

Subsidiary of Kirkland Lake Proprietary.

Inc. June, 1913, in Ontario. **Cap.,** $2,000,000.

Owns the Wright and Robbins claims adjoining the Tough-Oakes gold mine, Kirkland Lake. Work to date has been chiefly surface exploration.

TECK-HUGHES GOLD MINES, LTD. ONTARIO

Office: 14 Wall St., New York. **Mine office:** Kirkland Lake, Ont.

Officers: C. L. Denison, pres.; R. W. Pomeroy, v. p.; Geo. C. Miller, with A. W. Johnston and J. F. Thompson, directors. Wm. C. Himrod, treas; D. L. H. Forbes, gen supt.

Inc. in Ontario. **Cap.,** $2,500,000; $1 par; 2,134,000 issued. **Bonds:** $250,000. Traded on Toronto Stock Exchange.

Statement for year ended Aug. 31, 1918, showed an expenditure of $259,694. Income was $107,280, leaving a deficit of $152,415. Current assets were $59,895 and current liabilities $18,957.

Property: 4 miles from Swastika, in Kirkland Lake district, Ont. **Development:** by 600′ shaft, with five levels showing the vein to be 5′ to 30′ wide.

Equipment: hoist, 10-drill compressor, and milling plant, including ball and tube mills, cyanidation by counter current decantation, and Oliver filter. Electric power is supplied by the Northern Ontario Light & Power Co. of Cobalt, whose power plant is 65 miles distant.

Production: commenced in March, 1917, was continued until July, 1918, when property was closed on account of war conditions; reopened late in 1918. From Aug. 31, 1917, to July 2, 1918, the mill treated 15,879 tons ore of an average value of $7.87 per ton. In 1919, property produced 18,387 tons of ore, yielding $169,590.

TOUGH-OAKES GOLD MINES, LTD. ONTARIO

(Subsidiary of Kirkland Lake Proprietary, Ltd.) **Office:** 119 Finsbury Pavement, London, E. C. 2, Eng. **Mine office:** Kirkland Lake, Ont.

Officers: G. R. Bonnard, chairman; R. Simpson, E. H. R. Trenow, directors. C. O. Connell, mine mgr.; H. J. Almond, sec.

Inc. in England, Jan., 1914. **Cap.,** £500,000; shares £1; 230,007 outstanding. Organized to acquire 426,388 fully paid shares of the Tough-Oakes Mining Co., registered in Canada, with a capital of $3,000,000 (£600,000), in $5 shares, together with an option on a further 85,555 shares at 15s. each and 85,555 at 20s. On Feb. 28, 1919, company had 426,843 shares of Canadian company.

During 1915, two dividends of 2½% each were paid by the Canadian company and during 1916 four dividends of 2⅛% each.

For details of property see Tough-Oakes Mining Co., Ltd.

TOUGH-OAKES MINING CO., LTD. ONTARIO

Head office: Toronto, Ont. **Mine office:** Kirkland Lake, Ont.

Officers: Harry Oakes, pres., with Dr. R. J. Robins, J. B. Holden, J. Y. Murdoch and A. Burt, directors. Col. H. H. Johnson, gen. mgr. C. A. Richardson, mgr.

Inc. 1913, in Ontario. **Cap.,** $3,000,000; par $5; 531,500 issued; 426,843 shares owned by Tough-Oakes Gold Mines, Ltd. Operations for 1919 gave a net loss of $105,934.

On account of litigation the mine was closed down in 1918, but reopened March, 1919.

Dividends: to July, 1917, totaled $391,125.

Property: 185 acres in the Kirkland Lake district, Ont. **Development:** by shafts to 500′ depth, with extensive underground work. Ore is largely a hard mineralized feldspar-porphryry, with a net work of quartz stringers. The lode traverses conglomerate and graywacke.

Equipment: includes a 120-ton milling plant, using ball and tube-mills and the counter current decantation system of cyanidation.

Production: in 1918 was 22,000 tons yielding gold and silver worth $139,683.

Recent production figures are not obtainable. In April, 1919, seven drills and 98 men were employed and new work totaled 1,000′. A vein of $20 ore is said to have been found.

UNITED KIRKLAND GOLD MINES, LTD. **ONTARIO**

Address: Kirkland, Ont.

Officers: R. T. Shillington, pres.; W. G. Ellis, v. p.; H. A. Day, sec.-treas., with Levi Dodge and Ed. Kert, directors.

Inc. in Ontario. **Cap.,** $2,000,000; shares $1 par; 1,000,000 issued.

Property: 135 acres near the Teck-Hughes mine, Kirkland Lake district, Ont. Geologic conditions are said to be similar to adjacent producers.

Development: by surface prospecting; No. 1 shaft being sunk in September, 1917.

Company may have fair prospects, but has received considerable over-optimistic advertising by brokers. No recent information.

WEST KIRKLAND GOLD MINES, LTD. **ONTARIO**

Office: care Black & Martin, mining brokers, 147 Bay St., Toronto.

Officers: Edward Martin, pres. and gen. mgr.; Jas. Rogers, v. p.; T. R. Black, sec.-treas.; with S. Hurd and R. Hurd, directors.

Inc. June, 1919, in Ontario. **Cap.,** $500,000.

Property: 80 acres, in Kirkland Lake mining district, is said to show several gold bearing quartz veins on which but little work has been done.

WOOD-KIRKLAND CO. **ONTARIO**

Inc. February, 1920. **Cap.,** $2,000,000. Will explore and develop 300 acres in Kirkland district.

PORCUPINE DISTRICT

This section includes only the mining companies of the Porcupine District, those of Kirkland Lake being given under that heading, while the Swastika and Boston Creek companies are in the general section of Ontario mines.

ACME GOLD MINES, LTD. **ONTARIO**

See Hollinger Cons. Mines, Ltd.

APEX PORCUPINE MINES, LTD. **ONTARIO**

Address: J. A. Jacobs, Traders Bank Bldg., Toronto, Can.

Inc. 1911. Cap., $2,000,000; shares $1 par.

Owns 80 acres in southern Tisdale Twp., Porcupine district, Ont., showing pyrite and free gold. Shaft 108′. Shut down since 1912.

CANADIAN MINING & FINANCE CO., LTD. **ONTARIO**

Office: 85 Bay St., Toronto, Can.

Company is not engaged in any mining operations, simply owning a few claims. The several properties that it formerly managed are now owned by the Hollinger Consolidated Gold Mines, Ltd., which see.

CLIFTON PORCUPINE MINES, LTD. **ONTARIO**

Office: 703 Bank of Hamilton Bldg., Toronto. **Mine address:** Wm. C. Offer, supt.; Box 120, South Porcupine, Ont.

Officers: F. C. Preston, pres.; H. L. Gibson, v. p., with W. E. Preston, Jas. Cowan and Wm. C. Offer, directors.

Inc. April 5, 1919, in Ontario. **Cap.,** $2,000,000; par $1; 1,200,000 shares outstanding.

Property: one claim, 50 acres, in Porcupine district, ¼ mile S. of Dome Mines, Ltd., said to show several quartz veins in quartz-porphyry. When present company acquired the property there were two 90′ vertical shafts, and a 50′ incline shaft; 82 tons of ore shipped from the latter said to have realized $13,170. Total output to date reported as $14,511.

Power and machinery installed, and considerable ore developed above 200′ level in 1919. Electric power installed 1920, and 800′ crosscut on 200′ level started to cut eleven parallel veins.

DAVIDSON CONS. GOLD MINES, LTD. **ONTARIO**

Address: Porcupine, Ontario.

Officers: G. C. Crean, pres.; H. B. Sutherland, v. p.; H. H. Sutherland, mng. director, with W. C. Lacey, directors. L. C. Platt, sec.-treas.; N. J. Evered, mgr.; F. D. Henderson, mine supt.

Inc. 1919, as a reorganization of the Davidson Gold Mines, Ltd. **Cap.,**

$5,000,000; $1 par. Shareholders were to receive a bonus of one share of new stock for every share in original company. After issuing sufficient stock to pay for additional acreage, new company will have 1,000,000 shares in treasury, in addition to $125,000 cash. Half a million treasury shares were, it is said, underwritten at 75c. net, to provide funds for operations.

Property: 5 claims, in Porcupine area, showing a 5½′ vein of gold-bearing quartz, developed by 500′ shaft. A winze put down 300′ below the 500′ level is said to show ore. A second shaft was sunk to open an orebody disclosed by diamond drilling between the 550 and 650′ levels. This ore is reported to be 25′ wide and to average over $24 per ton.

The adjacent ground acquired in the reorganization has increased the holdings to a total of 420 acres.

Over 2,115′ of diamond drilling, and several thousand feet of underground development work has been done. The ore is treated in a 10-stamp mill, and mill heads are reported to have run as high as $20 per ton. Electric power is purchased.

It is claimed that over $83,000 was spent on development work in the 17 months ended January 1, 1918.

Production: in 1919, mill treated 3,831 tons, yielding $27,089.

DAVIDSON GOLD MINES, LTD. **ONTARIO**

Reorganized, 1919, as Davidson Cons. Gold Mines, Ltd., which see.

DOBIE MINES, LTD. **ONTARIO**

Office: 201 Inspector St., Montreal. H. E. Carmichael, mgr., Porcupine, Ont.

Officers: Frank C. Armstrong, pres., 25 Broad St., New York; S. J. LeHuray, sec.-treas., 260 St. James St., Montreal. Directors: F. C. Armstrong, Geo. C. Loveys, Donald D. Fish, B. Osler, and W. A. J. Chase.

Inc. March 27, 1911, in Ontario. **Cap.**, $1,500,000; outstanding, $1,200,000. Of the issued stock, 1,100,000 was given to the owners in payment of the property and $100,000 stock was purchased by the Tisdale Gold Mng. Co., to provide funds for development purposes. Transfer agents: Toronto General Trust Corp., Toronto; Investment Trust Co., Montreal. Listed on Toronto Standard & Mining Exchange, and traded in on the unlisted department of the Toronto Stock Exchange, and on the New York and Boston Curbs.

Property: 17 claims, crown patented, in Tisdale Twp., Ont., taken over from the Tisdale Gold Mng. Co., Ltd. Idle several years.

DOME EXTENSION MINING CO. **ONTARIO**

Head office: 36 Toronto St., Toronto, Ont., Can. H. C. Anchor, supt., South Porcupine, Ont.

Officers: W. S. Edwards, pres.; J. S. Tomenson, v. p.; Alex Fasken, sec.-treas., with J. S. Wilson, A. S. Wigmore, directors.

Inc. Jan., 1911, in Ontario. **Cap.**, $3,000,000; par $1; 2,300,000 shares issued. Annual meeting in May. Listed in Toronto and on New York Curb.

Property: 198¼ acres adjoining Dome Mines, Ltd., on the east, in the Porcupine district . An option to the Dome Mines, Ltd., given in 1919, provided that the latter company should spend $3,000 a month on exploration and development, and had until March 15, 1920, to purchase the property for 76,667 shares of Dome Mines, Ltd. stock. By December, work at 600′ depth had revealed considerable ore, and crosscutting at 1,150′ was started.

Development: 3 shafts and over 10,000′ of underground workings, said to have opened a considerable tonnage of low grade ore.

DOME LAKE MINING & MILLING CO., LTD. **ONTARIO**

Offices: New Liskeard, Ont., and South Porcupine, Ont.

Officers: F. L. Bapst, pres.; A. A. McKelvie, v. p.; F. L. Hutchinson, sec.-treas., with Thos. McCamus, W. H. Kinch, S. J. Dark and Chas. L. Sherrill, directors. Carl Frank, supt.

Inc. Aug. 26, 1912. **Cap.** $3,000,000; $1 par; 2,750,000 shares outstanding. Controlled by Hudson Bay Mines, Ltd., which owns 894,045 of the outstanding shares. Trusts & Guarantee Co., Ltd., Toronto, transfer office. Annual

meeting, second Monday in February. Listed in Toronto and on New York Curb.

Statement for 1918, showed revenue of $97,416; and expenditures, $115,487.

Property: 3 claims, patented, 120 acres, in Tisdale township, Porcupine, showing gold ore in quartz veins, regarded as replacement deposits. The veins run N. 10° E. and have a dip of 70°. The mineralized zone traverses a basaltic rock, and runs through the entire group.

Development: to depth of 600′ by vertical shaft and 16,853′ of workings. Work in 1918 was confined to drifts on the 3d, 4th, 5th and 6th levels on No. 3 vein, west of shaft. Two ore-shoots were found on the 5th level; one 135′ long, the other but 25′; the ore in these shoots varied from $9 to $13.40 per ton. Broken ore in stopes at end of 1919 was 2,422 tons, assaying $9.70 per ton.

Equipment: includes Vulcan hoist, compressor and 200-ton mill. A 100-ton cyanide plant was completed in 1918.

Production: Year	Tons Milled	Gross Value	Value per ton	Extraction %	Costs per ton
1919.....	4,433	$23,832	$6.50	78.85	.....
1918.....	11,929	115,202	9.65	84.5	8.73
1917.....	16,388	68,214	4.16	66.1	8.14
1916.....	6,540	25,629	3.92	....	....

In September, 1919, shareholders authorized a $100,000 bond issue to raise funds for further development. Work was resumed early in 1920.

DOME MINES, LTD. **ONTARIO**

Head office: 36 Toronto St., Toronto, Ont. **Executive and financial:** 43 Exchange Place, New York. **Mine address:** South Porcupine, Ont.

Officers: J. S. Bache, pres.-treas.; W. S. Edwards, 1st v. p.; C. D. Kaeding, 2nd v. p.-gen. mgr.; H. P. De Pencier, 3rd v. p.; Alex. Fasken, sec.; A. H. Curtis, J. S. Bache, treas. and asst. sec., preceding, except H. P. De Pencier, with G. C. Miller, Colgate Hoyt and T. R. Finucane, directors. Sol Wexler, asst. treas. C. W. Dowsett, mill supt.

Inc. March 23, 1910, in Ontario. **Cap.**, authorized $5,000,000; oustanding $4,000,000; shares $10 par. Guaranty Trust Co., New York, and Trusts & Guarantee Co., Ltd., Toronto, transfer agents. Bankers Trust Co., New York, and Toronto Genl. Trusts Corp'n, Toronto, registrars. Annual meeting, second Tuesday in June. On June 23, 1915, the New York Stock Exchange listed $3,500,000 of the capital stock with authority to add $500,000 on official notice of issuance and payment in full.

Dividends: on Sept. 1, 1915, initial quarterly of 50c per share was paid; continued until reduced in June, 1917, to 25c. quarterly. The total was $1,400,000. Disbursements suspended until January 15, 1920, when 25c., equal to $100,000, was paid; 25c. paid April 20.

Comparative General Balance Sheet, years ending March 31:

Assets.

Year	Property and Equipment	Current	Deferred Charges	Suspense	Total
1919.....	$4,430,996	$495,454	$41,647	$34,530	$5,002,626
1918.....	4,449,986	717,921	42,857	31,369	5,242,733
1917.....	4,457,192	677,357	56,825	.....	5,191,375

Liabilities.

Year	Cap. Stock	Current	Reserves	Surplus	Total
1919.....	$4,000,000	$14,251	$931,573	$56,801	$5,002,626
1918.....	4,000,000	21,406	695,930	524,798	5,242,733
1917.....	4,000,000	76,221	418,106	697,051	5,191,375

Profit and Loss Statement, years ending March 31:

Year	Gross Earnings	Expenses	Net Earnings	Dev., Deprec., and Improv.	Surplus
1919.....	.....	$812,852	.....	$234,373	$455,456*
1918.....	$1,041,784	237,279	$236,459	282,329	45,869*
1917.....	2,194,311	1,241,862	952,448	221,369	731,079
1916.....	1,778,959	.....	912,380	370,518	541,861
1915.....	1,055,497	.....	488,498	309,920	178,578
1914.....	1,204,597	.....	753,328	295,631	457,696

* Deficit.

Property: 6 claims, 240 acres, in Tisdale township, Ont. The tract shows the veins of milky quartz usual in the district, the ore carrying free gold and auriferous pyrite. They form a stockwork whose net work of interlacing stringers cut schists and intrusives of pre-Cambrian age. The orebody is over 100′ across in places, and has been proved by diamond drill work to a depth of 1,200′ or more. The original outcrop, a dome-shaped hillock about 30′ high, showed so much free gold at one place that it was called the Golden Stairway. The gold occurs irregularly in the quartz, as large irregular masses, entirely without walls and extremely uneven in value. It is mainly found on or near the contact of an intrusive porphyry with sedimentaries, and is capped by slate. Development has proven the existence of quite as good ore at 700′ and in diamond drill holes at 1,150′ vertically below the surface, as that mined on the surface and in the upper levels.

Company has an option until March, 1920, on the 5 adjoining claims of the Dome Extension Mining Co., and spent $22,669 in 1917, and $3,000 a month in 1919, diamond drilling and doing 2,730′ of new underground work.

Development: the Dome mine has 3 working shafts, the main shaft being 1,200′ deep. Considerable exploration and diamond-drill work has been done on the orebody, especially during the period December, 1917 to June, 1919, when the mill was idle on account of war conditions.

Reserves above the 700′ level are estimated as 3,499,832 tons, averaging $5.36 per ton, while the underlying block of ground down to a depth of 1,150′ has a large tonnage of potential ore. An official estimate of reserves made April, 1917, was 2,250,000 tons averaging $5.32 per ton. In 1918, the average assay value of the ore reserves was $5.10 per ton.

Up to 1918, over 750,000 tons had been mined and milled and 321,000 tons remained in stopes. Stoping costs in that period were 47c. per ton. New methods of mining and ore handling installed in 1919, will, it is said, make a notable saving in costs. A square-type shaft was sunk on the footwall side of the ore-bearing zone, to a depth of 1,000′, with stations at 100′ intervals, and loading pockets for ore and waste on several levels. The eighth level at a vertical depth of 850′, is the main haulage way, all ore going to a 36 by 54 in. jaw crusher just below the station. Ore passes are so arranged that all the ore mined above this level, estimated at 2,000,000 tons, will be moved mechanically after it is loaded into cars. Shaft No. 2 is utilized as a main chute or pass from the upper workings to No. 8 level. Electric locomotives are used for haulage. Ore is hoisted by skips working in balance, taking 4 tons per trip at a speed of 1,100′ per minute.

Equipment: is modern, extensive, and all electrically driven, by power obtained from Wawaitin Falls, 13 miles from the property. Three-phase current is supplied over the company's own transmission line at 12,000 volts, stepped down to 550 volts by 600 k. w. transformers.

The cyanide mill is of 1,500 tons daily capacity. It contains ball-mills (instead of the stamps formerly used), tube-mills, thickeners, agitators, and filter-presses. The mill was idle from December, 1917, until June, 1919.

Production:

Year	Ore Milled, Tons	Value per ton	Recovery %	Cost per Ton Mining	Reduction	General	Total
1919..	187,580	$7.04	.....	....	....	....	....
1918..	247,000	$4.27	97.67	$1.42	$1.05	$0.32	$2.79
1917..	459,530	4.73	92.98	1.44	1.05	0.30	2.70
1916..	347,640	5.50	92.88	1.22	1.01	.32	2.56
1915..	248,550	4.68	90.6	1.38	1.12	.46	2.97
1914..	145,305	8.77	94.51	1.86	1.69	.64	4.19
1913..	101,812	10.72	95.63	1.31	2.35	1.29	4.95

The Dome is a big low-grade mine in which some extraordinarily rich ore is found. The mine and mill are well equipped to handle 1,500 tons daily, and under normal conditions will earn a handsome surplus. From 1914 to 1917, inclusive, the cost of producing 300,000 oz. of gold was $11.80 per oz., but $11 is now considered ample to cover all expenses.

GOLD CENTRE MINES, LTD. **ONTARIO**

Head office: Dominion Bank Bldg., Toronto. **Mine office:** Timmins, Ontario.

Officers: T. G. Marquis, pres.; Geo. S. Bingham, v. p.; M. P. Van der Voort, sec., with A. H. Jucksceh, Wm. R. Kirk, and W. Melrose, directors.

Inc. in Ontario. **Cap.**, $3,000,000; par $1; issued 1,500,000 shares. Transfer agents and registrars, Trust and Guarantee Co., Toronto.

Property: 160 acres, in Porcupine district, formerly owned by the Boyce Syndicate, located about one mile E. of the productive area of the Hollinger Cons. in a section where only a limited amount of work has been done. Reported November, 1919, that company would do about 5,000′ of new diamond drilling.

HISCHA MINES OF PORCUPINE, LTD. **ONTARIO**

Head office: Toronto, Ont. Is a private company with capital of $40,000.

HOLLINGER CONSOLIDATED GOLD MINES, LTD. **ONTARIO**

Offices: 85 Bay St., Toronto, and Timmins, Ontario.

Officers: Noah A. Timmins, pres.; D. A. Dunlap, v. p.-treas.; J. B. Holden, sec., with L. H. Timmins, W. R. McDougold, and J. R. Timmins, directors. A. F. Brigham, general manager; C. G. Williams, general supt.; E. L. Longmore, mill supt.; R. W. Robbins, mech. supt.; A. W. Young, prod. supt.; R. T. Regnell, develop. supt.; Benjamin Richards, mine inspector.

Inc. 1916, in Ontario. **Cap.**, $25,000,000; shares $5 par; 4,920,000 issued. Toronto Genl. Trusts Corp. and Montreal Trust Co., transfer agents. Guardian Trust Co. and Montreal Safe Deposit Co., registrars.

Company is a consolidation of the Hollinger Gold Mines, Ltd., Acme Gold Mines, Ltd., Millerton Gold Mines, Ltd., and Claim 13,147 of the Canadian Mng. & Finance Co., Ltd.

Stock was issued as follows: 200,000 shares in treasury; 2,400,000 to Hollinger shareholders; 2,100,000 to Acme shareholders; 100,000 to Canadian M. & F. Co. shareholders. Shareholders in Acme, Millerton and Canadian M. & F. companies were to receive full dividends from January 1, 1916, on Hollinger Consolidated stock issued to them; amounting to $720,000 in June, 1916. Owing to increased labor costs and scarcity of labor, operations resulted in a deficit and company sold 120,000 shares to shareholders at $6.50, proceeds being used to pay the $720,000 indebtedness.

Comparative General Balance Sheet:

Assets.

	1918	1917	1916
Mining properties	$21,150,244	$21,150,244	$21,150,244
Plant	2,076,463	2,333,084	1,759,846
Development	761,936	756,930	625,706
Deferred Dev. Chgs	276,186	276,186	276,186
Material and Supplies	452,937	281,646	271,099
Cash	125,430	180,092	96,750
Victory Loan	1,625,000	50,000	.....
Other Current & Misc	96,256	102,071	126,275
Bullion Assets, etc	257,299	426,347	489,526
Profit and Loss	.....	.....	269,591
Total	$26,821,751	$25,556,600	$25,065,223

Liabilities.

	1918	1917	1916
Capital Stock	$24,600,000	$24,600,000	$24,600,000
Current	150,464	243,876	465,223
Surplus	2,071,287	712,724	.....
Total	$26,821,751	$25,556,600	$25,065,223

Comparative Profit and Loss Statement:

	1918	1917	1916
Gold and Silver Produced	$5,752,371	$4,261,939	$5,073,401
Other Income	155,957	9,321	*481,201
Total Income	$5,908,328	$4,271,260	$5,554,602
General Charges	296,105	235,542	188,503
Mining Charges	1,875,761	1,503,146	1,277,930
Milling Charges	685,644	523,023	626,312
	$2,857,510	$2,261,711	$2,092,745
Gross Operating Profit	$3,050,818	$2,009,549	$3,461,857
Deprec., Taxes, etc	462,255	289,234	335,857
Net Profit	$2,588,563	$1,720,315	$3,126,000
Dividends	1,230,000	738,000	3,126,000
Added to Surplus	$1,358,563	$982,315	.....

* Includes a deficit of $269,591.

Income for 1919 was $7,063,000; working expenses, $3,222,000; taxes, etc., $1,519,000; leaving net profit of $2,321,000; $599,000 was added to surplus.

Dividends: initial of 1% in July, 1912; 1% quarterly to March, 1917, when rate was increased to 1% every 8 weeks; payments suspended in June, 1917, but resumed in 1918, and to December 31, 1919, total paid was $11,146,000. Present rate is 6% per annum.

Property: the Hollinger mine, 11 claims, 440 acres, patented in Tisdale Twp., Porcupine, and other holdings mentioned; also oil lands in Kansas.

Geology: the chief rock of the entire area consists of basalt in the S. E. portion and the common greenstone of the Keewatin series in the N. W., while between these two areas, approximately 2,000′ apart, lies an area of basalt schist and an area of greenstone schist, which have been intruded by a quartz-feldspar porphyry. The porphyry has not, except near its marginal contacts with the older rocks, proved of value as a source of gold, yet it is believed that its occurrence has had a definite influence upon the mineralization and concentration of gold values in the older rocks. It is within the area between the

basalt and the greenstone that the gold bearing veins are found. Orebodies consist of quartz veins and country rock containing gold and pyrite. Veins do not have well defined walls and as the fissuring has been very irregular, a vein consisting largely of quartz in one place may consist of quartz veinlets and intervening schist a short distance away. The veins are practically vertical.

Ore reserves estimated December 31:

	Tons	Value	Gross Value
1919	4,392,000	$9.09	$39,928,000
1918	4,489,080	9.15	41,080,005
1917	4,494,510	8.95	40,231,435
1916*	3,938,540	8.68	34,185,535
1915**	1,846,000	9.65	17,824,800
1915	1,600,800	10.02	16,031,600
1914	1,162,960	11.49	13,358,420
1913	845,300	13.71	11,604,800
1912	664,540	17.48	11,271,400
1911	462,000	22.14	10,230,000

* For consolidated properties. ** Reserves re-calculated as a basis for consolidation.

Development: to depth of 1,250′ by eleven shafts, one of 1,250′ being on the old Hollinger claim. Development is very extensive; for a while, work was pushed forward by 40 machines at a hundred different faces, levels being opened at 100′ intervals down to 1,250′. Adverse labor conditions and the high price of supplies led to a curtailment of development in 1918, all work below the 800′ level being stopped, yet new work for that year totaled 25,611′, against 29,696′ in 1917; 20,280′ in 1916, and 22,643′ in 1919. Company employed 1,061 men in 1918, compared with 1,045 in 1917, 1,056 in 1916, and 1,207 in 1919.

Equipment: includes a 200-stamp mill with cyanide plant, having a daily capacity of 3,200 tons. The gold is largely free and the ore easily treated by simple crushing by stamps and regrinding in tube-mills, preparatory to cyanide treatment. Power is obtained from a central plant built by the C. M. & F. Co.

Production and Costs (per ton of ore milled):

	Tons Milled	Average Value	Mining Costs	Milling Costs	General Charges	Assay Tailing	Value Recovered
1919	711,822	$9.73	$2.88	$1.22	$0.43	$0.33	$6,722,226
1918	578,755	10.24	3.24	$1.18	$0.51	$1.18	5,752,371
1917	508,139	8.67	2.96	1.02	0.46	1.02	4,261,939
1916	601,854	8.84	2.19	0.97	....	0.40	5,073,401
1915	334,750	10.11	2.18	0.99	....	0.40	3,169,813
1914	208,936	13.67	2.70	1.22	....	0.56	2,719,354

Company has worked the mine under adverse conditions of labor and costs for 2 years past, with creditable results. Running full time and treating 2,800 tons daily of $9.15 ore, with a total treatment cost of $4.50 per ton, gives a return of about $4,500,000 net yearly, or about 18% on the company's capitalization. In 1919, with the mill running 69% normal, the mine produced an average of $134,440 weekly. Early in 1920, mill was treating 2,300 tons of ore daily, but its capacity is 3,200 tons, recovering 96% of the gold.

JUPITER MINES, LTD. **ONTARIO**

Succeeded, 1915, by the McIntyre-Jupiter Mines, Ltd., which see.

McINTYRE EXTENSION MINES, LTD. **ONTARIO**

Property and assets of this company purchased by McIntyre Porcupine Mines, Ltd. (which see), by payment to minority shareholders of 294,000 shares in exchange for 955,501 shares of McIntyre Extension Mines, Ltd. See Vol. XII for description of property, and history of company.

McINTYRE-JUPITER MINES, LTD. **ONTARIO**

Property and assets of company purchased by the McIntyre Porcupine Mines, Ltd. (which see), by payment to minority shareholders of 316,298 shares of McIntyre Porcupine Mines, Ltd., in exchange for 943,893 shares of McIntyre

Jupiter Mines, Ltd. See Vol. XII for description of property and of organization.

McINTYRE-PORCUPINE MINES, LTD. **ONTARIO**

Offices: Standard Bank Bldg., Toronto, and Schumacher, Ontario.

Officers: J. P. Bickell, pres.; H. M. Pellatt, v. p.; with W. J. Sheppard, J. B. Tudhope, and N. S. Dunlop, directors. M. P. Van der Voort, sec.-treas.; L. J. Pashler, asst. sec.; R. J. Ennis, gen. mgr.

Inc. March 16, 1911, in Ontario. **Cap.,** $4,000,000; shares $1 par; increased from $3,000,000, shares $1 par, in 1917, when company purchased properties and assets of McIntyre Extension Mines, Ltd., and McIntyre Jupiter Mines, Ltd. Payment amounted to 610,298 shares for both mines. McIntyre-Porcupine shares issued total 3,640,283. The capital of the three amalgamated companies was $7,500,000, $7,398,878 issued. Outstanding bonds were retired at maturity August 15, 1918.

Toronto General Trusts Corp. and Security Transfer & Registrar Co., New York, transfer agents and registrars. Annual meeting, first Monday in February. Traded in on New York Curb and Standard Exchange, Toronto.

Dividends: initial of 5% paid Feb. 15, 1917; 10c. cash in 1918 and 1919. Total to August, 1919, $1,448,612.

Comparative General Balance Sheet, years ending June 30:

Assets.

Year	Plant and Equip.	Capital Devel.	Investments	Disc. on Sec. Sold	Current	Total
1919.....	$4,688,682	.....	$197,163	.....	$728,992	$5,614,837
1918.....	4,616,811	.....	104,117	.....	393,679	5,125,344
1917(b).	4,432,250	.....	100,000	.....	319,530	4,851,780
1916.....	2,921,991	209,508	175,036	211,992	151,963	3,670,490
1915(a).	2,799,035	209,508	.....	214,492	104,670	3,327,705

(a) 15 months, ending March 31. (b) 15 months, ended.

Liabilities.

	Capital Stock	Bonds	Current	Reserves	Profit and Loss	Total
1919.....	$3,640,283	.....	$122,377	$688,445	$1,163,732	$5,614,837
1918.....	3,610,283	$4,500	106,181	532,207	872,173	5,125,344
1917.....	3,610,283	11,000	87,597	400,996	741,903	4,851,780
1916.....	2,999,985	31,000	111,989	144,466	383,050	3,670,490
1915.....	2,986,985	54,500	114,704	4,989	166,527	3,327,705

Comparative Operating Account, years ending June 30:

		Disbursements			Profit and
	Receipts	Mine	Mill	Miscel.	Loss Account
1919.....	$2,745,990	$510,727	$182,530	$369,381	$683,350
1918.....	1,729,842	607,208	161,201	281,071(c)	680,361
1917(b)....	1,693,040	526,200	159,005	285,185(c)	725,790
1916.....	775,821	265,622	102,389	80,286	327,524
1915(a)....	749,234	319,203	101,354	95,923	232,752

(a) 15 months, ending March 31. (b) 15 months ended June 30. (c) Includes depreciation.

Property: located on the south, west and north sides of Pearl Lake, Tisdale Twp., comprises 347 acres, of which 113 acres are under Pearl Lake and Gillies Lake. The area added by acquiring the Extension and Jupiter mines was 127 and 79 acres, respectively. The immediate object of amalgamation was to secure the right to use the Extension main shaft for deeper exploration of the McIntyre property on N. side of Pearl Lake, as development work had revealed large orebodies at 1,000' depth in both mines.

In 1918, a long term option was obtained on controlling interest in the Newray property adjoining the Plenaurum. Work on the Plenaurum held under option in 1918, failed to disclose orebodies of commercial value. In

November, 1919, company took an option on property of Martin Gold Mining Co., Hurricanaw River district near Amos, Quebec.

Geology: the tract shows a broad band of schistose quartz porphyry, between two areas of altered volcanic schist, basalt and associated lavas.

Exploration has shown that the best gold ore occurs in the altered volcanic schist, at or near the quartz porphyry contact; development in the quartz porphyry away from the contact has not shown much gold. Orebodies are lenticular in form and very irregular, the shoots consisting of quartz more or less interbanded with mineralized schist. The discovery of orebodies has been rendered difficult by the presence of compression faults which have displaced portions of the ore as much as 130′. Eighty per cent. of ore milled is heavily mineralized schist.

Development: to depth of 1,500′ by shafts, with stations at 1,125′, 1,250′, and 1,375′, the latter being the new main haulage-level. Total work, 57,965′ at end of June, 1919, not including 26,907′ of diamond drilling. The McIntyre-Jupiter veins are from 24′ to 50′ wide, with rich stringers running out along the joint-planes in the walls.

Ore reserves:

	Tons	Average Value	Total Value
June 30, 1919	433,057	$11.00	$4,777,324
June 30, 1918	459,276	9.80	4,490,432
June 30, 1917	443,617	11.14	4,943,034
March 31, 1916	201,920	11.12	2,247,128
March 31, 1915	109,693	7.79	854,436

Equipment: property is well equipped with hoisting and milling plants, including a 525-ton cyanide mill, in which a 95% recovery is obtained by grinding the ore in cyanide solution and giving a short period of agitation. (See A. Dorfman, in August, 1917, Bulletin of Canadian Mining Institute.)

Production:

	Tons Milled	Value per ton	Rec %	Costs per ton: Mine	Mill	Total	Profit per ton
1919(d).	179,874	$9.76	95.2	$2.89	$1.01	$5.08	$4.21
1918(d).	178,327	10.05	95.6	3.26	0.90	5.15	4.90
1917(c).	195,307	10.00	95.4	2.99	0.89	4.78	5.22
1916(a).	105,758	7.71	95.6	2.51	0.96	4.28	3.09
1915(b).	85,654	8.87	94.4	3.72	1.18	6.02	2.85
1913.....	31,979	7.85	89.8	....	....	....	....
1912.....	14,500	7.00	75.0	....	....	....	....

(a) Year ending March 2. (b) 15 months, ending March 31. (c) 15 months ended June 30, 1917. (d) Year ending June 30.

For calendar year 1919, company milled 185,018 tons yielding $1,978,013.

Mine development during the past few years has been very satisfactory as the veins on the lower levels show as much commercial ore as the upper workings, and lateral development on the upper levels has opened up entirely new orebodies. These results and the acquistion of adjoining properties, assures a long productive life to the company, which is now the second largest gold producer of Canada.

NEW PORCUPINE IMPERIAL MINES, LTD. **ONTARIO**

Successor of Porcupine Imperial Mines, Ltd. H. L. Taylor, pres.

Cap., $3,000,000; $1 par. Holders of Porcupine Imperial stock received one share of new stock for two shares of old company's stock.

Property: ¾ mile S. W. of Dome Lake, mine in Porcupine district is said to show several veins of gold ore, under development for several years by 115′ shaft with about 500′ of workings. Some diamond drilling has also been done.

NEWRAY MINES, LTD. **ONTARIO**

Office: 55 Yonge St., Toronto, Ont., Canada.

Officers: B. J. Bixby, pres., Buffalo, N. Y.; H. L. Pudor, v. p.; C. P. Charlebois, mgr., and J. E. Day, directors.

Inc. in Ontario. **Cap.**, $1,500,000; shares $1 par; 1,200,000 issued. Imperial Trust Co., Toronto, transfer agent. Traded in on Toronto Stock Exchange.

Is a reorganization of the Rea Consolidated Gold Mines, Ltd.; stock being exchanged at the rate of 1½ shares new stock for each share of Rea Consolidated stock.

Property: North ½ of lots 6 and 7, Concession III, about 320 acres; comprise the Rea mine, at Porcupine, Ont, 1½ miles from Schumacher, the nearest railroad station. The veins are well-defined quartz fissures, strike N. E. and dip N. W.; ore-shoots occur as lenses in and along shear zones.

Development: 2-compartment vertical shaft, sunk 420′ on vein, with levels at 200, 300 and 400′. The oreshoot is cut and displaced by a fault at depth of 240′; below the fault the vein is not of the same character. The orebody above the fault was stoped for about 300′ in length, 4½′ wide, and 200′ in depth and is said to have produced 19,500 tons of ore, averaging $11 per ton. Diamond drilling is said to have cut 12′ of quartz showing free gold at 630′ vertical.

Equipment: includes 10-stamp mill, hoist, 6-drill compressor, pumps and boiler.

Production: mill treated 11,607 tons of ore yielding $125,000 in bullion in 1915. It resumed treatment in May, 1917. Output in 1918 was 401 tons of $3.78 ore.

In November, 1917, property was taken under control by the Crown Reserve company of Cobalt, but option was relinquished in 1918 and McIntyre-Porcupine Mines, Ltd. then took a 2-year option on 1,500,000 shares at 45c. per share.

An immense quantity of literature has been published about this mine, mostly in the interest of speculators. Evidently, the management is trying hard to make it a large producer.

NORTH DAVIDSON **ONTARIO**

Address: L. G. Harris, managing director, Royal Bank Bldg., Ont. R. T. Jeffrey, pres.

Property: Lot 3, Con. 6, Tisdale Twp., Porcupine.

Development: by diamond drill work, 1919.

NORTH DOME MINING CO. **ONTARIO**

Owned by Temiskaming Mining Co., Ltd., which see.

NORTH THOMPSON (ASSOCIATED) GOLD MINES, LTD. **ONT.**

Merged, 1917, into Porcupine V. N. T. Gold Mines, Ltd., which see.

NORTH WOODS MINING CO. **ONTARIO**

Office: 115 Broadway, New York.

Officers: John C. Hicks, pres.; Ernest Sharp, v. p.; A. J. Dunkle, sec.; Charles S. Rees, treas.

Inc. 1914, in Ontario. **Cap.**, $2,000,000; $1 par; all issued. Shares closely held.

Property: 127 claims, 1,080 acres, in Tisdale and Whitney townships, in heart of the Porcupine district, close to the principal mines.

Development: only nominal exploration has been done owing to abnormal conditions. In the fall of 1919 some drilling was done, and work is to be resumed in the summer of 1920.

PEARL LAKE GOLD MINES **ONTARIO**

Bankrupt. Property acquired, 1915, by McIntyre Extension Mines, Ltd., a subsidiary of the McIntyre-Porcupine Mines, Ltd.

PORCUPINE CROWN GOLD MINING CO. **ONTARIO**

Offices: Dominion Exp. Bldg., St. James St., Montreal, Quebec.; 18 Toronto St., Toronto.; and Timmins, Ontario.

Officers: J. W. Carson, pres. and managing dir.; W. I. Gear, 1st v. p.; J. G. Ross, 2nd v. p.; with C. A. Smart, J. W. Ross, A. G. Gardner, R. W. Redford, F. S. Meighen, Ziba Gallagher, Chas. C. Dickson, directors. James Cooper, sec.-treas.; John Reid, asst. sec.-treas.; Samuel W. Cohen, Cobalt, Ont.; cons. engr.

Inc. in October, 1913. **Cap.**, $2,000,000; shares $1 par. Crown Trust Co., Montreal and Toronto, registrar and transfer agent. Sixty per cent. of

capital stock owned by Crown Reserve Mining Co., Ltd. Traded on New York Curb, and on Toronto Stock Exchange.

Balance sheet of December 31, 1918, showed net profit for the year $4,814, compared with $109,421 in the previous year, making a total with balance brought forward of $282,130. Expenses absorbed $10,174, leaving surplus of $271,956. Cash at end of 1919 was $174,576, and total surplus, $224,611.

Dividends: 3% quarterly was paid from 1914 to August, 1917. Total to that date was 42%, or $840,000.

Property: one patented claim, 40 acres, at Porcupine, shows quartz ore with free gold and sulphides in veins in schist. Orebody is 5′ wide and 1,100′ long. Vein strikes N. and has dip of 70° S.

Development: to depth of 1,100′ by vertical shaft. New work to July, 1918, totalled 700′, until property was shut down. Work was resumed early in 1919. Ore is mined by shrinkage stoping.

Equipment: includes 150-ton cyanide mill. Total cost per ton ore was $5.47 in 1916, and $7.07 in 1917.

Production:	Tons Treated	Value per Ton	Extraction	Net Value Bullion
1918	10,907	$9.64	97.09%	$124,474
1917	37,722	10.97	97.09%	.....
1916	51,273	12.11	97.14%	571,652
1915	41,326(a)	14.46	97.70%	613,565
1914	40,857	17.18	97.26%	689,151

(a) Not including 5,093 tons tailing, assaying $3.15 per ton, treated with an extraction of 85%.

The company's prospect of finding new veins is not generally regarded as favorable since the quartz-porphyry throughout the western portion of the property has been proved non-productive. At the beginning of 1919 mine reserves were of estimated value of $500,000. In December, 1919, the company was negotiating for the Moneta property which lies west of the Hollinger.

PORCUPINE EXCELSIOR MINING CO., LTD. **ONTARIO**

Mail returned 1919, from former address at Porcupine, Ont., Canada.

Officers: P. Cameron, pres.; Wm. Duncan, sec.; G. L. Wheeler, asst.

Property: claims, Nos. 13890, 13891 and 900 P. in Shaw Twp., Nipissing district, Ont., formerly owned by the Tommy Burns Mining Co.

PORCUPINE KEORA MINING CO., LTD. **ONTARIO**

Address: W. B. Gunton (who is in control), Toronto, Ontario.

Inc. 1912, in Ontario. **Cap.,** $2,000,000; $1 par; over 1,500,000 outstanding. Listed on Standard Stock Exchange of Toronto, and to be traded on New York Curb.

Property: 5 claims, 200 acres in Whitney Twp., Porcupine district, 5 miles N. E. of the Hollinger and 3 miles N. E. of the Dome.

Development: by incline shafts and extensive drifts to depth of 200′ on vein No. 1. Diamond drill work and underground development is said to show 40′ of $6 ore, but over $70,000 has been spent since February, 1919, in drilling the other veins of the tract. Three drill holes indicate the existence of two comparatively long and wide shoots of high-grade ore in No. 5 and 6 veins, at incline depths of from 250 to 480′. Results are considered to be favorable for development of a tonnage of ore in No. 5 vein, estimated to exist in a block 100′ by 100′ by 20′ of a total value of $1,500,000. This ore will be fully proven by the summer of 1920. Company started shaft sinking late in 1919, and will erect machinery. Is regarded as a property of merit, with promising prospects.

PORCUPINE MINES SYNDICATE **ONTARIO**

Care Mark Harris, Mutual Life Bldg., Buffalo, N. Y. Was a new scheme of the above named promoter and his associates.

Presumably organized to acquire the Cross Veteran location, 160 acres, in Tisdale Twp., Porcupine district. Not regarded favorably.

PORCUPINE PREMIER GOLD MINING CO., LTD. ONTARIO

Office: G. W. Fields, treas.-gen. mgr., 53 State St., Boston, Mass. B. M. Walton, supt.

Inc. in Massachusetts. **Cap.**, $1,000,000; shares $1 par. Traded on Boston Curb.

Property: 40 acres in Whitney Twp., 110 acres in Deloro Twp., Porcupine district, Ont., Can. Also said to own Standard group of about 110 acres, south of Dome Lake property, and the Virtue mine near Baker, Oregon.

Development: on the Porcupine property consists of two shafts, one 200′ deep, with drifts and crosscuts. Mines are in the prospect stage and are outside of the proven belt, but are regarded as worthy of prospecting. Company's promoter is also treasurer and general manager. No recent information, probably idle.

PORCUPINE VIPOND MINES, LTD. ONTARIO

Merged, 1916, into Porcupine V. N. T. Gold Mines, Ltd., which see.

PORCUPINE V. N. T. GOLD MINES, LTD. ONTARIO

Office: 50 East 42nd St., New York. **Mine office:** Schumacher, Ontario, Canada.

Officers: Henry H. Ward, pres.; H. A. Poillon, v. p.; Chas. C. Dickson, v. p.-treas.; H. F. Karst, sec.; C. H. Poirier, mgr., with L. A. Sorenson, and J. A. Carey, directors.

Is a merger of the Porcupine Vipond and North Thompson Mine companies. **Inc.** 1917. Stock traded in on Toronto Exchange.

Property: about 160 acres, adjoining the Hollinger on the west, in the Porcupine mining district, Ontario, Canada. Claims show several quartz veins, one cut on 600′ level reported to average 20′ in width.

Ore: gold quartz, occurs in fissure veins, said to be 3′-10′ wide, which run N. E.-S. W. and are vertical. Pay ore occurs in a shoot 900′ long. Formation is an amygdaloidal basalt.

Ore reserves: in the Vipond, April 1, 1916, estimated at 68,145 tons in place, valued at $8 per ton, and 22,850 tons already broken, but not hoisted, averaging $6.25 per ton, a total of 91,000 tons, valued at $688,600.

Development: by 600′ shaft.

Equipment: includes hoist, 2 compressors, hydro-electric and steam power, and 140-ton mill, which employs the continuous decantation process and is equipped with crusher, 6′ Hardinge ball mill, classifiers, Dorr agitators and Dorr thickeners. The mill was treating 100 tons daily, August, 1917.

Production: 15,134 tons of ore yielding 3,977 oz. gold in 1918. In 1919 explored Krist mine under contract.

In 1918, mine was closed down and lower workings allowed to fill with water. Company was to re-open mine in December, 1919, sink shaft to 800′ or 1,000′ level, and enlarge the mill to handle 300 tons. Management claims ore has improved with depth, and that ore reserves will assay about $10 per ton.

PORCUPINE WHELPDALE MINES, LTD. ONTARIO

Address: B. J. Simons, sec., 911 Royal Bank Bldg., Toronto.

Cap., $2,500,000; $1 par.

Property: north half of Lot 11 in Tisdale Twp., Porcupine, opened by a 114′ shaft and equipped with steam boilers, hoist, compressor, etc.

PRESTON EAST DOME MINES, LTD. ONTARIO

Office: 7 Melinda St., Toronto, Ont., Canada.

Officers: Lt. Col. D. M. Robertson, pres.; Gordon Taylor, sec.-treas., with C. L. Sherrill, R. T. Shillington and D. L. White, Jr., directors.

Inc. 1911, in Ontario. **Cap.**, $3,000,000; shares $1 par; 2,500,000 shares outstanding. Stock listed on New York Curb. Toronto General Trusts Corporation, Toronto, transfer agents.

Property: 3 claims, patented, in Tisdale Twp., Porcupine, Ont., adjoining the Dome Mines, Ltd.

Ore: which occurs in narrow veins in quartz-porphyry, carries coarse gold, associated with pyrite and zinc-blende. Company is idle, pending outcome of further development on the Dome Mines property.

SCHUMACHER GOLD MINES, LTD. **ONTARIO**

Head office: 85 Bay St., Toronto, Ont. **Mine office:** Schumacher, Porcupine district, Ont.

Officers: F. W. Schumacher, pres.; F. L. Culver, v. p.; J. Y. Murdoch, sec.-treas.; H. E. Tremain and C. A. Covert, directors; T. J. Harwood, mgr.

Inc. July 16, 1914, in Ontario. **Cap.,** $2,000,000; shares $1 par; 1,850,000 issued. Traded on Toronto Stock Exchange.

Balance sheet for year ended July 15, 1918, showed assets totalling $1,968,582, including property, $1,393,970; plant and equipment, $198,239; development, $135,606; current assets, $38,267, and discount on shares, $202,500. Liabilities included current, $24,707; and surplus, $81,902.

Revenue from bullion, etc., was $242,061, of which $8,888 was profit, compared with a loss of $7,696 in the previous year.

Property the Schumacher mine, at Porcupine, Ont., adjoining the McIntyre on the W. for ⅛ mile, and the Acme mine of the Hollinger Consolidated for ⅜-mile. Vein outcrops are numerous and extensive, occurring in an E.-W. ore zone 1,000′ wide. The No. 1 vein is traceable for 1,150′, and is from 50 to 60′ wide.

Development: to depth of 600′, with about 12,000′ of work at main or working shaft. Two orebodies cut on the 600′ level by diamond drilling have not yet been mined. The main shaft was to be sunk to 1,000′ in 1919. A second shaft, 400′ deep in December, 1919, is also used.

Reserves: 99,425 tons, averaging $6.78 per ton.

Equipment: includes 180-ton mill containing Hardinge and tube mills, and 300-ton continuous decantation cyanide plant.

Production: March 31, 1917, to March 31, 1918, 45,373 tons of ore yielding $259,365. Output in the calendar year 1918 was 4,463 oz. gold from 19,098 tons of ore.

TOMMY BURNS GOLD MINING CO. **ONTARIO**

Address: H. B. Hatch, Porcupine, Ont.; and Phil. Moore, Brookfield, Nova Scotia.

Officers: W. E. Beattie, pres.; L. M. Myers, v. p.; with V. Marone and J. Fairbrother, directors. A. W. Young, sec.-treas., at last accounts.

Inc. in Delaware. **Cap.,** $3,600,000; shares $1 par; Registrar & Transfer Co., 32 Nassau St., New York, registrar and transfer office.

Owns all but 5 shares of stock of the Tommy Burns Gold Mines, Ltd. Balance sheet of January 31, 1916, shows no other assets besides this stock and $5,000 cash. Balance sheet of the same date for the Tommy Burns Gold Mines, Ltd., gives this stock a value of $99,995 and shows $4,000 cash and total development expense of $5,645.

Not favorably regarded. No recent information.

WEST DOME CONSOLIDATED MINES **ONTARIO**

Head office: Traders Bank Bldg., Toronto. **Mine office:** Porcupine, Ontario.

Officers: Sir Henry M. Pellatt, pres.; Hugh Blain, v. p.; C. H. Manaton, sec.-treas., with J. A. Murry, R. L. Baker & Co., and G. A. Stimson, directors.

Inc. 1915, in Ontario, to take over property and assets of the West Dome Mines Co. **Cap.,** $3,000,000; $1 par; 2,000,000 shares offered in exchange for 3,000,000 shares in the old company, leaving 1,000,000 in the treasury to provide funds for development. Annual meeting in April. Listed on New York Curb and in Toronto.

Balance sheet of December 31, 1917, showed total assets of $3,009,935, with cash on hand $52,718; property and equipment, $2,000,000; discount on treasury stock, $749,965; deferred development, $166,250. Accounts payable were $9,935.

Property: 176 acres, in Tisdale Twp., Porcupine, Ont., adjoins Dome mine on W. Idle from 1912 to 1915, after fire destroyed many lives besides surface equipment worth $75,000. Property shows a quartz vein proven to depth of 1,800′. There are also 8 other veins as yet undeveloped.

Development: by 70° incline shaft, 365′ deep, sunk on a quartz vein that averages 5′ in width and in some places 8′. Workings total about 4,000′

Reserves in September, 1917, were estimated to be worth $2,000,000, the ore assaying $6.17 to $8 per ton. In 1918, a test run of 300 tons ore was made at the Dome Lake mill. This ore assayed $9.55, and an 86% recovery, or $8.21 was saved. Milling and transportation cost $6.05, and indirect charges were $1.23, so that the net profit was only 93c. per ton. Under normal conditions costs would not exceed $6, and mine could be operated with a profit of $3.55 per ton, but 93c. being too low for safety, mine was closed down.

Equipment: includes 12-drill compressor, electric motors and transformers, 4 boilers, drills, etc.

QUEBEC

ALBERT COPPER CO. **QUEBEC**

Office: 25 Broad St., New York. **Mine office:** Capelton, Sherbrooke county, Quebec. Was organized to take over the mining interests of the Nichols Copper Co. in Quebec.

ASCOT MINING CO. **QUEBEC**

A close corporation owning an old copper mine near the Eustis mine, in Ascot township, Sherbrooke county, Quebec. See Vol. XII.

BRITISH MINERALS CORPORATION, LTD. **QUEBEC**

Owns the Siscoe mine, located on an island in Lake De Montigny, 40 miles by river from Amos, on the National Transcontinental Ry. Mine shows quartz veins and stringers in diorite and greenstones. Veins are from 22″ to 10′ in width. Developed by shallow shafts, deepest 100′. An 8-ton sample assayed $39.64 gold per ton. Property is considered worthy of exploration.

CANADIAN WOOD MOLYBDENITE CO. **QUEBEC**

Described in Vol. XIII. Property taken over, 1917, by Dominion Molybdenite Co., which see.

DOMINION MOLYBDENITE CO. **QUEBEC**

Absorbed the Canadian-Wood Molybdenite Co.

Inc. 1917. **Cap.,** $500,000.

Property: the Moss mine, near Quyon, Pontiac county.

Development: by opencuts, exposing molybdenite in reddish gneissoid granite. A 200′ shaft has stopes connecting with the open cuts. The ore is principally finely disseminated in flakes of ½″ or less, and is hand storted. Present company did 12,000′ of diamond drilling, which is said to have blocked out considerable ore.

Equipment: includes 150-ton mill, using crushers, dryers, ball mills and Callow flotation machines. Ore containing as low as 1% MoS_2, gives 95% recovery.

Production: from March, 1917, to January, 1919, over 43,000 tons of 1% ore had been mined and milled. Mine was closed down in July, 1919, on account of the poor market for molybdenum.

EASTERN MINING & MILLING CO. **QUEBEC**

Fred. M. Connell, pres.

Property: the Huntingdon copper mine, 409 acres, near Eastman, Que. The ore deposit is a well mineralized mass of greenstone between serpentine and schist. The mineral is chalcopyrite.

Development: by tunnels. Company has a 250-ton flotation plant built to treat the 50,000 tons of ore on the dumps. Up to first week in February, 1919, the mill had treated 6,000 tons assaying about 2% copper. Concentrates were shipped to Nichols Copper Co. The plant was closed down for several months in 1919, but has been reopened. See Canadian Mining Journal, August 6, 1919, "The Huntington Copper Mine, Quebec."

EUSTIS MINING CO. **QUEBEC**

Office: Eustis, Sherbrooke county, Quebec, Can. W. E. C. Eustis, 131 State St., Boston, Mass., pres., sec.-treas.; F. M. Passow, supt.

Inc. 1878, in Quebec, and operated as a close corporation.

Property: near Sherbrooke, carries 4 parallel interbedded lenses of

cupriferous pyrite, in talcose schist crossed by diorite dikes, the cupriferous belt being traceable for 2 miles. The orebody is worked through an inclined shaft to a depth of about 3,450′ on the incline, with an average dip of 45°. Lenses are 3 to 60′ in width, averaging about 2.5% copper, up to 60 cts. per ton in combined gold and silver values, and 40% sulphur, but with considerable variations, ore occasionally carrying up to 50% sulphur. Footwall vein, or lens 4 to 20′ thick, 50 to 100′ long. Main vein 20 to 60′ thick, 100 to 120′ long. Shaft vein, 3 to 15′ thick, 50 to 100′ long. No. 1 vein 2 to 25′ thick, 20 to 120′ long. Footwall and shaft lenses richest in copper, averaging 4 to 8% while others carry 2½% copper with 42 to 48% sulphur. Property is primarily a producer of pyrite, for the sulphuric acid trade.

Development: the mine, opened 1870, and producing for 80 years, has a 7x7′ crosscut tunnel, 1,000′ long and a 3,000′ shaft, sunk at 20 to 45°, with double skip tracks. The mine is dry, most of the water coming from surface and the upper stopes, but the limited quantity of mine water is very acid, and contains copper in solution, which is precipitated as cement copper on scrap iron as it leaves the tunnel, through which it is conducted by a launder. Mine is served by the Boston & Maine railway. About 150 men are employed in the mine and mill.

Equipment: includes a 150-h. p. electric hoist, good for 3,500′ depth, and two 8-drill, 2-stage air compressors, 1 run by steam and 1 by electricity.

The 300-ton mill, three-fourths mile from the mine, is connected therewith by an electric tram, equipped with three 3-ton cars. The mill has a 150-h. p. electric equipment. Ore is dumped onto grizzlies, coarse ore falling to the sorting floors and conveyor belts, where hand-picked and cobbed. Ore sufficiently rich for shipping is reduced to 2½″ size, and concentrated ore is reduced to ⅛″ size, by crushers and ball mills, going thence to an 8-compartment classifier with spigots discharging to 8 Wilfley tables. Middlings from coarsest tables are returned to ball mills and from finer tables, to the re-crushing department.

Selected ore and concentrates are shipped to various acid works, and there burned for sulphur, the cupriferous cinder remaining then being shipped to the Norfolk smelter, where it is treated for copper. Production is about 30,000 tons of cupriferous pyrite yearly.

FEDERAL LEAD & ZINC CO. **QUEBEC**

Address: J. C. Beidelman, 315 Transportation Bldg., Montreal, Quebec.

Property: claims at Blende, 45 miles back of Cascapedia, Gaspé peninsula, Quebec. Examined in 1918 by Walter Harvey Weed.

Well mineralized fissure veins lie in slates cut by quartz-porphyry and later basic rocks. Ore consists of sphalerite and galena in quartz and spar.

Development: by 1,400′ of drift and crosscut work with tunnel entrance and connection with shaft at depth of 92′. Ore opened above the tunnel is estimated at 60,000 tons, worth $860,000 gross and $479,000 net. Possibilities are considered good.

INDIAN-PENINSULA MINING CO., LTD. **QUEBEC**

Office: W. E. Simpson, Cobalt, Ont., and 52 Broadway, New York.

Officers: W. J. Haines, pres.; P. G. Grant, v. p.; with S. D. Wright, W. H. Storey, A. W. Porter, Frank Groch, and W. E. Simpson, directors.

Inc. July, 1918, in Ontario. **Cap.,** $1,000,000; $1 par; all issued; non-assessable. Annual meeting, Friday before first Monday in September.

Company controls the St. Maurice Mines Co., Ltd., which see.

MARTIN GOLD MINING CO., LTD. **QUEBEC**

Property: in the Hurricanaw district, 40 miles by river from Amos, on the National Transcontinental Ry., consists of parts of lots A and 37, ranges VIII and IX, Dubuisson Twp. Shows a quartz vein in greenstone, 2 to 10′ wide, exposed for over 700′ by stripping and trenching.

Development: 125′ vertical shaft with 75′ of drifting on vein at bottom level. In 1918, company built and operated a small experimental 10-stamp mill. Ore is said to have yielded good gold value, but work was discontinued in July, 1919, on account of financial difficulties. Reported in November, that the McIntyre-Porcupine company of Ontario had taken an option on the property.

MUTUAL CHEMICAL CO. OF CANADA, LTD. QUEBEC

Address: Hugh B. Lee, supt., Black Lake, Quebec.

Property: the Belanger mine, 250 acres in Coleraine Twp., Megantic county, Quebec. Ore is chromite occurring in serpentine.

Development: by shafts, deepest 200′, with workings on 90′ and 190′ levels exposing ore for 500′ in length with crosscuts each 50′.

Equipment: includes an electric hoist, compressor, and 100-ton mill, making an 80% extraction. Concentrate assays 50% chromic oxide.

NORTH AMERICAN MAGNESITE CO., LTD. QUEBEC

Address: 36 Board of Trade Bldg., Montreal, Quebec.

Officers: E. Liersch, pres.; C. L. Higgins, v. p.; W. J. Phelps, sec.-treas.; with C. O. Clark, L. N. Benjamin, A. W. Gifford, A. Letang, and Jas. N. Laing, directors, all of Montreal. W. P. Boshart, supt., Calumet, Que.

Cap., $200,000; par $100; issued $186,000.

Property: 300 acres, in Greenville Twp., Argenteuil county, Quebec, said to have 1,000,000 tons of magnesite. Mining is by open-cut methods.

NORTON, A. O. QUEBEC

Office: Coaticook, Quebec. A. O. Norton, owner and mgr.; W. Jenkin, mine supt.

Property: 600 acres, freehold, except 150 acres, title covering only mining rights, includes the Suffield, King, Silver Star, and Marrington mines, in Ascot township, 7 miles from Sherbrooke, with railroads within 2 miles on either side.

The mines show 3 lenses, of 3 to 20′ width, 1 proven to depth of 400′, estimated by owner to average 4 to 5% copper, from a trace to 10% zinc, 5 to 25 oz. silver, and $1.50 gold per ton. The King mine has a 165′ incline shaft with about 500′ of workings. The Suffield mine has a 350′ shaft with about 1,200′ of workings, showing ore assaying 3% to 4%, and combined gold and silver values of $2 to $12 per ton, with about 25% sulphur. The Marrington mine, 100 acres, 1½ miles from Suffield, and about 1 mile from Capelton, is opened by a 260′ shaft with about 400′ of drifts, developing a lens about 75′ wide at surface, said to carry at depth 5 to 7′ of good ore. Little development work has been done since August, 1914, and no shipments have been made from the property.

Equipment: includes a steam plant, 100-h. p. boiler, a 50-h. p. double cylinder steam hoist and a straight-line air compressor. In 1918, electric power was installed, also compressor and 100 h. p. motor. A 100-ton flotation mill was built in 1919. Property considered promising.

ST. MAURICE MINES CO., LTD. QUEBEC

Office: W. E. Simpson, Cobalt, Ont., and 52 Broadway, New York.

Officers: W. J. Haines, pres.; A. E. Doucet, v. p.; W. H. Storey, sec.-treas., with W. E. Simpson, S. D. Wright, A. W. Porter, and P. G. Grant, directors.

Inc. June, 1916, in Quebec. **Cap.,** $750,000; $100 par; all issued; non-assessable. Annual meeting, first Monday in September.

Property: 5 claims, 683 acres, at Indian Peninsula on Lake Keewagama, 20 miles S. of Amos, Quebec, on the National Trans, Ry. Ore carries molybdenite, treated in a 100-ton mill, employing the Groch flotation system.

WEEDON MINING CO., LTD. QUEBEC

Office: 263 St. James St., Montreal. **Shipping office:** Room 560, 11 Broadway, New York. L. D. Adams, gen. mgr.

In 1915 acquired the property of the East Canada Smelting Co., at Weedon from the Precious Metals Corporation of New York. Controls the Zinc Co., Ltd., which operates a lead and zinc mine at Notre Dame des Anges, Portneuf county, Quebec; also the Canadian Zinc Products Co., Ltd., which operates a zinc oxide plant at Notre Dame des Anges.

Property: 375 acres in Wolff county, Province of Quebec. Has produced 260,000 tons of cupriferous pyrite ore, mined for sulphur as well as copper in the last 6 years. Average assay is 3.3% copper, 40.8% sulphur, trace of lead, 0.77% zinc, 0.5 oz. silver, and 20c. gold per ton.

Geology: ore occurs in two lenses in schist. Main orebody is 570′ long and from 15 to 45′ wide, with dip of 45° N. E., and course N. 37° E.

Development: by two shafts 700 and 900′ deep, and 9 levels driven to the limits of the ore. **Reserves:** on January 1, 1917, were about 200,000 tons.

Equipment: 2 air hoists (60-h. p.), one 150-h. p. electric hoist, 2 compressors (one electrically driven, 1,600 cu. ft. capacity), and all necessary buildings, shops, etc.

The zinc mine is developed by one 300′ shaft. It is equipped with a 150-ton concentrating mill using tables, flotation unit, and magnetic separation. Produces zinc concentrates containing 42% zinc and lead concentrates averaging 60% lead, 65 oz. silver, and $13 gold per ton.

Transportation: at copper mine 3½ miles of aerial tram to railroad, costing 7c. per ton.

At zinc mine there is 4 miles of teaming. Mining costs at copper mine in 1916, including development and all overhead charges were $2 per ton. Complete cost at zinc mine for concentrates, f. o. b. cars, was $6 per ton of crude ore.

Production of copper in 1916, 5,640,000 lb. Mine output in 1919 about 80 to 100 tons daily, or 25% of that in 1917-18. Company does not give out any information.

SASKATCHEWAN

BEAVER LAKE GOLD MNG. CO. **SASKATCHEWAN**

Mail returned, 1919, from Prince Albert, Saskatchewan, Canada.

Property: 32 claims acquired in 1914, from the Prince Albert Epl'n Co., on the north shore of Beaver Lake, 118 miles from Le Pas, the nearest R. R. point, on the Can. Northern Ry., out of Winnipeg.

On the Prince Albert claim, at the contact of the Huronian schist and Laurentin diorite, a 48″ quartz outcrop can be traced for a considerable distance. A 70′ incline shaft, sunk on the vein, is said to show a 4 to 5′ vein averaging $16 in gold and 2 oz. silver per ton. Probably idle.

YUKON TERRITORY

ATLAS MINING CO. **YUKON**

Dead. In February, 1916, holdings were taken over by the Yukon Copper Co., Ltd., which see.

CANADIAN KLONDYKE MINING CO., LTD. **YUKON**

Is a subsidiary of the Consolidated Gold Fields of South Africa, Ltd. On November, 22, 1917, the Granville Mining Co (which see), the bondholding company, applied for a receiver for the Canadian Klondyke Mining and Canadian Klondyke Power companies.

Address: Dawson, Yukon Territory. H. G. Blankman, receiver-manager.

Inc. March 5, 1913, in Canada. **Cap.,** $8,000,000 shares $5 par; $6,000,000 issued. When the receiver took over the property on January 5, 1918, total liabilities (excluding claims of litigants) were $662,038, which included $158,570 in wages. Balance sheet of December 31, 1918, showed current assets of $506,900, and current liabilities of $30,569; total assets, $4,156,837. The profit and loss statement for the year showed a gross profit on operation of $216,963. Gold returns were $452,648, and total income was $487,120; operating charges absorbed $270,157. Net profit to surplus was $44,570.

Property: 151 placer claims and hydraulic lease No. 18, about 26,000 acres, in the Klondyke valley, with total production to date of nearly $12,000,000.

In 1918, company operated 3 dredges which handled 4,300,910 cu. yds. at a total cost of 10.28 c., and yield of 11.19c. per cu. yd., compared with a cost of 14.46c. and yield of 14.76c. in 1917, and cost of 14.22c. and yield of 14.21c. in 1916.

Equipment: includes 10,000-h. p. hydro-electric power plant, six steam shovels, oxy-acetylene plant, electric furnace, and adequate shop equipment.

Reported October, 1919, that the lawsuit had been settled.

GRAFTER COPPER MINING CO. **YUKON**

Geo. Armstrong, E. A. Dixon, J. P. Whitney, Robert Law, and W. C. Pedlaw, owners.

Property: 1 claim, crown-granted, 50 acres, elevation 3,822′, 1 mile N. of the Arctic Chief, near White Horse, Yukon, Can., has a 7-mile wagon road to the terminus of the White Pass & Yukon R. R.

Mine lies in an area of alternating bands of limestone and diorite, with aplitic cross dykes. **Ore:** consists of magnetite containing bornite and chalcopyrite, with a garnet-augite gangue. Ore is estimated to carry 8% copper and $3 gold per ton. Mine opened 1900, but idle until 1907, has a shaft about 90′ deep with 150′ of workings, including some stopes nearly to the surface.

Equipment: includes steam power. Estimated 200 tons of high-grade copper ore on dumps. Operations resumed in 1915 and over 15,000 tons of 6% copper ore shipped to Tacoma smelter since then. No recent returns.

GRANVILLE MINING CO., LTD. **YUKON**

Head office: 8 Old Jewry, London, E. C., England. **American office:** 233 Broadway, New York. Receiver, E. Dexter, 21 Ironmonger Lane, E. C. 2, London, Eng.

Officers: F. A. Govett (chairman), M. H. Orr-Ewing, A. C. Beatty, H. L. Sapte, W. Trask; Lord Brabourne, A. N. C. Treadgold, H. C. Hoover, J. S. Wetzlow, directors; J. Bradshaw, sec.

Inc. Aug. 11, 1911, in England. **Cap.,** £1,500,000; shares £1 par; 1,410,000 shares outstanding.

In 1911 company bought the Treadgold placer properties in the Yukon, for £206,000 cash, £100,000 debentures, and 1,200,000 shares. Part of the property was sold to the Canadian Klondyke Mining Co (which see), which guaranteed the Granville company a minimum income of $240,000 per annum up to February 28, 1928.

Assets consist of $1,646,000 6% convertible debentures and $2,175,000 shares (out of $8,000,000) in the Canadian Klondyke (if converted; Granville holds 49% of the Canadian Klondyke); $1,200,000 6% debentures (out of $1,500,000) in Canadian Klondyke Power Co., Ltd. (a large electric power producer in the Yukon); and 1,015,000 shares in the North-West Corporation, Ltd.

In April, 1917, the courts appointed a receiver for the company at the request of the Gold Felds American Development Co. (which see), the holding company that acquired the American interests of the Consolidated Gold Fields of South Africa, Ltd. The receivership was granted to protect secured creditors from possible actions by unsecured local creditors of the Canadian Klondyke Mining and Power companies, and to prevent forfeiture of the North West company's claims.

On November 22, 1917, the Granville Mining Co., as bondholder, applied to the court at Dawson for a receiver for the Canadian Klondyke Mining and Canadian Klondyke Power Companies, alleging failure to issue bonds for a loan of $1,350,000, or to pay interest thereon, etc. Reported, October, 1919, that the suit had been settled.

YUKON COPPER CO., LTD. **YUKON**

Mail returned, 1918, from White Horse, Y. T. Probably idle.

Officers: Dr. Alfred Thompson, pres.; W. D. Greenough, v. p., White Horse, Y. T.; Jas. Smiley, sec.-treas., Ottawa, Can., at last accounts.

Inc. Nov., 1915, in Canada. **Cap.,** $200,000; shares $100 par; all issued. Company took over holdings of the Atlas Mining Co.

Property: 10 claims, 720 acres, in the valley of Porter creek, 4 to 7 miles west of White Horse, include the Pueblo group of 420 acres, and the Carlisle group of 300 acres.

The Pueblo concession, located 1899, was sold to the White Horse Copper Co. That company immediately bonded it to the British American Corp'n, who relinquished bond in 1901, and property reverted to locator, H. E. Porter. In

1906, the Yukon Pueblo Mines Co. of Spokane, bought the concession, transferring it in 1911 to the Atlas Mining Co., controlled by Greenough Bros. of Spokane.

Geology: the Pueblo orebody is an irregular shaped mass 400′ long and 200′ wide, running N. W.-S. E. and raking north. It is enclosed in crystalline limestone, near a granite contact, and apparently the limestone replaced by the orebody was cut by granite dikes, traces of which remain. There also is a porphyry dike of 3 to 4′ width, crossing the orebody, decomposed and showing copper stains. Ore is essenitally cupriferous hematite, varying in texture from compact to coarse, with some alteration, and with irregular silicification. The copper sulphides in the hematite have been largely altered into carbonates, oxides, and silicates, only a little chalcopyrite having been found to depth of 100′. Principal ore mineral is malachite, disseminated in hematite, with considerable chrysocolla, and some cuprite occurring in veinlets and small masses. Ore ranges from 1 to 10% in copper, and 700 tons of roughly sorted ore sent to the Crofton smelter, carried 5% copper, 1.25 to 2 oz. silver and some gold per ton.

Development: by a 400′ shaft and 28 prospect diamond drill-holes, totaling 3,796′. Employed 100 men at last accounts.

The Carlisle mine, 2 miles from the Pueblo, has a vein 15′ wide, with a high-grade paystreak up to 4′ in width of bornite and chalcopyrite. Developed by shafts of 50′ and 137′.

Equipment: includes steam power, a 10-drill air compressor and necessary mine buildings. Mine has a spur line to the White Pass & Yukon railway, built 1910.

Production: in 1914 was 250 tons of ore per day, shipped to the Tacoma smelter from the Pueblo mine. Property considered promising.

YUKON GOLD CO. **YUKON**

See same title under United States section.

Company operates dredges, hydraulicking, and power plants near Dawson, and is exploring silver-lead deposits near Mayo.

NEWFOUNDLAND

ANGLO-NEWFOUNDLAND DEV. CO., LTD. **NEWFOUNDLAND**

Address: Grand Falls, Newfoundland. Mining properties transferred to Terra Nova Properties, Ltd., which see.

BUCHAN'S MINE **NEWFOUNDLAND**

Idle. **P. O.:** Millerton, Newfoundland. Wm. Scott, gen. manager.

Property is owned by the Terra Nova Properties, Ltd., and described under that name. This company is a subsidiary of the Anglo-Newfoundland Development Co., which has a timber and mineral concession over about a million acres in the center of the island near Grand Falls, and has built largest pulp paper plant in the world. Mining is merely a side issue.

GREAT NORTHERN COPPER CO. **NEWFOUNDLAND**

Office: 11 Broadway, New York City. **Mine office:** Twillingate, Newfoundland.

Officers and directors: H. R. Warnock, pres.; H. G. Terry, M. L. Fonquet, and A. P. Hays, v. p.'s; C. H. Hill, sec.; Obadiah Hodder ,treas. and gen. mgr.

Inc. 1905. **Cap.,** $100,000; shares $1 par. Company was combined with Notre Dame Copper Co. and Hodder Supply Co. of Pittsburgh, in 1912. Reorganized January, 1917, and incorporated in South Dakota with capital of $5,000,000; shares $1 par, 4,033,000 issued.

Lands: 526 acres, freehold, on Twillingate, North Island, on the eastern coast of Newfoundland, in the vicinity of the Tilt Cove mine. Company claims a vein 160′ wide, uncovered for one-half mile and tested to depth of 200′, carrying chalcopyrite, averaging over 2% copper. Management estimates ore reserves of 9,000,000 tons with 500,000 tons blocked out.

Ores: of this district, as developed elsewhere, average about 4% copper, 50% sulphur and $1.50 gold per ton, and are somewhat bunchy, with sphalerite frequently found in connection with the chalcopyrite.

Development: by open-cut, with a 120′ shaft in ore.

Equipment: includes 800-h. p. steam plant, hoist, with a tram line and 2,000-ton ore bins on the sea. Has 1,500-ton coarse crushing plant and 150-ton concentrator.

Company expected to start regular operations in 1919.

HYDRO-ELECTRIC SMELTING CO. **NEWFOUNDLAND**

Developing an old copper property on Little Bay, Newfoundland, operated by a British company, 1878-1890, at last account.

REID-NEWFOUNDLAND CO. **NEWFOUNDLAND**

Address: St. Johns, N. F.

Property: a copper mine at New Bay, N. F., was under development in 1907, but has never been a producer. Company owns the railroad and steamship lines of Newfoundland.

TERRA NOVA PROPERTIES, LTD. **NEWFOUNDLAND**

Secretary and office: E. A. Sursham, Fleetway House, Farrington St., London, Eng. **Mine office:** Millertown, Newfoundland. Mayson M. Beeton, chairman; William Scott, gen. mgr. at Grand Falls, Newfoundland. Is a subsidiary of the Anglo-Newfoundland Development Co., Ltd.

Company owns rights over about 2,500 sq. miles, held by 99-year lease, in the central part of Newfoundland, surrounding Red Indian lake. The principal property is Buchan's River mine, about 5 miles W. of the lakes on the N. shore. Ore occurs in sericitic schists formed of volcanic grits, the vein having strike of N. 51° E. and dipping about 30°.

Development: consists of a 370′ shaft with several levels, having long drifts on the vein. The one orebody thus far found varies from 5 to 10′ in thickness, is 350′ long, horizontally, and 370′ in downward extension. The ore is a complex sulphide carrying 2.36% copper, 8.14% lead, 20.38% zinc, 6.70 oz. silver and $2.72 gold per ton.

Examined and reported on by W. H. Weed.

YORK HARBOUR MINE **NEWFOUNDLAND**

Idle. **Former address:** York Harbour, Birchy Cove, Bay of Islands, N. F. The mine, 4,000′ from the bay, at elevation of 1,000, carries cupriferous pyrite. The ore is compact and close-grained with 2% to 4.5% copper and 38 to 41% sulphur, the sulphur being valuable for the manufacture of acid.

Development: by 360′ main shaft sunk at an angle of 72° to the S. E., practically the same as the dip of the ore lenses. Levels are opened at 60′ intervals, with drifts driven S. W. along the strike of the orebodies.

Equipment: included a 250-h. p. steam plant, with a 50-h. p. Flory hoist and an 8-drill Norwalk high-altitude air compressor. Company supposedly bankrupt and property has been closed down for years.

MEXICO

Owing to the unsettled political condition of this country, and to the numerous massacres of American men in the revolutionary States of the nation, the mining industry of Mexico has been greatly depressed for six years past, and many companies formerly prosperous, have stopped work, while others have maintained merely nominal operations.

As an instance of the burdens under which mining companies operate, in addition to a 25% increase in rail freight and supplies, and the frequency with which bullion was stolen by so-called bandits, the Batopilas Mining Co. of Chihuahua pays 10% of its gross output for taxes. Another example is the Guanajuato Reduction & Mines Co. of Guanajuato; owing to the prohibition on gold exports from the United States in 1918-'19, the company had to pay a premium of $53,558 to obtain Mexican currency with which to meet payrolls, taxes, and supplies purchased in Mexico.

AMERICAN SMELTING & REFINING CO. **MEXICO**

See same title under United States mines.

EXPLORATION CO. OF ENGLAND & MEXICO, LTD. **MEXICO**

In liquidation, 1917.

EXPLORATION CO., LTD. **MEXICO**

Office: H. F. Wreford, sec., 24 Lombard St., E. C., London; P. L. Foster, 61 Broadway, New York.

Directors: R. T. Bayliss, chairman and mng. director; J. H. M. Shaw, mng. director; J. R. Maguire, J. E. D. Ryder, G. D. Smith, and O. E. Warburg.

Inc. March 21, 1904, in Great Britain, to acquire the assets and undertakings of a company of same name, registered June, 1896, except certain assets and liabilities which had been acquired by the Exploration Assets Co., Ltd. The company carries on a general financial business and holds interests in the Tomboy, El Oro, Santa Rosa, Buena Tierra, Greene-Cananea Copper, Chile Copper, Natomas Co., South African Real Estate Trust Ltd., and other concerns, and floated the Mexico Mines of El Oro, Ltd.

Cap., £750,000; shares £1 par; reduced Nov., 1916, to £375,000; shares 10s. par. For every 5 old shares, holders received 3 fully paid shares and £2 of the Assets Company's debenture stock.

Dividends: declared by former company: 1896, 2s; 1897, 2s 6d; 1898, 2s. 6d.; 1899, 3s.; 1902, 1s. Dividends paid by present company: 1905, 1s.; 1906, 1s.; 1907, nil; 1908, 1s.; 1909, 1s. 6d.; 1910, 1s.; 1911, 1s. 6d.; nil in 1913, 1914 and 1915; 1s. in 1916; 6d. in 1917; 9d. in 1918.

For year ending December 31, 1916, there was a net profit of £3,251, making with balance forward, £97,457. Investments were valued at £617,863. For 1917, the profit was £21,024, plus £60,210 from 1916. The dividend absorbed £18,750, and £62,484 was carried forward. Investments were £262,530 plus £183,757 of British Treasury Bills. In 1918 the profit was £31,742, plus £62,484 from 1917. Investments were £305,779 plus £173,692 cash and War Bonds.

INTERNATIONAL CO-OPERATIVE HOLDING CO. **MEXICO**

Dead. Former office was at Las Cruces, New Mexico. See Vol. XIII.

MEXICANA; COMPANIA METALURGICA **MEXICO**

Offices: 82 Beaver St., New York, and 26, Ave. 16th de Septiembre, Mexico City, D. F.

Officers: Geo, Foster Peabody, pres.; D. C. Brown, 1st v. p.; C. J. Peabody, 2nd v. p.; R. E. Safford, sec., asst. treas., with H. H. Dean, G. F. Peabody and Wm. Mason Smith and Isaac Jackson, directors.

Inc. 1890, in New Jersey. **Cap.**, $4,000,000; shares $100 par; fully issued: in $1,000,000 cumulative 8% preferred stock, $1,250,000 guaranteed 6% second preferred stock, and $1,750,000 common stock

Bonded debt $2,774,700 first gold 5s. dated July 1, 1901, due July 1, 1931; interest payable at the company's New York office. Coupon (principal may be registered) $1,000, and registered in multiples of $100. Guaranty Trust Co., New York, trustee. Authorized $3,000,000, of which $732,700 held alive in sinking fund. Subject to call at 110 and interest. Sinking fund, 2% per annum of amount outstanding; bonds so purchased being kept alive and the interest thereon added to the fund. Interest paid without deduction for normal income-tax. Guaranty Trust Co., New York, registrar.

Property: interests are extensive, including control of numerous subsidiary mining, transportation, and land companies, among the more important being the **Sombrerete Mining Co.**, and the **Mexican Lead Co.**, at Sombrerete, Zacatecas, Mex., the **Montezuma Lead Co., Alvarez Lead & Timber Co., Mexican Mineral Railway Co.**, and **Potosi & Rio Verde Railway Co.**

The **Veta Rica** mine, owned outright, is at Sierra Mojada, and is an important silver-lead producer. Development is by a 600′ shaft.

Other important producers are the silver-copper mines at **Concepcion del Oro,** State of Zacatecas. The **San Pedro** and **San Pablo** mines at Diente in Coahuila, 12 miles from Monterrey, are also important producers of lead, and the mines of the San Pedro district at San Luis Potosi are heavy producers of silver, gold, and lead ores, constituting the main supply of ore for the company's custom smelter at San Luis Potosi. Smelter has been operating since February, 1918.

At the **Diente** group, including the San Pedro, San Pablo, and Zaragosa mines, J. S. Carnaham, mgr, silver ore was originally discovered in caves in cliffs of hard blue limestone. It is found in so-called chimneys or pipes, the largest one being beneath a cave 150 meters wide and of same height. The orebodies extend from near the crest of the cliffs or 3,266′ above the valleys, down to the deepest workings. The ore chimneys are connected by thin seams and stringers which are a guide in exploration work. The silver occurs in cerussite, changing to galena in depth. Mining is by panel slicing under mats of timber. (See Brinsmade, "Min. & Sci. Press," November 22, 1919.) Monthly production averaged 1,000 tons, but in December, 1919, ore extraction was suspended, though development continued.

Equipment at Diente: steam boilers, Frazer and Chalmers engine-driven Bullock generators, motor-driven compressor, Lidgerwood hoist, ventilating fans, machine-drills, 3-rail gravity surface tram 1,000 meters long, Hallidie single-rope aerial tram, and 2,200-meter aerial tram to loading-bins at rail.

The **San Luis Potosi smelter,** blown in February, 1918, treating 1,000 tons daily, includes 12 furnaces for the reduction of gold, silver and lead ores, and a special copper department of 100 tons daily capacity. The works have steam and electric power, and employ about 1,000 men. In addition, there has lately been completed the Carmen 250-ton cyanide plant for cyanidation of lower grade ores from the San Pedro mines.

The company is a large producer of lead and silver, with copper and gold, secured mainly as by-products, and is active and enterprising in the rejuvenation of old properties and the development of new mines.

MEXICAN CORPORATION, LIMITED (THE) **MEXICO**

Offices: A. A. Kelsey, 1 London Wall Bldgs., London, E. C. 2, England; 61 Broadway, New York; and Edificio La Mutua, 522, Mexico City.

Directors: F. W. Baker, R. T. Bayliss, Walter McDermott, F. A. Govett, A. S. Elmore, Herbert Guedalla, J. A. Agnew, and Lord Brabourne. Consulting engineers: J. A. Agnew, L. Chevrillon, and Hugh Rose.

Inc. August, 1919, in Great Britain. **Cap.**, £1,000,000; £1 par; £952,729 allotted, of which £850,000 is held by Consolidated Gold Fields of South Africa, Consolidated Mines Selection Co., Central Mining Corporation, Imperial &

Foreign Corporation, Lena Goldfields Co., Lake View & Oroya Exploration, and the Exploration Co., Limited.

When the company was formed 25% of the capital stock was underwritten by the Camp Bird Co., 25% by Santa Gertrudis, and 15% of the capital, or 150,000 shares reserved for subscription by Santa Gertrudis shareholders. Additional shares accrued to Camp Bird, through the shareholding in Santa Gertrudis.

Seventy-six thousand shares were offered at par in September, 1919, to Camp Bird shareholders at the rate of one share in the Mexican Corporation for every 23 shares held in Camp Bird.

By November 28, 1919, £108,040 had been paid in and preliminary expenses of £3,583 incurred.

Company was organized to acquire three promising properties in Mexico.

(1). A 25-year lease on the holding of the **Teziutlan Copper Co.**, at La Aurora, State of Puebla, on the railway line, consisting of 2,500 acres of mineral land, together with a 3,000-h. p. hydro-electric plant, a 500-ton mill and smelter.

The mine has 600,000 tons of sulphide ore blocked out that will assay 2.4% copper, $1.75 gold and silver, and 5.5% zinc, and diamond-drilling has revealed additional ore. This ore needs concentration by flotation, followed by smelting. The plant requires improvements that will cost $500,000, to be repaid at the rate of 20% from the annual profit. The Mexican operating company gets 37½%, and the Teziutlan Copper Co., 62½% of the remaining profit. A yearly profit of $230,000 is estimated, aside from probable profits from custom ores treated or zinc recovered. See Teziutlan Copper in Volume XIII of this Handbook.

(2). The holdings of the **Fresnillo Mining Co.**, at Fresnillo, Zacatecas, comprising the Proaño mine and a total of 733 acres mineral land. The Proaño was worked from 1550 to 1873, when pumping expenses and low silver prices caused its shut-down. In 1919 there was 600,000 tons of tailing left, assaying 0.05 oz. gold and 3.2 oz. silver per ton, besides 3.5 oz. of mercury.

Development: to depth of 1,500′ with workings on 50 veins. Equipment includes a 1,000-h. p. gas engine power plant and 500-ton cyanide mill.

Reserves are estimated as follows:

		Average assay		Total contents	
		Gold,	Silver,	Gold,	Silver,
Outcrop ore	Tons	dwt.	oz.	oz.	oz.
Positive	2,000,000	0.12	5.25	12,000	10,500,000
Probable	2,000,000	0.12	5.25	12,000	10,500,000
Totals	4,000,000	0.12	5.25	24,000	21,000,000
Dump ore:					
Oxide	60,000	0.09	4.9	270	294,000
Sulphide	365,000	0.12	6.5	2,190	2,372,500
Total	425,000	0.11	6.3	2,460	2,666,500

It is estimated by company that with silver at $1 an ounce, the net profit will be $2.10 per ton and the profit from the tails $1 a ton.

The power-plant is to be enlarged to 3,000-h. p, and the mill to 2,000 tons capacity at a cost of $2,000,000.

The company engineers estimate an annual return of 33% on the investment in the Teziutlan and Fresnillo properties.

(3) a 22% interest in the **Esperanza Company's** new mine in Jalisco.

The rejuvenation of these mines is not an easy matter, nor are the ores high grade. Moreover, $2,500,000 must be spent to enable the Teziutlan and Fresnillo mines to make 33% annual return. The undertaking is a large one, but in the hands of people who are accustomed to handling enterprises of this kind, so that success is confidently expected.

MINERALES Y METALES, COMPANIA DE **MEXICO**

Subsidiary of American Metal Co., Ltd. **Office:** 61 Broadway, New York.

Cap., $2,500,000; $100 par; of which A. M. Co. owns 24,423 shares. Increased from $1,250,000 in 1917.

Company owns the following properties:

Guadalupe—Mines and smelter	Nuevo Leon
Cerralvo—Mines and smelter	Nuevo Leon
Providencia Mines	Zacatecas
Santa Eulalia Mines, under lease and bond	Chihuahua
Guanacevi—Mines	Durango
Oil leases	Vera Cruz

Company manages or controls the following properties:

Agujita Coal Mines	Coahuila
The Torreon Smelter	Coahuila
Paloma Mines	Coahuila
Parrena Mining Co	Coahuila
Penoles Mines	Durango
Monterrey Smelter and Refinery	Durango

1. The mines near Guadalupe, owned outright, cover 2,270 acres, and yield lead and zinc ores shipped over an 18-mile narrow-gauge railway to the treatment plant at Guadalupe. This smelter has a blast-furnace with capacity of 75,000 tons lead ores annually, making 7,000 to 8,000 tons of bullion. There is also a calcining plant for zinc-carbonate ores, capable of handling 7,000 tons per month from the mines near Guadalupe, and the company's other mines and custom ore. At Guadalupe there is also a modern power-plant, offices, workmen's houses, schools, hospitals, and other miscellaneous equipment.

2. *Cerralvo.*—This unit of 750 acres, includes a mine and smelter. The concentrate is either shipped out or treated at the smelter at Cerralvo. The mine produces 1,200 tons of 40% lead ore and can furnish 300 tons of zinc carbonate ores monthly. The Cerralvo smelter treats 35,000 tons of lead ore per annum. Transportation between the mine and smelter and the railroad junction at Herreras is by means of automobile-trucks.

3. *Providencia Mines*—These mines are capable of producing 4,500 tons of lead-silver ores per month, averaging 18% lead and 13 oz. of silver; also 1,500 tons of oxidized zinc ores running about 35% zinc. The ore goes by aerial tramway and narrow-gauge railway to the National Railway at Saltillo. The zinc ores are sold in the United States and the lead-silver ores treated at the various smelting-plants controlled by the company. A first-class power-plant is under construction at these mines.

4. *Guanacevi*—In Guanacevi the company, in 1919, acquired valuable silver properties covering 415 acres. As Guanacevi is remote from a railway and in an unsettled district, the company has not yet begun operations there. Work already done on the properties is said to show that they are worth more than the amounts invested.

5. *Santa Eulalia*—These properties cover 2,935 acres, operated under lease and bond. The leases run from 10 to 15 years and require the payment of a royalty. The properties are still in the development stage. Ores will be transported by aerial tram from Santa Eulalia to the main line of the National Railway.

6. *Vera Cruz Oil-lands*—Early in 1917, before the enactment of the new oil-land laws in Mexico, company acquired 6,710 acres of oil-land under leases in the State of Vera Cruz, adjacent to producing properties. No development work has been undertaken owing to high cost of operation and unsettled conditions.

7. *Railway equipment*—The company owns and operates about 30 locomotives and 900 cars, which it was compelled to purchase in order to transport its product over the National lines.

8. *Real estate*—The company owns office-buildings at Monterrey, Laredo, and Saltillo; also a recreation park in Monterrey.

9. *Compania de Combustibles Agujita, S. A.*—Incorporated in 1917 with a capital stock of 45,000 shares of P100 each. Of these shares the Minerales Co. owns approximately 55,000, the rest being owned by Mexican citizens. The company owns coal-lands aggregating 2,700 acres at Agujita and 1,525 acres at Lampacitos. The developed tonnage is estimated at 18,000,000 tons, and the mines are capable of maintaining a production of 45,000 tons per month. A modern washery, recently completed, serves a coking-plant with a capacity of 12,000 tons at Agujita and 500 at Lampacitos. The largest proportion of the output of the Agujita Co., both coal and coke, goes to the Minerales Co. and the national railway lines. The excess is sold to domestic consumers through a fuel-selling company, which the Minerales Co. also controls.

10. *Fuel Sales Co.* (*Cia. de Combustible Nacional y Transportes, S. A.*)—This company was incorporated with 1,250 shares of P100 each, of which the Minerales owns 750, for the purpose of disposing of the excess production of coal and coke not required by Minerales and its subsidiaries or by the National Railway companies. This company has its own transportation equipment, consisting of three 90-ton locomotives and 60 standard-gauge cars, and maintains a retail-sales agency in Sabinas and Mexico City.

11. *Compania Metallurgica de Torreon*—This company has a capital stock of 50,000 shares of P80 par value, of which the Minerales Co. owns approximately 83%. The company owns 503 acres, including mines and a large smelting-plant near Torreon. The plant consists of nine lead blast-furnaces and one copper blast-furnace, with an annual capacity of 400,000 tons. There is a copper converter to treat copper matte, and two Dwight-Lloyd roasting-machines, and all the necessary auxiliaries, such as power-plant, etc. This plant has been operated as a custom smelter for the past 15 years. The normal production is 20,000 tons of silver-lead bullion per annum and 2,500 tons of blister copper. The company has an extensive townsite, with dwellings suitable both for laborers and officials, offices, hospitals, schools, etc.

12. *Parrena Mining Co.*—The capital stock of this company is P500,000, of which the Minerales Co. owns 50%. The company owns mining properties in the Sierra Mojada district, covering 475 acres, from which are produced lead-silver, copper, and zinc ores. The Parrena Co. also owns a 50% interest in the San Salvador mine in the same district, which has been producing for over 30 years. The Parrena Co.'s own properties are still in the development stage, although the value of the production up to date covers development expenses.

13. *Cia Minera Paloma y Cabrillas, S. A.*—This company has a capital stock of 72,000 shares of P50, which is distributed throughout the United States, Mexico, and foreign countries. The company owns 278 acres of mining properties near Higueras, in the State of Coahuila, and is connected with the National Railway lines at that point by an aerial tramway. The mine is equipped with adequate power-plant facilities as well as offices, workmen's houses, hospitals, schools, etc., and is capable of producing 5,000 tons monthly of iron-lead ores containing 15% lead and 3 oz. of silver, and 800 tons of zinc carbonate ores containing 32% zinc.

14. *Compania Minera de Penoles, Durango*—This company has a capital stock of 120,000 shares of P30 each. Its property, which is one of the best and longest known in Mexico, covers 7,123 acres, from which 15,000 tons of lead-silver ores are being produced monthly, containing 14% of lead and 13 oz. of silver and 1 oz. of gold.

The Mapimi smelter also owned and operated by this company has five blast-furnaces and a roasting-plant for the treatment of 400,000 tons of charge per annum, and there is also an arsenic plant which produces arsenic as a by-product from smelting operations. One power-plant supplies mine and smelter, as well as the town. A 25-mile narrow-gauge railway connects both mine and smelter with the National Railway lines at Bermejillo. The normal yearly production of the plant is 25,000 tons of silver-lead bullion and 5,000 tons of white arsenic.

15. *Monterrey smelter and refinery*—In 1918 Minerales perfected a leasing arrangement with the Compania Minera, *Fundidora y Afinadora Monterrey, S. A.*, for the operation of its smelting and refining plant at Monterrey. This plant

recently modernized, is under the management of the Minerales staff. It can smelt 200,000 tons of lead ores per annum and has a refining capacity of 50,000 tons of lead bullion. It also has an electric silver parting plant for the separation of gold and silver, equivalent to a production of 10,000,000 oz. of silver. This plant treats primarily ores and bullion controlled by Minerales, but also handles custom business.

In addition to the above, the Minerales Co. has minority interests in several other companies which it does not operate, and maintains a trading department for the marketing of its own products as well as for the purchase and sale of the products of independent companies operating in Mexico.

STATE OF AGUASCALIENTES

ASIENTOS MINING CO. **AGUASCALIENTES**

Idle on account of unsafe conditions at Asientos, Ocampo, Aguascalientes, Mex. Chas. Adler, v. p.; Abram Rapp, gen. mgr., at last accounts.

Inc. 1898, in Delaware. **Cap.**, $1,000,000; shares $10 par; non-assessable; fully issued.

Lands: 190 acres, including the old Nopensada and Alta Palmira mines, and the Veta Grande and Refugio mines. The Nopensada, a considerable producer in early days, carries slightly argentiferous copper ore, of about $40 per ton average value. The Alta Palmira mine, having a 450′ shaft, produced auriferous and argentiferous copper ore. The Refugio mine shows ore carrying up to 10% copper and 1,100 grams silver per metric ton, with small gold values.

Equipment: includes a 150-h. p. steam plant and hoist.

FORTUNA, S. A.; COMPANIA MINERA LA. **AGUASCALIENTES**

Address: Aguascalientes, Mex. **Mine office:** Tepezalá, Ocampo, Aguascalientes, Mexico.

Officers: Geo. B. Wardman, pres.-gen, mgr.; O. F. Westlund, v. p.; De Witt Crevelling, sec.-treas. Alberto Pez, supt., at last accounts.

Inc. 1902. **Cap.**, 200,000 pesos; shares 100 pesos par.

Property: 20 hectares, including La Fortuna and adjoining mines.

Development: by tunnels and a 100-meter blind shaft to a vertical depth of 200 meters, and length of 600 meters, showing oxidized argentiferous copper ores of commercial grade.

STATE OF BAJA CALIFORNIA

BOLEO; COMPAGNIE DU **BAJA CALIFORNIA**

American office: Cunard Bldg., Market St., San Francisco, California.

Secretary and office: M. Georges Odier, 56 Rue de Province, Paris, France. Mine at Santa Rosalia, Sur, Baja California, Mex. Directors: Albert Mirabaud, pres.; William d'Eichthal, Marquis de Montaigu, Henri Puerari, Ernest Tambour, Charles de Wendel, P. Gal, and Alex. Tombelaine. R. Plonin, resident mgr. in California.

Inc. May 16, 1885, in France. **Cap.**, f12,000,000; shares f100 par. There are also 46,000 founders' shares. Is controlled jointly by the French house of Rothschild and the Banque Mirabaud, and owns a considerable share interest in the Compagnie d'Inguaran. Is exempt, until December 17, 1925, from all federal and local taxes, except stamp taxes; is exempt, until 1935, from export and import duties on fuel consumed; is exempt, until 1942, from custom duties and local duties.

Balance sheet of December 31, 1915, published May, 1916, shows: assets, f 37,119,557, which includes: works, f 1,000,000; ore and copper matte, f 6,198,029; supplies on hand and en route, f 5,792,483; live stock, f 488,267; cash on hand and in banks, f 7,233,532; notes receivable, f 5,799,642; acct's receivable, f 10,214,122. Liabilities include: stock outstanding, f 12,000,000; reserve fund,

f 8,517,189; acct's payable, f 8,335,418. Operating profit for 1915 was f 7,941,489, as compared with f 4,587,442 in 1914.

For 1917, the credit balance was f 6,048,789, of which f 4,800,000 was distributed to ordinary shares; f 1,147,013 to founder's shares, and f 101,776 as directors' percentage. Reserves amount to f 14,678,436.

Five per cent. of the net profit goes into the reserve fund, 8% to the ordinary shares and 2% of the remainder to the directors. Of the balance then left, 77% goes to the ordinary shares and 23% is divided among 46,000 founders' shares. The result is that ordinary stockholders get 73½% of the profit, founder shareholders 19½%, and directors 2%.

Dividends: f 62.5 in 1901; f 62.5 in 1902; f 104.16 in 1903; f 135.41 in 1904; f 200 in 1905; f 312.5 in 1906; f 200 in 1907; f 25 in 1911; f 36 in 1912, with f 34.1 for founders' shares; f 35 in 1913, with f 21 for founders' shares; f 22 in 1914, with f 10.90 for founders' shares; f 40 in 1915, with f 24 for founders' shares; f 75 in 1916; f 40 in 1917.

Property: the mines lie in three different arroyos at a distance of about 19 miles from the plant, the latter being at the port of Santa Rosalia, where a harbor has been enclosed by breakwaters built of poured slag. The ores are in the form of 3 "mantos", or bedded deposits, slightly inclined, resting on an extensive stratum of conglomerate. The predominant minerals are the oxides and silicates of copper, with many rare species, some containing antimony. The deposits dip at angles between 10° and 15° toward the sea, that is to the east. Water is found at a shallow depth, which is raised by large centrifugal pumps. The roof is soft and is subject to caving, which renders the problem of timbering the stopes somewhat difficult and costly. A force of 3,500 workmen is employed, and a population of 11,000 persons depends upon the operation of the property. The region is a desert, nearly destitute of vegetation, and incapable of cultivation. The ores comprise a remarkably varied series of oxidized copper minerals in which the metal occurs in combination with silver, lead, cobalt, manganese and other metals. The oxide is melaconite, more or less mixed with manganese and iron oxides; ore sulphides below water level are coyellite and copper glance.

The following rare minerals are peculiar to this deposit; boleite, an oxychloride of lead, copper and silver; cumengeite, oxychloride of lead and copper; fosgeneite, a chlorocarbonate of lead; spherocobaltite, a carbonate of cobalt. Practically every known oxidized ore of copper occurs here, as well as those of lead, manganese and iron. Gypsum is abundant and native sulphur occurs. All minerals occur in an unctuous, decomposed tuff, locally called soap-clay.

There are 3 cupriferous beds, the upper averaging about 3′ in thickness, the middle 2 to 3′, and the bottom, 2 to 10′. The middle bed carries oxide and carbonate ores in oolitic concretions, known locally as boleos; hence the name of the mine. The lowest bed, partly below in the water line, carries sulphide ores, as well as oxides and carbonates. This bed, called No. 3, has been the chief source of ore supply of the property. It averages a meter thick, from a few inches up to 16′ in different parts of the property. The ore is disseminated through the tuffs in thin, irregular veins, with clay gouge, and has a marked concentration toward the bottom of each bed, where the ore forms compact layers of 6 to 12″.

Development: the mine is worked by tunnels 15 to 200 meters above sea level, and by 7 shafts, varying from 150′ to 500′ deep, with extensive underground workings.

Owing to the peculiar occurrence of the ore, drilling is done by hand, the ore is hand-sorted, and about half the output is machine-briquetted at a cost of only about 18 cents per ton, the argillaceous gangue serving as a natural binder.

Equipment: the mines have complete steam and electric plants, generating upwards of 2,500-h. p. from steam engines, of which 2,000-h. p. is transformed by two 500-k. w. 3-phase current generators and two 250-k. w. 3-phase generators. The Santa Rosalia electric plant furnishes power for hoisting, traction engines and a lighting system having 50 arc lights and a number of incandescent lamps. The climate is tropical, and the country extremely arid. Potable water is brought from a reservoir on the Yaqui plateau, through a

16,074-meter pipe-line, having pumps at Santa Agueda and Santa Rita. The mines and works are connected by a 30-kilometer private railway, equipped with 9 locomotives and 250 cars.

Compañia del Boleo treats 1,000 metric tons daily, the ores averaging from 4 to 5% copper. There are 7 blast-furnaces in operation, with a capacity of 200 tons each per 24 hours. The ores are mainly oxidized and contain a large amount of moisture as delivered to the smelter. The products shipped are black copper assaying 93% in that metal and matte containing 63% copper.

In 1918 the company employed 3,500 men. Almost all hand labor is Mexican with some Yaqui Indians. Europeans are only employed as foreman and for special work.

Production: in 1918-'19 averaged 1,673,776 lb. of copper per month from ore that averaged 3.49% copper; 29,120,000 lbs. in 1910; 27,686,400 lbs. in 1911, and 28,336,000 lbs. in 1912. The production of ore mined for 1911 was 355,100 tons of 3.47% ore; 364,850 tons of 3.51% ore in 1912; 371,300 tons in 1913; 324,000 tons in 1914; 316,800 tons in 1915. The smelter handled 356,700 tons of ore in 1911; 360,000 tons of ore, yielding 12,650 tons of copper in 1912; 374,350 tons, yielding 3.47% or 13,000 tons copper in 1913; 324,000 tons, yielding 3.53% or 11,480 tons of copper in 1914; 317,000 tons, yielding 3.62%, or 11,500 tons of copper in 1915; 290,000 tons of 3.79% ore for 11,000 tons of copper in 1916; and 258,400 tons of 3.56% ore for 9,225 tons metal in 1917. Reserves of ore amount to 6 year's supply.

The company's policy of secretiveness concerning mine operations, together with its refusal to permit inspection by visiting engineers and geologists, has made it impossible to give detailed information concerning a unique ore deposit and its exploitation. The property is one of exceptional merit and has been ably managed for many years. Company has been able to continue operations despite revolutionary disturbances in Mexico.

Producing at rate of 1,600,000 lb. of 3% copper ore monthly in 1917, about 1,800,000 lb. in 1918; and 1,300,000 lb. monthly in 1919.

ESMERALDA COPPER MINING & SMELTING CO.

Idle. Mine near Santa Catarina del Norte, Baja California, Mex., known as La Esmeralda, is opened by shaft, with considerable development.

ESPERANZA MINING CO. **BAJA CALIFORNIA**

Secretary and office: E. W. Nicholson, 801 Land Title Bldg., Philadelphia, Pa. **Operating office:** P. O. Box CCC, San Diego, Cal. Mine near Ensenada, Baja California, Mex. Geo. P. Brown, gen. mgr.

Property: 83 hectares, and 40 acres miscellaneous lands, on Cedros island, on the Pacific coast, shows diorite cut by veins having 3 lenticular ore shoots, carrying carbonate and sulphide ores, estimated by company to average 40' width, 300' depth and 1,100' length, and to contain an average of 2.5% copper, 3% zinc, 2 oz. silver and $3.50 gold per ton.

Development: about 8,500' of workings, showing 150,000 tons of low-grade ore, with about 100,000 tons blocked out for stoping. Has received about $450,000 from shipments to the Denver, Pueblo, San Francisco and Tacoma smelters.

Unsettled conditions in Mexico since 1914 have prevented reopening the property.

GULF COPPER CO. **BAJA CALIFORNIA**

Head office: Phoenix, Ariz. Mine at Angeles Bay, Gulf of California, Mexico.

Cap., $1,000,000; shares $1 par. J. H. Baker, pres. and gen. mgr.; G. E. Anthony, mgr. engr.; J. H. Louden, directors.

Property: 40 hectares, about 100 acres, at north end of Angeles bay, 140 miles N. W. from Guaymas and about 90 miles S. W. from Port Lobos. Claims show silicious schists cut by porphyry dikes and a vein running N. W., dipping at 45° and varying from 5 to 42' in width.

Ore: black oxide and sulphide of copper said to average 4.7% with trace of gold and silver.

Development: by tunnels with 1,363' workings, including winze sunk on

vein 175'. Has shipped 300 tons, 25% picked ore, and has several thousand tons of low-grade ore on dump. Property considered promising if properly financed and handled. Presumably idle; no recent returns received.

SAN JUAN REDUCTION CO. **BAJA CALIFORNIA**

Address: San Antonio, Baja California, Mexico. Paul Knapp, gen. mgr.; J. C. Puttner, mine mgr.; David Lawrence, mill supt. Operates a mine yielding gold-bearing arsenopyrite ore, 5 miles E. of Triunfo.

The reduction plant has dry rolls, Hardinge mills, roasting furnaces, and cyanide department. No recent information is available.

WEST MEXICO MINES CO. **BAJA CALIFORNIA**

Office: Krape Inv. Co., Gas & Electric Bldg., Denver, Colorado. **Mine office:** San Antonio, Baja California, Mexico.

Officers: W. G. Krape, pres.-mgr.; D. H. Lawrence, v. p.-supt.; H. C. Van Norman, sec.; T. Williams, treas.

Inc. January, 1912, in Arizona. **Cap.**, $3,000,000; shares $1 par; non-assessable; outstanding 1,985,000 shares. Annual meeting, first Wednesday in January.

Property: 3 claims, about 30 acres, in the San Antonio district, 38 miles S. of La Paz, Lower California, Mexico. Veins are both fissure and contact, containing gold and silver. Pay ore occurs in shoots and streaks, the main orebody varying from 3' to 14' wide. Sulphides appear at 275' depth.

Development: by inclined shaft, greatest depth being 340' and extent of lateral workings 5,000'. Company claims to have 15,000 tons in reserve with a gross value of $400,000.

Equipment: includes a 3-stamp concentrating mill.

Production: total production said to be $20,000 from 6 shipments of ore assaying $192 to $326 per ton.

In 1914 the Wm. G. Krape Inv. Co. was selling this stock at "12½c. per share, fully paid and forever nonassessable" on the installment plan, a statement that is itself a warning.

STATE OF CHIHUAHUA

ALMOLOYA MINING CO. **CHIHUAHUA**

Office: 203 Broadway, New York. **Mine office:** Baca, Chihuahua, Mexico.

Officers: Nils O. Bagge, pres.; W. H. Schlofield, v. p.; C. I. Morey, sec.-treas.; preceding officers and W. M. Jermyn, directors; Victor C. Joslyn, mine mgr.

Inc. 1903, in Arizona. **Cap.**, $2,000,000; shares $1, in $800,000 participating non-cumulative 10% preferred stock, and $1,200,000 common stock, all outstanding. New York Trust Co., registrar. Holds title to lands through Minas de Almoloya, S. A., a Mexican corporation.

Property: 177 hectares, including the San Enrique group adjoining the Cigarrero mine, and 4 other groups, about 4 miles from Baca, in the Allende district, with rail transportation over a standard-gauge line to the Cigarrero mine.

Geology: the Sierra de Almoloya is an isolated mountain range, about 9 miles long and 2 wide, carrying limestone beds of the Comanche series of the Lower Cretaceous, extensively fractured by several systems of faulting, with shear zones of 50 to 90 metres width, principal zones being the northeast system, of Eocene age, of which the most prominent is the San Pedro fault zone, and the N. 40° W. system of Miocene age, which are the sources of large and rich ore chambers, the most important orebodies occurring at the intersection of these faults. Lands adjoin the Cigarrero mine on the northeast, and carry the extension of the San Pedro fault, proven by diamond-drilling to occur between the 800' and 900' levels.

Ore so far found has been in pockets, in leached shear zones, carrying low

copper values, which are expected to increase at depth, with about 30% lead, 700 grams silver and 8 to 80 grams gold.

Development: several shafts, deepest 700′, and 4 tunnels, longest 1,600′. Present development is confined to the San Enrique and Exploradora groups, having 1,186′ of shafts and winzes, with 2 main and several shorter tunnels, and a total of 4,400′ of workings.

Equipment: includes gasoline and air power, with one 15-h. p. and two 60-h. p. hoists. Electric current is to be used as soon as available.

Past operations have been almost entirely along the San Pedro fault which shows ore in depth. Revolutionists practically stopped all work in 1913, holding the superintendent for ransom in April and stopping mail and telegraphic service. Work will be resumed when conditions are again stable.

ALVARADO MINING & MILLING CO. CHIHUAHUA

Offices: Richard Fay Parker, sec. and asst. treas.; 60 State St., Boston, Mass.; R. F. Lilley, asst. treas., Mills Bldg., El Paso, Texas. **Mines and reduction plant:** Parral, Chihuahua, Mexico; T. G. Hawkins, Jr., asst. mgr.; D. V. Fennessy, cons. eng.

Officers: A. J. McQuatters, pres. and gen. mgr.; Gordon Dexter, v. p.; J. Dudley Clark, treas.; N. H. Peckham, with S. R. Kaufman, F. W. Clifford, Junius Beebe, Herbert Dumaresq, Dr. Leonard Wheeler, and Frederick Parker, directors.

Inc. 1910, in Maine. **Cap.**, $7,000,000; shares $20 par; 215,251 shares issued; increased 1920, from $6,000,000; par $5. Dividends: $2 per year, payable 50c. quarterly beginning April, 1920. Old Colony Trust Co., Boston, Mass., transfer agent; State Street Trust Co., Boston, Mass., registrar. The American Engineering & Operating Co., in which Alvarado M. & M. holds a 20% interest, has worked the property since October, 1917, for 30% of net profits. Contract expires April, 1920.

Comparative General Balance Sheet.

Assets.

Year	Property	Power Plant	Cons. & Devel.	Stock Discs.	Current	Total
1918	$6,482,439	.....	.....	$59,143	$366,206	$6,907,787
1917	.....	.....	.....	.....	.....	.....
1916	.....	.....	.....	.....	.....	.....
1915	5,355,935	$100,000	$1,099,388	20,000	536,310	7,111,634
1914	5,355,935	100,000	910,616	30,073	371,495	6,768,120

Liabilities.

Year	Cap. Stock	Bonds and Notes	Res. for Bond Conv.	Misc.	Current	P. & L. Surplus	Total
1918	$4,305,025	$1,172,000	$1,376,139	.....	$54,623	.....	$6,907,787
1917	.....	.....	.....	.....	.....	.....	.....
1916	.....	.....	.....	.....	.....	.....	.....
1915	4,305,025	996,700	665,333	124,730	355,191	664,655	7,111,634
1914	4,305,025	1,007,100	665,333	129,000	289,354	371,603	6,768,120

Comparative Operating Statement.

Year	Gross Earnings	Oper. Costs	Oper. Profits	Deductions	P. & L. Surplus
1918	$2,118,607	$1,169,309	$949,297	$181,639	$767,658**
1917	.....	.....	.....	.....	.....
1916	759,058	863,441	.....	155,632	260,015*
1915	1,296,631	871,156	425,475	132,423	293,052
1914	871,156	650,629	412,567	243,046	169,521

*Of this, $221,445 was the American Engineering & Operating Co.'s share, and after deducting interest and reserves there was a deficit of $65,688.

**Deficit.

Net earnings in 1919 were about $1,200,000.

Property: at Parral, includes the Presena, Las Cruces, and Palmilla groups of mines, the latter including the famous Palmilla bonanza mine of Pedro Alvarado. These are old mines which were worked in former days by Mexicans. Examined in 1918 by F. W. Smith and E. M. Hamilton.

Development: the mines are in good physical condition, and reserves of silver-gold ore exceed the 500,000 tons estimated in 1917. Recent exploration has been highly satisfactory. New work in 1918 totaled 9,500′. The Alfarena shaft is 935′ deep.

Equipment. company operates a 600-ton cyanide plant, and 50-ton flotation mill, built in 1919. Employs, when working, over 1,000 men. Electric power obtained from the Mexican Northern Power Co.

Production:

Year	Ore to Mill Metric tons	Gm. Per Ton Silver	Gm. Per Ton Gold	Contents Silver oz.	Contents Gold Oz.
1919	.....	.....	....	2,038,000	1,591
1918	157,340	.....	....	.....	.....
1916 and 1917	76,389	.....	....	.....	.....
1915	128,612	530.2	1.19	2,192,444	4,932
1914	82,728	548.1	1.06	.....	.....
1913	118,383	570.1	0.79	.....	.....

In February, 1920, the mill treated over 18,000 tons.

In 1914, company lost 131 days of operating time; in 1915 operations covered 93.2% of the total time; loss was due mainly to shortage of fuel which had to be transported chiefly from El Paso on special trains operated by the company. In 1916, due to political disorders in Mexico, company's properties were operated only 42% of the year. The Villista forces occupied Parral on November 5th, 1916; seized the cyanide mill and mines, which they operated for 15 days, producing 45 bars of gold and silver bullion; 96 additional bars were stolen and the property robbed to the extent of $300,000. Many of the office and operating records were destroyed. In 1916 and 1917, operations were stopped 4 times, the mine being operated but 7 months out of 24. In spite of disturbances during 1918, the mill was operated 95.3% of the time. Company is earning about $4 per share annually.

AMERICAN ENGINEERING & OPERATING CO. **CHIHUAHUA**

This company operates the Alvarado M. & M. Co.'s properties, under lease to April, 1920, paying a royalty of 30% on all ore extracted.

ARADOS COPPER CO. **CHIHUAHUA**

Address: Clarence W. Hoyt, pres., 79 Milk St., Lowell, Mass.

Property: about 2,000 acres were taken over 1910 from Chihuahua Copper Co., Quo Vadis Copper Co., and claims privately owned.

The Quo Vadis and other groups show numerous contact veins between limestone and porphyry, ranging from 2 to 40′ in width, development work said to have yielded enough ore shipped to pay for machinery in use on these properties, ore averaging better than 5% copper.

The Chihuahua group has several shallow shafts, and 9 tunnels with about 1,500′ of workings, estimated by management to show several thousand tons of ore.

Equipment: includes a 25-h. p. hoist, good for 500′, and small Gardner air-compressor, and necessary mine buildings.

Idle several years owing to political disturbances, but president states that property will be vigorously and systematically developed as soon as conditions in Mexico warrant. Company is controlled by strong interests who are successful copper producers, and stock is privately held by a few people.

AURORA Y ANEXAS, MINERA LA, S. A. **CHIHUAHUA**

Owns the Aurora mine, with 160 hectares, in the Cuchillo district, near Coyame, Chihuahua; and the Justicia copper mine, four miles east of Marquez

station on the Kansas City, Mexico & Orient railroad. These properties were purchased from Don Francisco Diaz in 1908, by the late Ernesto Madero.

Owing to conditions in Mexico it is impossible to get recent information.

BATOPILAS MINING CO. **CHIHUAHUA**

Address: 49 Cedar St., New York City. **Mine office:** Batopilas, Chihuahua, Mexico. John R. Harbottle, gen. mgr. in Mexico.

Officers: F. D. Merchant, pres.; N. F. Palmer, v. p.; W. M. Brodie, v. p.; S. Elliott, v. p., with Jas. Marwick, Geo. W. Field, Gates W. McGarrah, Geo. Rowland, E. L. Stevens, all of New York; F. A. Drury, Worcester, Mass.; Robt. M. Currier, Boston; A. B. Parker, Edward L. Stevens, L. H. Scott and Geo. Rowland, trustees; E. W. A. Jorgensen, sec. and asst. treas.; L. H. Scott, treas.;

Trustees: foregoing with Alton B. Parker and eight others.

Inc. 1887, in New York. **Cap.,** $9,000,000; shares $20 par; 446,599 issued. **Bonds:** authorized $1,000,000, 1st mtge. 6's, dated Dec. 1, 1887, for 15 years, outstanding $366,500. Bonds were extended to December 1, 1927. Shares listed on the New York and Boston Stock Exchanges. Annual meeting, third Tuesday in April. Union Trust Co., New York, and State St. Trust Co., Boston, transfer offices. Farmer's Loan & Trust Co., New York and Old Colony Trust Co., Boston, registrars. Shares, old, $1 low, $1¼ high in 1918; $1⅛ low, $2 high in 1919.

Dividend: one of 12½c a share was paid December 31, 1907.

Balance sheet as of December 31, 1914, the last issued, shows assets, $12,794,479, of which amount $12,485,435 represents mines, real estate, buildings, equipment, etc., and $207,322 current assets; current liabilities, $37,258, accrued liabilities, $24,950. Total surplus December 31, 1914, $3,365,771. On April 1, 1917, cash in Mexican silver, etc., totaled 6,187 pesos; cash in New York banks, $29,000. The 98,555 (pesos) Chihuahua currency, which company was forced to purchase, is worthless. Company has filed claims for $390,000 against the Mexican Government, and $150,000 more will be filed.

Property: concessions to 61 square miles of richly mineralized lands near Batopilas, in the Andres del Rio mining district, in the extreme southwestern part of the State of Chilhuahua, Mexico. When 1913 began the company had titles in the silver zone for 2,137 acres, and in the auriferous zone, 20 miles up the river, for 140 acres. On account of the revolution it has been impossible to comply with the provisions of the contract covering what is known as the concession and time allowances have been granted. In addition, the company owns 130,000 acres of ranch and timber lands.

Ore: native silver occurring with calcite in veins in diabase. The San Miguel property contains many veins, some of which have been worked for more than 100 years. The main veins are the San Antonio, Cancio, Cinco de Mayo, Diablo, Carmen, and Veta Grande now worked out. During 6 months in 1913 the average assay for low grade ore from the San Miguel mine, which produces ¾ of the silver output, was 9.27 oz. per ton, while the ore from the Porfirio Diaz Tunnel group averaged 6.55 oz. per ton. High-grade ore produced during 8 months, 609 tons, averaged 411 oz. per ton.

Development: over 10 miles of adit levels and 77 miles of workings. The principal mines are the Porfirio Diaz Tunnel on the Todos Santos Group, the San Miguel mine, El Escritorio, and El Camuchin. Work at El Escritorio and El Camuchin was unsatisfactory in 1913 and they were closed down.

Equipment: the Hacienda San Antonio contains a 125-stamp mill with a daily capacity of 400 tons, electric light plant and air-compressor, all run by Pelton wheels capable of furnishing 550-h. p. The San Miguel Hacienda contains a 25-stamp mill for high-grade ores, cyanide plant, amalgamating pans, refining plant, a roasting and lixiviation plant for concentrates, with a daily capacity of 8 tons, machine-shop, foundry, office buildings, dormitories, boarding house, etc.

Power obtained from the Batopilas River by means of a dam 764' long and an aqueduct 9,900' long. The water after being used in the San Antonio plant, is siphoned under the river and runs to the San Miguel Hacienda, where 32-h. p. is developed by turbines.

Production and profits have been as follows:

Year	Ore Treated, Tons	Silver, Oz.	Operating Profits
1915	.....	156,862	.....
1914	6,630	188,087	$10,556
1913	20,887	374,174	60,068
1912	34,032	564,398	80,046
1911	33,073	516,688	17,409*
1910	43,612	730,697	106,258*

* Deficit.

At a special meeting called in August, 1916, company's charter was amended, authorizing the management to conduct mining operations in the United States. Company did some exploration work near Joplin, Mo., in 1918, but results were unsatisfactory. It also has options on coal lands in Missouri.

Since 1910, only about one year's work has been done by the company (in 1913) and since 1915, operations have been conducted on a share basis by loyal Mexicans. About 40,000 oz. silver ore was produced from May to October, 1919. The management is not particularly optimistic for the near future, because of unsettled and unsafe political conditions. In December, 1919, the manager returned to the mine to prepare for resumption of full scale operations.

BUENA TIERRA MINING CO., LTD. **CHIHUAHUA**

Office: T. D. Pillans, sec., 24 Lombard St., London, E. C. 3, England.

Directors: R. T. Bayliss, chairman; Lord Arthur Butler, W. McDermott, J. H. M. Shaw; R. M. Raymond, cons. engr.; A. C. Brinker, gen. mgr., 1209 Mills Bldg., El Paso, Texas.

Inc. Feb. 10, 1912, in England. **Cap.,** 330,000 shares, £1 par; all issued and fully paid.

Property: acquired from the Exploration Co. of England and Mexico, Ltd., the Buena Tierra mine, 89 acres, in the Santa Eulalia district, Chihuahua, 15 miles S. E. of Chihuahua. Purchase price was £300,000, payable £178,201 cash, £121,799 in fully-paid shares. Property reported on by R. T. Bayliss and R. M. Raymond.

Dividends: 5% each in 1912 and 1914; nothing since.

Ore: principally lead and zinc carbonates assaying 10 oz. silver, 15% lead and 25-50% zinc. There is also a low-grade mixed sulphide. Ore-bodies occur in limestone lying almost flat, but instead of following the fissures, spread out into flat beds near them, their average width is 30′, average thickness, 40′. The Chorro orebody has a depth of over 1,000′. Developed orebodies are most numerous at 450′ depth, but most of the mines have ore down to a depth of 1,300′. Ore reserves estimated in 1917 as 281,500 tons.

Development: by shafts; Buena Tierra shaft is 1,400′ deep. Raises are put up from the levels at intervals of 75-200′ and the ore is mined in small bunches, little powder being required and practically no timber.

Operations were resumed in May, 1918, but Mexican troubles have interfered with production during the past few years and property has not been steadily operated. Lead ore is shipped to the A. S. & R. Co.'s smelters at Chihuahua or El Paso, and the zinc ore to the United States.

BUENA VISTA GOLD MINING CO. **CHIHUAHUA**

Owned by El Rayo Mines Co., which see.

CANDELARIA MINING CO. **CHIHUAHUA**

Office: 111 East 34th St., New York.

Officers: A. S. Dwight, pres.; D. E. Moran, v. p.; C. I. Reeves, sec.-treas.; and H. J. Stehli, directors.

Property: in the State of Chihuahua, but details not obtainable.

CHIHUAHUA-ESPERANZA GOLD MINING CO. **CHIHUAHUA**

Subsidiary of the Dolores Esperanza, which see.

CHIHUAHUA MINING CO. **CHIHUAHUA**

Controlled through stock ownership by El Potosi Mng. Co., a subsidiary of the Howe Sound Co.

Offices: 734 Fifth Ave., New York City, and Chihuahua, Mexico.

Officers: G. B. Schley, pres.; E. B. Schley, v. p.; W. J. Walworth, sec.-treas.; C. G. Raynor, asst. sec.-treas.; W. J. Quigly, mgr., Chihuahua.

Inc. Jan. 8, 1890, in New York. **Cap.,** $600,000; $1 par; outstanding, 587,806 shares. Stock transferred at company's New York office. Annual meeting, second Monday in January. Stock is closely held.

Property: in the Santa Eulalia district, Chihuahua, Mexico.

Ore: lead, silver, and zinc occurring as replacement deposits in limestone.

Development: by vertical shafts to a depth of 1,800'. Operations have been hampered by the revolution, though shipments of zinc ore were made in 1915 and 1916. No work was done in 1919. See El Potosi Mining Co.

CUSI MINING CO. **CHIHUAHUA**

Office: 144 South Wabash Ave., Chicago, Ill.

Officers: Potter Palmer, Jr., pres.-treas.; Honore Palmer, v. p.; A. M. Murphy, sec.; all of 721 Peoples Gas Bldg., Chicago.

Property: the Promontorio mine and other claims at Cusihuiriachic, Chihuahua, Mexico, showing veins of silver-lead ore.

Equipment: includes a 250-ton mill.

Company reported to have given a lease on the mine, on a royalty basis.

DESCUBRIDORA MINING & DEVELOPMENT CO. **CHIHUAHUA**

Owned by El Rayo Mines Co. See Dolores-Esperanza of America.

DOLORES ESPERANZA CORPORATION **CHIHUAHUA**

Succeeds Mines Company of America.

Office: Room 226, 111 Broadway, New York City.

Officers: H. S. Black, pres.; W. E. Reis and A. T. Black, v. p.'s; with W. T. Graham, Frank Ray, E. N. Skinner, and E. L. Gruver, directors. J. D. Gruver, sec.-treas.

Inc. Jan. 18, 1919, in Maine. **Cap.,** $2,000,000; shares $2 par; 864,817 outstanding. Bankers Trust Co., New York, transfer agent. Equitable Trust Co., New York, registrar. Listed on New York Curb.

On February 11, 1919, directors of the Mines Company of America were authorized to sell all the company's property to the Dolores Esperanza Corporation for $600,000 cash, this money to be used to pay off all debts and to meet expenses. Old stockholders could buy new stock at $2 per share up to number of shares held.

Balance sheet, June 30, 1919, showed assets totaling $1,733,351, including cash and U. S. Government certificates, $130,824; second installment on capital stock due July 7, $824,595; investments in subsidiary companies, $771,906; and sundries, $6,025. Liabilities included capital stock, $1,729,634, and sundries, $3,717.

Ownership in companies is as follows:

Per cent. of subsidiary owned by Dolores Esperanza.	Par value of shares	Number of shares owned
99—Dolores Mines Co.	$5.00	396,220
100—Chihuahua Esperanza G. M. Co.	1.00	2,411,000
75—Consuelo M. M. & Power Co.	1.00	1,826,500
99—El Rayo Mines Co.	2.00	355,187
100—Creston Colorada Co.	100.00	1,000
33⅓—La Dura Mill & Mine Co.	10.00	33,333⅓
33⅓—Compania Minera Gloria Fortuna.	1.00	8,000

Dolores Mines and El Rayo Mines each own ⅓ of La Dura and Fortuna capitalization.

Dividends: (by Mines Co. of America) total paid to Dec. 31, 1916, amounted to $4,958,600, including a dividend in 1906 in stock of the Dolores Mines Co.

Chihuahua-Esperanza Gold Mining Co.

Property: adjoining that of the Dolores Mines Co., Chihuahua, on the west, consists of 3 claims, 304 acres. Company also owns 10,000 acres of timberland 5 miles north of Dolores.

Geology: formation is similar to that of the Dolores. Fissure veins occur in rhyolite dikes cutting andesite; 3 vein-systems exist. Development amounts to 502′. Ore reserves said to total 2,500 tons worth $15 per ton. La Esperanza mine has great possibilities.

Consuelo Mining, Milling & Power Co., Mexico.

Property: adjoins that of the Dolores Mines Co., west of Madera, in Chihuahua, on the south and east, and consists of 77 pertenencias, 190 acres, and a half interest in 9 pertenencias, 22 acres, also a water-right on the Tutuaca river. The formation is similar to that of Dolores. No systematic development has been done; the value of the ground is prospective.

Creston Colorada Co., Mexico

Mine office: Torres, Sonora, Mexico.

Inc. February, 1902, in Ohio. **Cap.,** authorized and outstanding, $100,000; par $100. Annual meeting, first Saturday in November.

Property: 27 claims, 828 acres, commonly known as "Minas Prietas" (black mines), in Sonora, at La Colorada, a station on the narrow-gauge Mexico Union Ry., 12 miles east of Torres, on the Southern Pacific R. R. of Mexico, and 200 miles south of Nogales, Ariz. The mines have been worked for 100 years and have produced regularly during the last 33 years, but are now considered depleted. Gross production estimated at over $112,000,000.

The property is divided into 4 different mines: the Creston Colorada, Amarillas, Grand Central, and Verde. The claims contain a number of producing veins, and cover the latter for 8,000′ along their strike. Company also owns surface rights to 7,000 acres land, including the mining claims. It also owns a water-right on the Matape river.

Ore: veins have a general E.-W. strike, dip N. 55° to 90°, and vary in width from 3′ to 40′. Larger orebodies occur principally in diorite, metamorphic rocks and quartz porphyry. The Creston ore, or east end ore, is a highly fractured quartz. The Colorada is a harder quartz. Sulphides of silver, iron, lead and zinc occur from the surface down. Streaks of high-grade sulphide shipping ore are occasionally found. The Verde ore is a hard quartz, at times very refractory. The Amarillas-Grand Central ore is a highly oxidized quartz, containing free gold in places. Average values in ores, as milled, are said to be 60% gold and 40% silver.

Development: in 1916 totaled 2,075′, compared with 2,578′ in 1915. Work was divided as follows: Creston mine, 1,473′; Colorada mine, 226′; Amarillas-Grand Central mine, 376′.

Ore reserves: estimated Jan. 1, 1917, as 190,350 tons, average assay $4.93 per ton, or a gross value of $937,591, as compared with 200,300 tons, average assay $4.89 per ton, the previous year; gold figured at $20 per oz., silver at 75c. per oz. The Amarillas-Grand Ceneral mine has one dump of tailing containing 280,000 tons which will be retreated.

Equipment: at the Creston mine includes steam hoist and compressor plant, foundry, etc. The Colorada cyanide plant receives Creston ore over a 3,200′ aerial tramway, and the Colorada ore over an 800′ incline tramway. The Amarillas-Grand Central mine includes steam operated hoisting and compressor plants, electrically-driven crushing plant; also a 450-ton cyanide plant, which receives ore from the Creston, Amarillas and Colorada over aerial tramways. A pumping plant, 18 miles from the mines, on the Matape river, supplies water for all purposes through a 5″ pipe.

Mill and cyanide plants: in 1916 extensive shut-downs were in order, due to revolutionary disturbances. The Amarillas-Grand Central unit was operated 48 days and treated 14,550 tons of ore. Extraction amounted to 73.8%, 20.5% by concentration and 53.3% by cyanidation.

Production:

Year	Creston mine, tons	Colorado mine, tons	Am.-G. C. mine, tons	Old tailing, tons	Total tons	Value per ton
1916	12,400	2,150	.....	.....	14,550	$5.65
1915	98,662	18,854	10,365	3,469	131,350	4.80
1914	94,655	18,090	10,887	3,243	126,875	4.67

The Creston-Colorada mines were badly damaged by Mexicans (bandits) in 1919, who looted pillars of good ore, fired the shaft sets, burned buildings and cyanide tanks, and stole the metal from all machinery. It will require a large amount of time and money to put the property in shape for operating.

Dolores Mines Co., Mexico.

Inc. Nov., 1903, in Mexico. **Cap.**, authorized and issued, $2,000,000; full paid and non-assessable; par $5. No bonded debt. U. S. Mortgage & Trust Co., New York, transfer agent. Guaranty Trust Co., New York, registrar. Annual meeting, first Tuesday in December. Listed on New York Curb.

Entire capital stock of this company was formerly owned by an English company called Dolores, Ltd., dissolved February 25, 1908, by exchange of stock, share for share, of Dolores Mines, Ltd. The company owns 33⅓% of the La Dura Mill & Mining Co.

Property: 17 contiguous claims, 250 acres, in Chihuahua, west of Madera, a station on the Mexico Northwestern Ry., about 250 miles S. W. of El Paso, Texas, and 200 miles N. W. of the city of Chihuahua. Mines are reached over a 45-mile trail, requiring 7 days' time for pack trains. Company also owns 3 detached mineral claims, 126 acres, near Dolores, and all surface rights to 12,500 acres, also a water right on the Tutuaca river. The main group, as shown by developments to date, contains 4 main vein systems, known as the Alma, San Francisco, West San Francisco, Washington and Arco Iris dikes, covered for 8,000′ on the strike of the Alma vein system, 4,000′ on the San Francisco vein system, 3,800′ on the West San Francisco, 1,000′ on the Washington, and 2,600′ on the Arco Iris vein system.

Geology: vein systems consist of rhyolite dikes in andesite; the veins are fissures in these rhyolite dikes, strike north and dip 55° to 90°. Ore-bodies occur at or near intersections of side fractures and within the boundaries of the dike. Dolores ore is a very hard quartz, containing about 2% sulphides of iron, silver and occasionally lead and traces of zinc. Values in ore are approximately 40% gold and 60% silver.

Development: in 1916 totaled 1,795′ as compared with 2,833′ in 1915; all done by hand and above the 500′ level. The 600′ and 700′ levels are under water.

Ore reserves: were estimated Jan. 1, 1917, as follows:

	Tons	Value per ton	Gross value
Ore in place.....	135,628	$13.80	$1,873,335
Broken ore.....	13,595	14.10	191,668
Total	149,223	$13.83	$2,065,668

Compared with 125,663 tons of $14 ore with gross value of $1,768,693 on January 1, 1916. Value is based on $20 per oz. for gold and 50c. per oz. for silver.

Equipment: includes steam-operated crushing, concentrating and cyaniding plants, also compressor and hoisting plants, machine shops, etc. A steam-driven Reidler pump, 2½ miles east of the mine on the Tutuaca river, supplies all necessary water. Electrical equipment to supplant steam power is in place. A 30-mile transmission line connects Dolores with Madera; line is designed to carry 3-phase, 60-cycle current of 33,000 volts. Power will be furnished by a generating plant built near Madera, to consist of three 320-k. w. generators, driven by 3 Diesel type oil engines of the "Snow" make.

In the re-modeled mill a 15x24″ Blake crusher replaces 3 small machines; belt conveyors and steel ball mills replace stamps and Bryan mills. Extraction is about 87%, 18% by concentration and 69% by cyanidation. Bullion is sent to Maurer, N. J. Concentrates are shipped to the El Paso smelter.

Company employs about 365 men under normal conditions, only 17 being Americans. The small amount of development work done in recent years gave good results.

The orebody found in 1915 is over 265′ long, with indications of greater length. New company expects to reduce power costs to one-third when the plant is run by electricity.

El Rayo Mines Co., Mexico.

Mine office: Santa Barbara, Chihuahua, Mexico.

Inc. Feb. 13, 1906, in Maine. **Cap.,** $1,000,000; outstanding $714,000; shares $2 par. No bonded debt. Annual meeting, second Tuesday in February. Listed on New York Curb. Company is the American holding company for the El Rayo Mining & Development Co., S. A., a Mexican corporation. Owns the Descubridora Mining & Development Co. and Buena Vista Gold Mining Co.

Property: 21 claims, 766 acres, in the State of Chihuahua, S. W. of Santa Barbara, the terminal of a branch line of the Mexican Central Railway. Mines can be reached from Santa Barbara over an 8-mile trail. Company also has a 14-year lease on about 12 square miles of timberland, adjoining the mining property. El Rayo is at an elevation of 7,200′ above sea level. The mining claims cover the N. S. strike of the producing veins for over 2 miles.

Ore: gold-silver in fissure veins in rhyolite, which dip from 50° to 90°, The gangue varies from a friable and oxidized quartz at the north end to a harder sulphide-bearing quartz at the center and south end of the property. The north end contains about 4% sulphides, chiefly iron, with traces of lead and zinc. Copper sulphides are found occasionally. The metal content is about 74% gold and 26% silver. The ore shoots are irregularly shaped lenses which occur at vein junctions or intersections with main fracture.

Development: underground workings extend to depth of 1,400′ and total 79,000′. The Adela mine covers 4,700′ of the vein system at the north end. The El Rayo mine covers 2,300′ of the vein system and adjoins the Adela. The Descubridora mine covers 5,000′ of the vein system on the extreme south end of the property.

Ore reserves: were estimated Jan. 1, 1917, as:

	Tons	Value per ton	Gross value
Ore in place	65,210	$11.58	$755,283
Broken ore	13,328	10.77	143,542
Total	78,538	$11.44	$898,825

Compared with 75,038 tons of $10.48 ore with gross value of $786,825 on January 1, 1916. Value is based on $20 per oz. for gold and 50c. per oz. for silver.

Equipment: includes a 1,950 cu. ft. steam operated compressor plant. A 2-mile aerial tram furnishes the necessary fuel, lumber and mining timbers.

Mill: includes 160-ton crushing, concentrating and cyaniding plants. From the storage bin at the portal of the 1,100′ level of the Adela mine the ore is trammed 1,300′ in 6-ton cars to the mill storage bin. Course of ore through plant is as follows: from bin through 9″x15″ Blake crusher, set at 1″ discharge; undersize by conveyor belt to bin, by Challenge feeder over conveyor belt to one set of 16″x36″ Traylor rolls, discharge to 2 sets of 14″x30″ Traylor rolls, to classifier; overflow to tables, oversize in closed circuit returned to 7′x14′ tube-mill; discharge to classifier, overflow to tables, oxersize in closed circuit returned to tube-mill. Pulp treated by cyanide solution. Resulting bullion and concentrates are marketed in America.

Electrification of entire plant was finished in 1917. Electricity is furnished,

under contract, by the Cia. Agricola y de Fuerza Electrica del Rio Conches, S. A., from its plant at La Boquilladam, about 70 miles from El Rayo.

Extraction has varied from 80% to 89%, from 12% to 20% being taken out by concentration and flotation, the balance by cyanidation.

Flotation by the Callow system is a success, and in later work recoveries were 42.7% by flotation, and 47.6% by cyanidation.

Due to revolutionary conditions the property was closed down September 9, 1915, reopened 1919.

La Dura Mill & Mining Co.

Office: 111 Broadway, New York City. **Mine office:** La Dura, Sonora, Mexico. **Cap.,** outstanding, $1,000,000.

Property: 4 individual mines—Gloria-Fortuna and La Dura, on the east bank of the Yaqui river, Sonora; California and Prieta, 1½ miles N. E. of the former. The mines are near La Dura station on the Cananea, Yaqui River & Pacific Ry., which leaves the main line of the Southern Pacific of Mexico at Corral station, 325 miles south of Nogales, Ariz. Mines are connected with railroad by aerial tram.

Ore is a white quartz containing sulphides of silver, copper, lead, iron and zinc. Most of the ore requires milling.

There are 5 main veins known as the California, Prieta, Gloria-Fortuna, West Floria and La Dura. The Prieta and Gloria veins, from 6″ to 4′ wide, occur in andesite, strike N. W.-S. E. and dip 30° S. W.

Ore reserves: estimated Jan. 1, 1917, as 16,015 tons, average grade $54.80 per ton.

Only the Prieta and Gloria mines are operated by the company. The Prieta has a 3-compartment shaft, 1,040′ deep. The Gloria is operated through a 1,600′ incline shaft and a 700′ vertical shaft, connected with the former, on the 500′ and 700′ levels. Stoping has proved persistence of veins in spite of faulting.

Equipment: in 3 units as follows: the Prieta-Gloria steam-operated compressor and hoisting plants; the Gloria-Fortuna-La Dura steam-operated compressor, hoisting, milling and generating plants; pumping plant, stores, offices, and shops located half way between the two groups of mines. A transmission line from the Gloria-Fortuna plant furnishes power for pumping.

The mines employ under normal conditions, 8 Americans and about 225 Mexicans. Owing to the revolution the property has been closed down, but will be re-opened as soon as it is safe to do so. Bullion, etc., was stored in the bottom of the mine under water.

Dolores Esperanza Corporation had ore reserves in all its properties, estimated January 1, 1917, to have a gross value of $5,824,670. The company has several good properties, is well managed, and should make large profits when conditions are better in Mexico.

DOLORES MINES CO. CHIHUAHUA

Subsidiary of the Dolores-Esperanza Corporation, which see.

EL POTOSI MINING CO. CHIHUAHUA

A subsidiary of the Howe Sound Co., which purchased 53,800 shares out of a total outstanding capitalization of 60,000 shares in 1916.

Property: in Santa Eulalia district, Chihuahua, adjoins that of Chihuahua Mining Co., nearly all of whose stock is owned by El Potosi. Is one of the oldest producers of silver-lead ore in the district, said to have paid dividends for many years. The group consists of the Santa Domingo, Potosi, Santa Rita, Fortuna, Coronel, Leonidas, and Zubiate mines.

Large caverns are encountered in mining that are lined with a crystalline coating of cerussite, galena, calcite and gypsum. The ores contain native silver and silver bromides, and chlorides. The mines also contain contact deposits in limestone, and mantos or bedded deposits.

Development: to depth of 1,800′ by vertical shafts. Ore reserves are large, and diamond-drilling shows that the orebodies persist to a depth of 800 meters.

Equipment: hoists, pumping plant, 19 kilometer pipe-line, narrow gage railroad, and an old smelter at the Robinson hacienda.

Production: the smelter operated from 1894 to 1896, reduced 28,555 tons of ore from the Chihuahua mines, which yielded 3,768 tons of lead and 529,450 oz. of silver. In October, 1919, shipments of 500 tons of silver-lead ore daily were being sent to the A. S. & R. smelters.

EL RAYO MINES CO. **CHIHUAHUA**

Subsidiary of the Dolores Esperanza Corporation, which see.

ERUPCION MINING CO. **CHIHUAHUA**

Property: 85 miles S. of Juarez, Chihuahua, operated by an American company. In July, 1918, company was ordered by Epifanio Holguin, a Villa leader, to stop operations. The bandits destroyed the surface plant and took the mine supplies.

IGNACIO RODRIGUEZ RAMOS, S. A.; COMPANIA MINERA

Property "confiscated" by Gen. Villa in 1915, and operated by Sr. F. R. Quijano, Chihuahua City, Chih., Mexico. Shipments in 1915 to Granby Mining & Smelting Co. at St. Louis, were held up by Villistas, and smelter agent unjustly jailed.

Property: 129 hectares, covering the mineral zone of the Sierra Almoloya. The geological conditions greatly resemble those at Santa Eulalia. Ore occurs in limestone, in lenses, one having a width of 70′ and length of 140′, ore said to average 5% copper, 25% lead, 6% zinc, 15 oz. silver and $8 gold per ton. Values are mainly in silver-lead ores, though chalcopyrite occurs as a by-product.

The mine is extensively developed to a depth of 300 meters, by an 800′ shaft and 2 main tunnels, with much rich ore in sight.

Equipment: includes steam and electric power, with steam hoist and air compressor. A 3-stamp experimental mill is connected with the mine by a 4,000′ incline tram.

No definite information obtainable since 1916.

INTERNATIONAL GOLD & COPPER MINING CO. **CHIHUAHUA**

Mine office: Guaynopa, Chihuahua, Mexico. J. C. Peterson, pres. Company took over lands formerly held by International Cons. Smelting & Mining Co., known as the Utah mine, in Guaynopa canyon. Claimed by former owners to have a 90′ vein, with an 8 to 12″ pay-streak carrying high-grade chalcopyrite, assaying 5 to 8% copper, with good silver value. Mine has several short tunnels. Idle on account of revolution, but regarded unfavorably for other reasons. No recent returns secured and mine idle for several years.

LAS VIGAS MINING CO. **CHIHUAHUA**

Property was controlled at last accounts by A. McKenzie, formerly at 66 Broadway, New York.

Mine at San Sostenes, Coyame, Iturbide, Chihuahua, Mex., consists of 74 hectares, said to show upturned Cretaceous sandstones and shales with interbedded copper lodes, occurring as impregnations and replacements in sandstone. Four veins last under development are reported to average 7 to 12′ width, and to give average returns of 7.5% copper and 3 oz. silver per ton, mainly from disseminated bornite and chalcopyrite, with occasional oxidized ores and native copper.

Development: by shafts of 61′, 98′, 125′ and 212′ with various levels; also 3 short tunnels. Workings estimated to develop 160,000 tons of ore.

Equipment: includes steam power, a hoist, an air compressor, and a 100-ton concentrator. Buildings include an office, store and 19 dwellings. Ore was hauled, 43 miles, to Las Trancas stations, by traction engine.

LLUVIA DEL ORO MINING CO. **CHIHUAHUA**

Is a close corporation, owned and controlled by B. F. Yoakum, John Scullin of St. Louis, Mo., and the estate of Jas. Campbell. Fred G. Farish, mgr.

Property: in the Andres del Rio Mtns., Chihuahua, Mexico, consists of the Lluvia del Oro gold mine, a mill, cyanide plant and hydro-electric plant. No data available.

MINES CO. OF AMERICA **CHIHUAHUA**

Fully described in Vol. XIII. Property now owned by Dolores Esperanza Corporation, which see.

MIRASOL; COMPANIA MINERA DEL. **CHIHUAHUA**

Address: C. B. Clyne, Mills Bldg., El Paso, Tex. E. W. Enriquez, supt., Cusihuiriachic, Chihuahua.

In 1919, it was reported that a 200-ton mill was under construction and that ore was being shipped to smelter at Chihuahua.

PALMAREJO & MEXICAN GOLD FIELDS, LTD. **CHIHUAHUA**

Office: E. B. Brown, 10 Austin Friars, London, E. C. 2, England.

Directors: Sir W. B. Perceval, chairman; G. Hallett, H. G. Tollemache, and E. Turk. W. D. Hole, mgr.; E. T. McCarthy, cons. eng.

Inc. June 25, 1898, in Great Britain. **Cap.**, £565,000, in 200,000 A shares of 6 pence each, 21,000 pfce. shares of £1,, and 1,400,000 of 5s., of which 120,000 pfce. and 835,978 ord. issued.

Bonds: £25,000 of prior lien, due April, 1921; £28,330 of 5% first, £18,797 of 7% second, and £93,500 of 6½% third mortgage debentures.

Accrued debenture interest on March 31, 1918, was £43,348. Property was in hands of Receiver from December, 1914, to August, 1918.

Property: 127½ sq. miles of mineral and timber lands in the Hurwapa district of western Chihuahua. Reserves estimated as 319,000 tons proven ore, averaging 45 s. ($10.80), and 2,000,000 tons of possible ore of similar value.

Equipment: an old 60-stamp mill and treatment plant, which will be remodelled.

Operations were suspended from 1912 until late in 1918.

PARCIONERA CONSOLIDATED MINING CO. **CHIHUAHUA**

Address: Jos. S. Qualey, pres., 25 Pine St., New York City. **Mine office:** Santa Eulalia Chihuahua, Mex. Ernest Henderson, sec. Is a close corporation, shares $100 par.

Property: a silver-lead mine, with some copper. Idle on account of Mexican revolution.

RIO PLATA MINING CO. **CHIHUAHUA**

Office: 654 W. 51st St., New York.

Officers: H. W. Miller, pres.; Archibald Nesbitt, v. p.; J. J. Bonneau, sec.; Lincoln Bonneau, treas., with Geo. F. Parker, John C. Hanson, W. E. Green, Jos. Coult, R. N. Brundage, A. P. Roth, D. J. Dwyer, and J. H. Lee, directors.

Inc. April 7, 1906, in Arizona. **Cap.**, $2,000,000; shares $5 par; outstanding $1,872,590. Stock transferred at company's office. New York Trust Co., New York, registrar. Annual meeting in January, at Phoenix, Ariz. Protocolization of the company completed October 15, 1910.

Company controls the Trinity Cons. Hydraulic Mining Co. in California.

Dividends: initial dividend, 1½%, paid Dec., 1909; quarterly dividends, 2% from March, 1910, to December, 1911, inclusive; none in 1912; February 1, 1913, 1%; none since.

Property: the mines and reduction works of the Cia Minera de Rio de Plata, S. A., of Mexico; 187 acres mining land, 2,700 acres ranch and timber lands and water rights, located 6 miles S. of Guazapares, Chihuahua, and 350 miles from El Paso. Holdings include the Santo Nino, David, Santa Teresa, Santa Barbara, Cleopatra, La Ultima and Enrique silver mines. The ore occurs in the Santa Barbara fissure vein, dipping 17°, with average width of 4 to 6'.

Development: by tunnels, with about 3,000' of workings.

Equipment: includes hydro-electric plant and an auxiliary steam plant, 25-stamp mill, 60-ton concentrator and an 80-ton cyanide plant.

Operations have been greatly interfered with on account of the revolution, but property not molested. A new staff was sent to the mine in May, 1919, but withdrew shortly after, as they reported the mine to be worked out, which is doubted.

RIO TINTO COPPER CO. **CHIHUAHUA**

Mine and works office. Terrazas, Chihuahua, Mexico.

Office: James Corrigan, gen. mgr.; H. A. Eye, supt.; Capt. M. D. Murray, mine supt.; H. L. Schneider, smelter supt.; J. M. Baker, smelter foreman; F. W. Topken, master mechanic in 1913.

Inc. in Ohio. Is a holding company for Mexican subsidiaries. Operated as a close corporation under the control of Corrigan, McKinney & Co.

Property: the Rio Tinto Mexicano mine and works bought 1908 for $187,500, and the property formerly held by the San Rafael Copper Mining Co. The first named is about 25 miles north of Chihuahua City and comprises a main tract of 153 hectares, and a smaller tract of 6 hectares, including nearly all the developed mineral property of the Terrazas camp, except a few lead mines. The tract includes the Rio Tinto mine, and properties formerly worked by the Rio Tinto Mexicano Mining Co., Boston & Mexican Mining Co., Dragoon Mining Co. and San Rafael Copper Mining Co. The principal properties are the Rio Tinto Mexicano, San Rafael, Promontorio, Verde and Colombia mines, all connected underground. The company also owns the Savanarola group, at Savanarola, about 50 miles south of Chihuahua and 35 miles west of Ortiz, carrying silver-copper and lead ores.

The Rio Tinto Mexicano mine opened 1860, closed 1902, reopened 1905, has been owned and operated by a number of different mining companies until purchased by this company from Messrs. Enrique and Juan A. Creel.

Geology: the claims cover contact deposits between limestone and altered andesite, there being 5 known orebodies in a metamorphic zone traced 1,500 metres. The orebody has a minimum width of 2′, maximum of 100′, and averages 20′ across. Ore also occurs between the limestone bedding planes, near a large quartz ledge, and the orebodies, while erratic in size and occurrence, are connected and practically continuous. The limestone has an average dip of 45° N.-W., and the property has also some silver-lead ore. The gangue is mainly limestone, somewhat garnetiferous. Extensive diamond-drill borings show large orebodies containing workable copper ore.

Development: by a number of shafts to a depth of 400′; has about 3 miles of workings. The ground is firm, requiring no timbering, pillars having been removed to give chambers up to 100′ square.

The San Rafael mine has a 440′ two-compartment shaft. The Promontorio mine has 2 shafts, 1,000′ apart, the main shaft being 350′ deep. The Colombia mine has a 275′ shaft, with about one-half mile of workings.

Equipment: includes steam and gas power, air compressors, etc.

Ore is carried from mines to smelter by a mile long narrow-gauge railway, equipped with a 6-ton Porter locomotive and 5-ton iron ore cars.

Smelter at Terrazas, one mile from the mine, connected by ½ mile spur with the main line of the Mexican Central railroad, has two 300-ton 42x192″ blast-furnaces. The converter department has 1 stand and 3 shells, with a 40-ton electric traveling crane and a relining plant. The power plant has a 250-h. p. compound engine, direct-connected to a No. 8 Connersville blower, and a 100-k. w. generator supplies current for the other machinery.

Production: 1906-1910 was 9,150,000 lb. copper; 27,000 metric tons smelted averaged 2.5% copper, mining cost being $3.50 per ton, and smelting cost $3.50 per ton, or a cost for finished copper of 12.5c. per lb. The ore, though low grade, exists in large quantities, and the mine bids fair to become a producer, capable of making 1,000,000 lb. fine copper monthly.

The mine and smelter operated intermittently throughout the earlier revolutions, but the intolerable conditions since 1913 have kept them closed.

SAN FRANCISCO DEL ORO MINING CO., LTD. **CHIHUAHUA**

Reorganized as San Francisco Mines of Mexico, Ltd., which see.

SAN FRANCISCO MINES OF MEXICO, LTD. **CHIHUAHUA**

Offices: W. Maclachlan, 65 London Wall, London, E. C. 2, England; and The London Syndicate of Mexico, 20 Avenida del 5 de Mayo, Mexico City.

Directors: Earl of Denbigh, chairman; T. Ford, J. Hatfield, J. Kitchin, W. Maclachlan, A. S. Northcote, and A. J. H. Smith. W. S. Harrison, gen. mgr.; Knox & Allen, 17 Madison Ave., New York, cons. engr.

Inc. March 27, 1913, in England. **Cap.,** £650,000; outstanding £350,000; shares £1 par. **Bonds:** £200,000 convertible first mortgage debentures, in denomination of £100 and £ 20 each; int. payable April and October 1, was paid to October 1, 1914; payment of the next six half-yearly installments has been

postponed for a period of 3 years so that in each of the 6 half-years ending October 1, 1920, a year's interest will become due, and on the postponed interest 6% interest will be allowed. Company is controlled by the Union Corporation of South Africa.

Accounts for period ended September 30, 1916, showed mine expenditure, £44,269; cash, £50,698; creditors, £2,608, and accrued debenture interest, £25,080. For the period of 1918 the respective figures were £64,757, £31,646, £3,425, and £53,040. The daily profit in December, 1918, was reported by Knox & Allen to be $300.

Property: the San Francisco group of silver-lead-zinc mines, 253 acres, 14 miles from Parral, formerly worked by the San Francisco del Oro Mining Co., Ltd., covers nearly 1½ miles on the strike of the San Francisco vein, a fissure lode in limestone. The oreshoot has a length of 2,600′ with minimum width of 5½′, 4th level is in primary ore; ore minerals are galena, blende, pyrite and chalcopyrite.

Development: to depth of 484′ by 3 shafts and 5 levels. Ore reserves are estimated at 390,000 tons that should average 21 oz. silver, 1.4 dwt. gold, 12.5% lead, and 17.4% zinc.

Equipment: includes an aerial tram, a 100-ton mill, lately remodeled, and having flotation equipment. Operations have been intermittent as a result of the Mexican revolution, but milling was resumed in September, 1918.

SAN JUAN Y ANEXAS; MINA — **CHIHUAHUA**

Office: M. F. Crossette, mgr., 1133 Monadnock Bldg., Chicago, Ill.

Inc. in Illinois. **Cap.**, $300,000; $10 par; 20,000 issued.

Property: a group of silver-bearing claims in the Cusihuiriachic district of Chihuahua.

Development: to 500′ depth by shaft and levels opening veins of silver ore. The mine was closed in 1916, after the Santa Ysabel murders, but was being unwatered in November, 1919. Company says it is on a sound financial basis and shipments will commence as soon as possible.

SAN JUAN MINING CO. — **CHIHUAHUA**

Address: A. H. Kraft, owner, Box 994, El Paso, Texas.

Property: 40 acres in Chihuahua, 9 miles S. of the border, opposite Fort Hancock, Texas. Office and loading stations are on the Southern Pacific, 2 miles N. of border. Examined by C. E. Ambrosius in May, 1919.

Geology: the tract shows limestone and sandstone, cut by dykes and sheets of porphyry, which form the walls of the orebody. Ore is an irregular impregnation and replacement of limestone and sandstone, with chalcopyrite and chalcocite, and in the oxidized zone with malachite, etc. Enrichments occur along the porphyry contact.

Development: by 1,200′ tunnel and 3,000′ of work on 3 levels. These have opened up a width of 3 to 10′ of ore for a length of 200′. Reserves consist of 10,000 tons broken in the mine, 8,000 tons on dumps, and 25,000 tons ready for stoping. This ore carries from 3 to 4% copper and 3 to 4 oz. of silver per ton.

Equipment: includes a complete mining plant, and 75-ton concentrator.

Production: from Feb., 1916, to Dec., 1918, inclusive, 22,500 tons sent to El Paso smelter yielded $336,563. Expenses were $226,336, leaving a profit of $110,227. Mining, milling, and freight is estimated to total $7.80 per ton.

SANTA MARIA MEXICO MINING ASSOCIATION — **CHIHUAHUA**

Mine near Parral, Chihuahua, Mex. Wm. G. Gruber, pres. and gen. mgr.; Arthur H. Gruber, sec. and treas.

Inc. in Wisconsin. **Cap.**, $250,000; shares $1 par.

Property: 50 claims, La Lolita, La Viola and Santa Clara groups, in the Galeana district of the San Blas mountains.

Development: is on La Lolita group, which has shafts of 75′ and 150′, showing oxidized ores, shipments from which are said to have averaged 15% copper. Idle for several years.

SAN TOY MINING CO. — **CHIHUAHUA**

Office: L. A. McKee, sec., Oliver Bldg., Pittsburgh, Pa.

Officers: G. McCargo, pres.; C. A. Blanchard, v. p., with Wm. L.

Abbott, R. R. Brown, G. A. Deitch, D. L. Gillespie, Geo. E. McCague, Eugene Murray, J. C. Slack and D. B. Gillies, directors. Edward Hoopes, sec.-treas.; W. V. Paterson, asst. sec.

Inc. 1901, in Maine. **Cap.**, $7,000,000; $1 par; outstanding $5,750,000.

Colonial Trust Co., Pittsburgh, transfer agent. Commonwealth Trust Co., Pittsburgh, registrar. Annual meeting, third Monday in February at Augusta, Me. Stock listed on Pittsburgh Stock Exchange and New York Curb. Shortly after flotation of the company stock sold up to $1.25 per share. In 1918, it sold 7c. low, 18c. high; in 1919, 5c. low, 13c. high.

Dividends: 6% in 1911; 1% in 1912; 2% in 1913; none since.

Comparative General Balance Sheet:

Assets.

	Mines & Equip.	Supplies	Accts. Rec.	Cash	Total
1916	$5,865,564	$14,484	$4,204	$256,156	$6,140,408
1915	5,865,564	12,156	4,114	290,412	6,172,245
1914	5,864,172	18,085	11,209	346,155	6,239,621

In 1919 total assets were $5,857,443.

Liabilities.

	Capital stock	Undiv. Profits	Reserve	Accs. Pay.	Total
1916	$5,750,000	$322,639	$67,231	$538	$6,140,408
1915	5,750,000	352,274	67,236	2,735	6,172,245
1914	5,750,000	420,849	68,772	.....	6,239,621

1918 operations showed a deficit of $236,000 leaving undivided profits, January 1, 1919, of $79,985.

Comparative Statement of Earnings, years ending December 31:

Year	Gross Value	Expenditures	Net Earn. & Misc. Inc.	Dividends	Surplus Year	Balance Surplus
1917	$26,715	$33,292	$6,577*	.....	$6,577*	$316,062
1916	13,098	42,733	29,635*	.....	29,635*	332,639
1915	19,552	100,956	68,575*	.....	68,575*	352,273
1914	64,950	172,139	92,379*	.....	92,379*	420,850
1913	334,728	184,905	132,428	$115,000	34,928	513,229
1912	314,884	229,539	106,458	60,000	46,458	478,301
1911	793,319	321,314	496,493	360,000	136,493	431,844
1910	529,470	376,762	157,566	.....	157,566	295,350

* Deficit.

In 1919, net earnings were $22,515, and surplus, $107,009.

Property: 5 claims, the Bustillos, La Fortuna, Independencia, Juarez and La Central, in the Santa Eulalia district, 12 miles S. E. of Chihuahua, adjoining the Potosi mine, controlled by the Howe Sound Co.

Ore: lead-silver, occurring in chimneys and "mantas" (beds or blankets) in limestone. For detailed description of geology of the district, see Trans. A. I. M. E., Vol. LI (pp. 57-99).

Developemnt: on the Santa Eulalia mines to depth of 2,000′ by several shafts with extensive workings and 5,000′ of diamond drilling, which was without any specific result.

Comparative Statement of Operations:

Year	Ore, Tons	Silver Oz.	Silver Oz. p. t.	Lead Lb.	Lead %	Average Net Value Silver Oz.	Lead Lb.
1914	2,918	110,824	31.5	.....	...	51.48c	....
1913	7,129	554,181	78.5	.....	...	57.45c	....
1912	7,851	485,712	66.3	260,989	1.8	60.07c	2.89c
1911	12,173	1,433,071	117.7	1,275,778	5.9	51.87c	1.79c
1910	20,181	879,492	43.6	1,584,528	3.9	52.10c	1.65c
1909	25,509	1,410,630	47.8	1,810,397	3.1	50.77c	1.66c

Company was a large producer of silver lead ore prior to the Madero revolution, in 1917, the Santa Eulalia property was leased to Compania de Minerales y Metales for 10 years, on a royalty of 15% on net smelter returns, the minimum to be $300,000, payable monthly in advance in installments of $2,500 .

It does not seem likely that San Toy can pay dividends on its present production.

SIERRA CONSOLIDATED MINES **CHIHUAHUA**

Office: 120 Broadway, New York, N. Y.

Officers: J. B. Cotton, pres.; Robert Linton, v. p.; F. R. Kennedy, sec.-treas.; H. B. Paull, auditor.

Directors: Robert Linton, E. R. Grochau, J. F. Bankerd, T. F. Cole, J. B. Cotton, L. D. Ricketts, C. d'Autremont, Jr., F. R. Kennedy, and H. B. Paull.

Inc. Aug. 18, 1909, in Arizona. **Cap.**, $5,000,000; $10 par; 76,500 shares issued, fully paid 223,500 shares part paid at $7 each, $1,564,500; total outstanding $2,329,500. Stock transferred and registered at the company's office. Annual meeting, first Tuesday after first Monday in May at Warren, Arizona. Stock listed on New York Curb and traded in on Boston Curb.

Property: embraces mines, mineral and timber lands, water-rights, and surface acreage for power plants and reduction works. The mineral properties consist of 1,235 acres, in Ocampo, Pinos Altos, Socorro, and Yepachic, in the district of Rayon, State of Chihuahua, Mexico. The timber lands comprise 80,000 acres all in Chihuahua. The company has water-power rights at Jesus Maria arroyo, a stream that flows through Ocampo, and to the Basaseachic falls 18 miles from Ocampo.

Development: was carried on by the company from 1909 to 1912 in Matulera, Belen, Santa Eduviges, Guadalupe, San Ramon, El Conico, San Estanislao, and La Cumbre mines, and about 13,000′ of work had been done when operations were suspended on account of the revolution. No work has been done on the property since, but the mines can be reopened in short time when conditions permit.

The underground work has developed six ore-shoots blocking out approximately 100,000 tons of ore, averaging $12 per ton in gold and silver, basing the value of silver at 50c per ounce. The silver occurs as argentite, with some associated gold, in a silicious gangue. The ledge matter is an andesite breccia cemented with quartz.

Equipment: the equipment for a mill is at the mine ready for erection as soon as operations can begin, consists of the following: A 20 by 10″ Blake crusher, ten 1,500-lb. stamps, two 4 by 20′ tube-mills, three 15 by 45′ pachuca agitators, two Dorr thickeners, Esperanza classifier, 135-ton Oliver filter, Gwynne centrifugal dumps, all necessary solution tanks, steel zinc-boxes, Johnston precipitate press, tilting furnace for refining precipitates and all other necessary accessories. The electric generating station, 6 miles from Ocampo, on one of the company's timber tracts, consists of 66″ by 16′ Brownell tubular boilers, with feed waterheaters, pumps, etc.; three 100-h. p. Russell high-speed automatic engines belted to 75-k. w. generators; three 75-k. w. oil-cooled transformers; and all necessary lightning arrestors, switch-board apparatus, Tyrell regulators, etc. The current is generated at 2,300 volts and raised to 22,000 volts for transmission to Ocampo.

Sierra Mining Company, S. A.

Principal office: Juarez, Chihuahua. Mines and works at Ocampo, district of Rayon, Chihuahua, Mexico. This company is the Mexican title-holding and operating corporation for the Sierra Consolidated Mines Co.

Officers: J. B. Cotton, pres.; Robert Linton, v. p. and gen. mgr.; H. O. Flipper, Sec.; F. R. Kennedy, treas.; H. B. Paull, auditor and Enrique N. Seyffert, commisario.

Inc. Dec. 11, 1908, in Mexico. **Cap.**, 25,000 shares at $20 each (Mexican Currency).

Combined balance sheet Sierra Consolidated Mines Co. and Sierra Mining Co., S. A., December 31, 1918.

Assets.

Property	$1,452,602
Cash	20,086
Accounts receivable	24,008
Assessment No. 2	166,111
Investments	45,000
Supplies at mines	32,375
Suspense items	1,891
Construction and equipment	170,283
Development, taxes and miscellaneous expenses	469,231
Total	$3,381,590

Liabilities.

Capital stock	$2,329,500
Collateral trust notes	45,600
Accounts payable	6,490
Total	$2,381,590

STATE OF COAHUILA

COAHUILA MINING & SMELTING CO., LTD. COAHUILA

Office: 614 Penobscot Bldg., Detroit, Mich. **Operating office:** Apartado 72, Monterrey, N. L., Mexico. **Mine office:** Jimulco, Viesca, Coahuila.

Officers: H. T. Ambrose, pres.; Frank J. Llewellyn, v. p.; Walter E. Parker, sec. and gen. mgr.; Archibald Cattell, treas.; preceding, with J. Kirby, Jr., Sidney B. Cohn and C. F. Jennings, directors; J. C. Treadwell, supt.; Alex. McCormick, mine supt.; Harry Reed, mill supt.

Inc. January, 1902, in Mexico. **Cap.,** $500,000 gold; shares $1 par; non-assessable, fully issued.

Dividends: 10% in 1902; 6% in 1904; 29% in 1905; 30% in 1907; 10% in 1909 and 16% in 1910, a total of 101%, or $505,000. Annual meeting, first Wednesday in February.

Property: includes holdings in the Mapimi, Viesca and San Juan de Guadalupe districts, containing the (1) Santa Maria, Sultana, and other mines at Jimulco, carrying auriferous and argentiferous copper and lead ores, opened by a 700′ main shaft, and a 1,000′ main tunnel, with steam and electric power; (2) the Alberto mine, in the Mapimi district, was said to have made regular shipments of high grade ore to the Mapimi smelter, 1910; (3) a 250-ton smelter, with steam and electric power, connected with the mines by rail, blown-in early 1903, but idle since 1909. The revolution in Mexico has practically stopped all mining in Coahuila and the mines are closed down until peace and safety again prevail.

CONTINENTAL MINING CO. COAHUILA

Mine office: San Antonio, Texas.

Officers: Otto Wahrmund, pres.; C. T. Priest, San Antonio, v. p.; S. G. Newton, sec.

Inc. April, 1905, as a reconstruction of Continental Copper Co., **Cap.,** $1,000,000; shares $10 par. Is closely allied in ownership and management with the Jimulco Mining Co.

Property: the Panuco mine with 65 hectares, opened in 1700 and worked at intervals since. Property was bought from the Panuco Copper Co.

Ore: deposit is a chimney of breccia, cemented by metallic sulphides, mainly chalcopyrite, but with a little chalcocite, in a quartz gangue, the country rock being granite. The ore is reported to average about 3½% copper.

Company owns a 40-mile railway, from Monclova to Panuco. Old company invested about $1,000,000 in the property and improvements. Largest production, under former ownership, was 1,466,059 lb. fine copper in 1902, and a

small production was secured, July-November, 1907, by present company, estimated at 1,250,000 lb. copper. Mine considered promising, though low in grade, and management good. Closed down since 1913, on account of danger to life and property by revolutionary bands.

INTERNATIONAL ORE CO. **COAHUILA**

Officers: 23 Rue Fabry, Liége, Belgium; and Victoria 85, P. O. Box 136, Saltillo, Coahuila, Mexico. F. E. Salas, gen. mgr.

Cap., $200,000; shares all issued and fully paid.

Revenue is about $1,000,000 per annum. Profit for 1918 was $55,000. Assets total $354,628, and liabilities, including capital, $238,796.

Property: includes several zinc and lead-silver mines in Mexico, principally in Coahuila.

Equipment: includes a calcining and smelting plant at Saltillo. This has 2 Belgian distillation furnaces of 300 retorts each, heated by petroleum; also an 8-grate furnace for making zinc oxide from ore. These works were completed in 1919.

TORREON, S. A.; COMPANIA METALURGICA DE **COAHUILA**

Office: Torreón, Viesca, Coahuila, Mexico. (Managed by Cia de Minerales y Metales, S. A., of Monterrey, N. L., Mexico).

Officers: A. S. Gonzáles, pres.; Rodolfo Moreno, v. p.; Lic Lázaro de la Garza, sec.

Inc. June, 1901, in Mexico. **Cap.,** 4,000,000 pesos; shares 100 pesos par.

Dividends: 20% in 1902; 18% in 1903; 14% in 1904; 12% in 1905 and 1906; 6% in 1909.

Property: the Torreón smelter and a number of lead mines and several partly developed copper mines in northern Mexico. The San Diego mine at Santa Barbara, Chihuahua, has a 150-ton concentrator treating zinc ore.

Smelter: is a modern plant of 1,250 tons daily capacity at Torreón, an important railway junction point. The plant handles the company's own output, but also does an extensive custom business in gold, silver, lead and copper ores.

The plant has 10 blast-furnaces, including eight 100-ton silver-lead stacks, and two 250-ton copper stacks, all use mechanical chargers. There are two Dwight-Lloyd sintering machines, and a converter plant of 30 tons daily capacity. Water is furnished by three large wells. The works employ about 500 men.

Property was operated throughout 1917 and 1918, but figures are not available. Prior to the revolution the plant treated over 200,000 tons of ore annually at a profit of $700,000.

STATE OF DURANGO

AMAZON GOLD CO. **DURANGO**

Probably defunct. Formerly operated the Candelaria silver mine near Chacala, Durango. See Cia Rest de Baca Ortiz.

AMERICAN-MEXICO MINING & DEVELOPING CO. **DURANGO**

Office: Watertown, S. D. **Mine office:** Velardena, Cuencame, Durango, Mexico.

In July, 1915, company had debts amounting to $14,518, and creditors began action for appointment of receiver. Is not regarded favorably. See description by Horace J. Stevens in Vol. X. of the Copper Handbook.

ANITA MINE **DURANGO**

Address: E. F. Knotts, El Paso, Texas.

This mine at Guanacevi, Durango, has a 50-ton ball mill, flotation, and a filter plant erected in 1919.

AVINO MINES, LTD. **DURANGO**

Office: F. F. Fuller, 638 Salisbury House, London, E. C. 2, England. **Mine office:** Gabriel, Durango, Mexico; Lionel W. Harris, chairman; Edw. Hooper and A. Glencross, directors. Hooper, Speak & Co., cons. engrs.

Inc. March 6, 1909, in Great Britain. **Cap.**, £100,000, in 1,000,000 priority shares and 1,000,000 ord. shares of 1s par; issued 500,000 priority shares and 978,429 ordinary shares.

Was a reconstruction of Avino Mines of Mexico, Ltd., which was reorganized February 24, 1903, as successor of company of same name, organized February 13, 1899, which was the successor of Avino Syndicate, Ltd. Present company took possession of property August 1, 1909. Stockholders of old company were given 1 ordinary share, par 1s, full paid, for each fully paid £1 share of the old company, with the right to buy priority stock at par, share for share. After payment of 200% on priority shares, they rank equally with ordinary shares. Shares are listed on the London Stock Exchange.

Accounts for year ending June 30, 1918 show a loss of £4,793, leaving a debit balance of £7,749, cash assets exceeded liabilities by £10,500.

Property: the Socovon mine, 166 acres, at Avino, 10 miles from Gabriel, on the Mexican International railway, the nearest rail point.

The mine has a 900′ shaft and 1,050′ tunnel, with several large tajos or pits, one being nearly 400′ in width and of considerably greater length. Ore is a complex mixture of auriferous and argentiferous lead and copper sulphides Reserves were reported June, 1913, as 113,167 tons, averaging 1.8% copper, 9.7 oz. silver and $6 gold per ton.

Production: for 14 months to June 30, 1910, was 43,350 long tons of ore, of which 17,937 tons was rejected and 18,094 tons shipped, yielding 910,499 lbs. fine copper, 261,000 oz. of silver and 993 oz. gold, giving a profit of £4,338. Operations during 1912 were seriously interrupted by revolutionary disturbances. As the present mill is not successful the company has been shipping ore to smelters, at such times as the revolutionary troubles in Mexico permitted. All work was stopped in April, 1913. During 1912-13, 6,199 tons were sorted out for shipments, of an estimated value of £21,840. An unsuccessful attempt was made to resume operations in 1918.

Equipment: includes a steam and a 300-h. p. electric plant, operated by a gas engine.

The mine has experienced managers who should make money, if peaceful conditions ever prevail again in Mexico.

BACA ORTIZ; COMPANIA RESTAURADORA DE **DURANGO**

Mine office: Tepehuanes, Santiago Papasquiaro, Durango, Mexico. Property is the Candelaria mine, carrying auriferous and argentiferous copper ore. Idle on account of revolution, 1912-19.

BACIS GOLD & SILVER MINING CO., LTD. **DURANGO**

Office: W. McNeill, sec. and cons. eng., London Wall Bldgs., London, E. C. 2, England.

Directors: C. W. Milne, chairman; J. T. Henderson, and J. Stone.

Inc. June 7, 1901, in Great Britain. **Cap.**, £50,000; shares 5s par; 193,875 issued. **Debentures:** £25,000 of 10% income bonds, due 1930; and £15,000 prior-lien debentures due 1930. Interest on bond issue overdue since 1907.

During 1917 there was a loss of £9,473, which brought the debit balance to £55,912.

Property: several gold and silver mines, together with water and timber rights near Bacis, on the Quila river, Durango.

Equipment: includes mining plant and a mill with 40 stamps and cyanide plant.

Operations were suspended in 1913, but are to be resumed as soon as the region is safe.

CARMEN COPPER CO. **DURANGO**

Idle for several years. **Office:** 56 Pine St., New York. **Mine office:** Mineral del Carmen, El Oro, Durango, Mexico. Geo. Moeser, pres.; R. D. Kent, sec.; F. C. Alley, special agent.

Inc. in New York. **Cap.**, $750,000; shares $100 par.

Property: includes El Carmen mine, 160 hectares, and a considerable acreage of miscellaneous lands, 45 miles from Rosario, the nearest rail point.

The mine carries silver-bearing copper ores, with considerable development. Mill has 40 stamps, 3 crushers and Frue vanners.

EL ORITO MINING & MILLING CO. **DURANGO**

Address: care Robt. F. Fitz, gen. mgr., P. O. Box 275, Los Angeles, Calif. **Mine address:** Yerbanis, Durango.

Officers: Wm. Grote, pres., Elgin, Ill.; A. W. Church, v. p.; C. R. Hopson, sec.; J. A. Waterman, treas.; with J. A. Rovelstad, E. S. Eno and F. H. Ackerman, directors..

Inc. May 10, 1910, in Arizona. **Cap.,** $500,000; shares $100 par; outstanding, $432,500. Annual meeting, third Monday in May.

Properties: 233 pertenencias containing free milling gold property, at Peñon Blanco, and a copper property at Velardeña, Durango, Mex.

Development: one vertical and one incline shaft, depth 375′ with deepest workings at 475′. Total underground workings 1,500′.

Equipment: includes a 3-stamp mill. Mines closed down owing to revolution, but management states operations will be resumed as soon as permissible.

ESPERANZAS MINING CO. **DURANGO**

Idle for several years. Mine at Estación Symon, San Juan de Guadalupe, Durango, Mexico. Joseph Steel, gen. mgr., at last accounts. **Cap.,** $200,000.

Property: includes the Montaña de Cobre, Esperanza and other claims.

GUANACEVI TUNNEL CO. **DURANGO**

Mine at Guanacevi Santiago Papasquiaro, Durango, Mexico.

Inc. 1904, in Arizona. **Cap.,** $5,000,000; shares $5 par. Debts amounted to $150,000 in 1912 and have since increased.

Property: is in hands of trustee until conditions in Mexico permit of financing company sufficiently to carry on the extensive development planned. There are 22 properties, including timber rights and original concessions, said to possess large bodies of gold and copper ore. The mine has 3 shafts, of 100′ depth each, with tunnels of 1,250′ and 1,400′, the main tunnel, 7x9′, planned to be driven about 3 kilometers, management estimating that in this distance a large number of veins carrying lead and copper ores should be cut, the tunnel being estimated as likely to cost about $250,000.

The L. Diamond Co., of Boston, was never a representative of this corporation, but a number of brokers bought stock and combined to unload on the public at unduly high prices.

Idle for several years.

LUCIA MINING CO. **DURANGO**

Office: 15 William St., New York. **Mine office:** Pánuco de Coronado, San Juan del Rio, Durango, Mexico. H. M. Hubbard, v. p.; Myra B. Martin, sec.-treas.

Inc. 1900, in West Virginia. **Cap.,** $25,000; shares $5 par. This company is controlled by the San Luis Mining Co. and its property is described under that title.

NATIONAL MINES & SMELTER CO. **DURANGO**

Office: Magee Bldg., Pittsburgh, Pa. **Mine office:** Magistral, Durango, Mexico.

Officers: S. H. McKee, pres.; Wm. L. Curry, v. p.; John S. Eberman, sec.-treas.; Renald Ailes, financial agt.; E. A. Kennedy, supt.; R. W. Stiler, mgr.

Inc. 1911. **Cap.,** $2,500,000; issued, 1,700,000 shares. Authorized $400,000 collateral income bond issue; issued, $375,000. Company owns all the stock of the Santa Maria del Oro Mines Co., which company purchased property of the Lustre Mining & Smelting Co. from old stockholders, paying for same in stock and bonds of the National Mines & Smelters Co.

Property: the Magistral and Cocinera mines, 32 claims, 441 hectares, 1,089 acres of mineral lands, 397 hectares of mill and smelter sites, besides miscellaneous lands and leasehold timber lands. The Magistral mine is developed by 3 tunnels and 9 shafts and has a large body of slightly cupriferous pyrite with quartz and limestone gangue, carrying 0.5 to 5% copper, probably averaging under 1% copper, 1 oz. silver and 15 to 20 grams gold per metric ton.

The Cocinera mine developed an ore-shoot, 1,000′ long, 15′ wide and said to average $10 in gold and copper with a little silver. Depth over 600′.

Ore reserves: in this and the Azurite mines are estimated by the management at 190,000 tons, developed in new ground since 1911. The old company claimed reserves of 185,000 tons in other and entirely distinct orebodies, in 1910.

Equipment: is complete, including a central power plant having two 360-h. p. and two 350-h. p. gas engines, one 200-h. p. and three 400-h. p. gas producers, 2,300-volt 3-phase generator, two 6-drill air-compressors and 10 hoists of 100 to 300-h. p. The 40-stamp mill, 750-lb. heads, has Huntington mills, 1 ball-mill and 10 Frue vanners.

The smelter has 6 blast-furnaces, including two 150-ton hot-blast furnaces and three 200-ton furnaces, air for blast being heated by waste gases in a specially-designed heater. Produced 8,000 tons matte sent to the A. S. & R. Co. at Aguascalientes, averaging 15 to 17% copper, $155 gold and $4 silver per ton.

The old company apparently spent a million dollars or so for installation before the mines were sufficiently developed to provide the ores necessary to keep the various plants running and in 1907-08 became financially embarrassed. The mines are not yet on a profitable basis, but with the new concentration plant, built in 1915, it is expected that the property will yield a satisfactory return on the investment, as soon as operations become normal in Mexico.

The plant is reported to have been badly damaged by bandits.

PENOLES MINING CO. (CIA MINERA DE PENOLES) DURANGO

See Minerales y Metales, Compania de, under "Mexico."

SAN LUIS MINING CO. DURANGO

Office: Myra B. Martin, sec., 15 William St., New York. **Mine office:** Panuco de Coronado, Durango, Mexico.

Officers: David F. Beggs, pres. and treas.; C. P. Jacobs, F. C. Hanford, W. B. Raymond, Wm. T. Read and Walter S. Logan, directors.

Inc. 1900, in West Virginia, and cap. increased, 1905, to $3,000.000; shares $1 par. First dividend, 1%, was paid January, 1906, and a second dividend was paid July, 1916. Direct title to this property is held in the name of Lucia Mining Co. Annual meeting, last Tuesday in February.

Property: 225 pertenencias, 500 acres, and a 25-acre millsite, in the San Lucas and Panuco de Coronado districts of Durango. The property shows limestone and porphyry, carrying fissure veins and contact deposits, whose ores are estimated by the management to average 3% copper, 12% lead, 1% zinc, 35 oz. silver and $4 gold per ton, mainly from sulphide ores. The mines were discovered 1650, and worked more or less irregularly until 1830, when closed on account of water and Indian troubles, remaining idle until reopened, 1901, by the present company.

The Potosina mine is said to show, at the western end, a considerable body of ore of smelting grade and a large quantity of milling ore.

The San Gonzalo mine, 450′ deep, has a vein showing mainly low-grade ores carrying silver values above, with copper on the lower levels, and is also reported to have a 2′ vein carrying 25 kgs. silver per ton, with some gold.

The Sidney has a 2′ vein of galena, giving assays up to 45% lead, 4 oz. silver and 3 grams gold per metric ton, opened by a shallow shaft, but has been idle for some years on account of water.

The San Lucas mine, 19 hectares, about 35 miles N. W. of Gabriel, is an old property claimed to have nearly 2 miles of workings, carrying mainly lead and zinc ores, and is idle.

The San Pablo mine has parallel veins said to carry 6 to 36″ paystreaks of sulphide ore, giving assays up to 16% copper, 360 oz. silver and 14 grams gold per ton, opened by a 175′ vertical shaft, equipped with headgear and hoist.

Equipment: at the various mines includes steam plants, claimed to aggregate 750-h. p. with 6 hoists and 2 air compressors of 12 drills combined capacity. Buildings include a machine shop, carpenter shop, smithy, offices, 4 general stores and a large number of dwellings for workmen, with a total of 175 buildings. The mill has 2 crushers, 1 jig and 4 Bartlett tables. Concentration seems to have proven more satisfactory than leaching.

The Trinidad leaching mill, of 120 tons claimed daily capacity, has 2 calcining furnaces and apparently treated only about 40 tons of ore daily, when in operation.

Idle on account of revolution, but reported late 1919 that the company was about to give a lease on the mines.

SAN MATEO, S. A.; CIA MINERA **DURANGO**

Office: Velardeña, Durango, Mexico. Carlos Michaud, pres.

Inc. 1911, as successor of the Hileta Gold & Silver Mining Co.

Property: 72 acres, including the Santo Tomas, Bolsa and other mines, and a 60-acre mill site. Claims are reported to show 5 E.-W. fissure veins cutting through limestone and porphyry.

Development: one vein of 12" to 3' width, is developed by a 1,600' tunnel, with 6,000' of workings, exposing ore said to average 1% copper, 6% lead, 36 oz. silver and $10 to $50 gold per ton.

Equipment: includes steam and gasoline hoists, good for 1,000' each, and a 3-drill air compressor. There are 9 buildings. Shut down several years on account of political conditions.

STATE OF GUANAJUATO

EL CUBO MINING & MILLING CO. **GUANAJUATO**

Office: 1025 Peoples Gas Bldg., Chicago, Ill.; and Apartado 49, Guanajuato, Gto, Mexico.

Officers: H. L. Hollis, pres.; Alfred Cowles, treas.; A. Hunter, sec.; Irving Herr, gen. supt.

Property: in the towns of Cubo and Villalpando, 6 miles from Guanajuato, Mexico, embraces the Cubo mine, developed to a depth of 800', with extensive workings on a typical fissure vein in andesite. The free milling silver ore occurs in oreshoots.

Equipped: with 250-ton flotation and cyanide mill. held under lease and option from the Providencia M. & M. Co., which see.

Operations were resumed in October, 1919.

GUANAJUATO CONS. MNG. & MILLING CO. **GUANAJUATO**

Office: 35 Wall St., New York, and Guanajuato, Gto., Mexico.

Officers: Fred G. Corning, pres.; Robt. Mulford, v. p.; C. Van Rensselaer Cogswell, sec.-treas.; with Walter D. Clark, Walter W. Storer, R. A. Walker, W. Lawrence Green, Chas. G. Molin, Sidney Green, all of New York, and Geo. A. McGlone, Charleston, W. Va., directors.

Inc. 1899, in West Virginia. **Cap.,** $3,000,000; shares $5 par; 566,184 issued. $169,080 of the unissued stock has been set aside to retire the outstanding 7% bonds. State St. Trust Co., Boston, transfer agent. Old Colony Trust Co., Boston, registrar. Annual meeting in January, at Charlestown, W. Va. Listed on Boston Stock Exchange and dealt in on New York Curb.

Bonds: authorized $300,000; outstanding $128,000 convertible debenture 7's, dated January 2, 1904, due January 2, 1924. Interest January 2 and July 2, at New York office of company. Coupon and registered bonds, $100, $500 and $1,000; convertible at 120 into stock at par; 10% of net earnings is set aside for redemption of this bond issue. Coupon No. 22, due January 2, 1915, on the debenture bonds, was payable on May 15, but No. 23, due July 2, 1915, was deferred until further notice. Trustee, Columbia Trust Co., New York.

Dividends: 1¼%, 6¼c per share, paid July 31, 1906; 1½%, 7½c per share, October 31, 1906; none since.

Balance sheet December 31, 1913, the last one published, showed assets of $3,495,586, which included mines, plants, etc., $3,136,890; supplies, $78,896; cash, $96,996. Liabilities included: 6% bonds, $5,000; refunding notes, $53,800; surplus, $200,000; sinking fund, $28,409; undistributed profits, $45,019; notes payable, $10,466.

Income account for 1913, last reported, showed: Receipts—bullion and concentrates, $670,142; expenditures, mining, etc., $302,452; ore bought, $176,585;

treatment charges, $39,186; bullion expense, $23,413; taxes, etc., $26,674; total $568,312. Gross profit, $101,830. Deduct: bond interest, $13,412; depreciation, $33,427; bond redemption reserve, $5,494; total, $52,333. Net profit, $49,498; undistributed profit forward, $45,522; total, $95,019. Forward to surplus accounts, $50,000. Undistributed profit, December 31, 1913, $45,019.

The company owns a large interest in the Carmen-Guanajuato Gold Mining Co.

Property: owns a number of silver-gold mines in the Guanajuato district. Of these the Sirena is the oldest, having been worked for 100 years. Under normal conditions it has a monthly output of 7,500 tons of milling ore. with value mainly in silver. Vein varies in width from 3′ to a maximum of 200′. Ore reserves of the Sirena mine were estimated 1913 as 800,000 to 1,400,000 tons blocked out, pillars and fill; Penafil lease, 180,000 tons.

Development: by shafts to depth of about 1,000′.

Equipment: includes 80-stamp mill, cyanide and electrical plants.

The revolution has greatly interfered with operations during the past few years, the property having been run on half time for a large part of the time, but is now running at full capacity, and making money despite the low-grade of ore milled.

GUANAJUATO DEVELOPMENT CO. GUANAJUATO

Office: 50 Broad St., New York. **Corporate office:** Jersey City, N. J. Mine office at Guanajuato, Gto., Mexico.

Officers: Geo. W. McElhiney, pres.; Wright Johnson, v. p.; P. E. Sharpless, v. p.; W. H. Porter, sec.-treas.; with A. A. Barnes, H. C. Field, H. O. Marcy, John A. Martin, and F. G. Peck, directors. John Pritzel, asst. treas.; K. A. Cunningham, gen. mgr.

Inc. Feb. 24, 1906, in New Jersey. **Cap.**, $300,000 com. and $600,000 pfd., decreased June 24, 1916, from $1,000,000, 6% cum. pfd.; $3,000,000 common; pfd. $60 par; com. $10 par. Preferred stock has preference as to assets and is subject to call at par and accrued dividends on any semi-annual dividend date. Stock transferred at company's office. Annual meeting, first Wednesday after second Tuesday in June, at Jersey City, N. J.

Dividends: preferred, paid semi-annually Jan. and July 1, from 1906 to 1910, inclusive, none since.

Property: company controls the Pinguico Mines Co., Mexican Milling & Transportation Co. and Peregrina Mining & Milling Co. Properties are located at Guanajuato, Gto., and are held under Government titles, options, etc.

The mines have strong fissure veins cutting bedded volcanic tuffs and intrusive rocks. The ore-shoots contain rich silver ore with gold values, in a quartz gangue. Lead and copper are practically absent.

Peregrina Mining & Milling Co.

Controlled by Guanajuato Dev. Co. Same officers, with H. C. Field, A. G. Lund, John A. Martin, Frank G. Peck, and James Tracy Potter, directors.

Inc. Feb. 21, 1905, in New York. **Cap.**, authorized and issued, $1,000,000, 7% cum. pfd., and $2,000,000 common. **Shares:** preferred, $100; common, $10. Annual meeting in June in New York.

Dividends: preferred paid 3½% in 1905; 1906 to Sept. 1, 1910, inclusive, 7% per annum; none thereafter until April 15, 1915, when 3½% as paid. Common none. Preferred dividends, payable March 1 and Sept. 1, at 50 Broad St., New York. Last one, of 5% paid April 15, 1916.

Property: about 175 acres, which include a group of old producing silver-gold mines near Guanajuato, Mexico. Output under normal conditions, 13,000 tons per month. Ore reserves were estimated January 1, 1919, at 70,000 tons.

Equipment: includes milling and cyanide plants. Ore milled in 1918 was 55,146 dry metric tons.

Operations resumed in 1918, following a shut-down due to war conditions.

Pinguico Mines Co.

Controlled by the Guanajuato Dev. Co.; same officers, with W. B. Field, H O. Marcy, Jr., A. G. Lund, J. A. Martin, and Frank G. Peck, directors.

Inc. Sept. 13, 1906, in New Jersey. **Cap.**, authorized and outstanding. $1,000,000 6% cum. pfd. and $500,000 common, reduced from $2,000,000 and $5,000,000 respectively June 24, 1916. Shares: preferred $50; common, $1 par. Preferred stock has preference as to assets and is subject to call at par, and accrued dividends an any dividend date. Stock transferred at company's office. Annual meeting, first Friday after second Tuesday in June at 15 Exchange Place, Jersey City, N. J. Fiscal year ends December 31.

Dividends: preferred, 1907, to Oct., 1913, inclusive, 6% per annum; none reported since. Common, none. Preferred payable April and October 1 at 50 Broad St., New York.

Property: 5 claims, 300 acres, covering 3,200′ on the main Pinguico vein, near Guanajuato, Gto. **Ore:** silver-gold. **Development:** Pinguico shaft, 800′ deep, and the Fortuna, 670′ deep, with several miles of underground workings. **Equipment:** includes a 40-stamp mill and a cyanide plant. Capacity, under normal conditions, about 8,000 tons per month.

In March, 1920, company was unwatering the Esperanza mine at Santa Ana. K. A. Cunningham in charge.

GUANAJUATO REDUCTION & MINES CO. GUANAJUATO

Address: Columbus, Ohio. Mines and mills at Guanajuato, Gto., Mex.

Officers: C. L. Kurtz, pres., Columbus, Ohio; Wm. G. Moore, v. p.; Geo. D. Bounton, v. p.; Philadelphia; C. J. Kurtz, sec.-treas.; with C. J. Schlachter, Wm. D. Sherrerd, Robt. T. Moore, Geo. W. Chase, W. G. Moore, G. D. Bounton and L. O. Bailey, directors. W. G. Wheaton, auditor; H. P. Smith, gen. mgr. at Guanjuato; August McDonald, mill supt.

Inc. 1904, in Colorado, as a consolidation of several silver and gold mines in the Guanajuato district. **Cap.**, $75,000; $1 par. Stock transferred at company's office, Columbus. Empire Trust Co., New York, registrar. Annual meeting, first Tuesday in February, at Colorado Springs, Colo. Listed on New York Curb.

Bonds: authorized $3,000,000; outstanding, $2,800,000, first mortgage 6%, 20-year, $100, $500, and $1,000 gold bonds, dated July 1, 1904, due July 1, 1924; interest January 1 and July 1, at office of the trustee, Empire Trust Co., New York.

Bond interest was deferred January 1, 1915, and operations temporarily suspended in August, 1916, due to the revolution in Mexico and also to the inability to secure cyanide and other supplies.

The company was unable to convert its product into cash on account of the Mexican revolution and defaulted, July 1, 1914, interest on its first mortgage 20-year 6% bonds; this interest was paid in January, 1915. On February 1, 1919, interest was paid for the period July 1, 1914 to January 1, 1915.

Comparative Income Account, years ended December 31:

Year	Gross Earnings	Operating Expenses	Net Earnings	Bond Interest	Balance for Year
1917.....	$1,214,145	$1,043,940	$170,205	$168,000	$2,205
1916.....	353,357	339,314	14,048	168,000	153,957(b)
1915.....	489,724	366,434	123,290	168,000	44,693(b)
1914.....	1,523,668(a)	1,361,720	161,948	168,000	6,052(b)
1913.....	1,149,176	839,674	309,502	168,000	141,502
1912.....	1,004,290	693,477	310,813	168,000	142,033
1911.....	930,280	648,247	282,033	168,000	113,033
1910.....	931,562	618,414	313,148	168,000	145,148

(a) Includes deduction of $64,191 for conversion of accounts from 2 to 1 ratio to U. S. currency. (b) Deficit.

Property: a group of famous bonanza silver mines in the Guanajuato district.

Development: a total of 8,130 meters of new work was done in 1918, the largest footage in any one year. No new large orebodies were found, but indications for profitable ore were favorable.

Operating results for 1918:

Mine	Production, tons	Silver, grams	Gold, grams	Cost	Profit	Reserves, tons
Tepeyac—Valenciana	6,187	279.6	2.33	$3.34	$1.17	11,544
Maravillas—Cata	15,054	233.9	2.81	3.03	0.69	50,913
Mellado—San Miguel....	30,612	269.0	2.43	2.93	1.54	54,233
Mellado—Kurtz	18,895	218.1	2.18	....	....	49,575
Mellado—Rayas	16,169	269.0	3.94	3.69	....	26,055
Mellado—Garrapata	32,477	200.0	2.99	2.10	1.14	63,818
Dumps	68,194	158.1	1.40	0.49	1.37	440,400
Totals	187,588					696,538

In addition to the above reserves there is a probable tonnage of 138,022, averaging 242 grams of silver and 3.31 grams of gold. The grand total of 834,560 tons compares with 870,444 tons in 1916, and 772,980 tons in 1917.

Equipment: includes the Bustos 160-ton stamp and concentrating mill and Flores cyanide plant. Crushed ore is sent from the mill to the treatment works through 6,000′ of 8″ pipe. A new 200-ton mill with 20 stamps, ball-mill and cyanide plant is under construction.

Production, year ending December 31:

Year	Tonnage	Silver, grams	Gold, grams	Extraction, Silver, %	Extraction, Gold, %	Cost Mining per ton	Cost Milling per ton
1918....	187,760	209.7	2.29	78.08	80.39	$2.91	$2.10
1917....	.....	.....	....	.....	.....	....	....
1916....	64,030	245.7	2.49	80.18	85.35	1.44	1.68

Since April, 1918 mine and mill have been operating full capacity, the first time in 5 years. Normal output is 230,000 tons of ore per annum, and with silver at $1.30 an ounce, company should soon be able to make up for the long period of inactivity.

PROPRIETARY MINES COMPANY OF AMERICA GUANAJUATO

Office: 25 Broad St., New York; or D. C. Catlin, 60 Broadway, New York.

Officers: D. C. Catlin, pres.; E. J. Page, v. p.; Chas. E. Pope, 2nd v. p.; C. W. Pope, sec.-treas.; above with Horace E. Parker, Wm. A. Robinson, Jr., Theodore Dwight and W. B. Cogswell, directors.

Inc. 1907, in Nevada. **Cap.**, $3,000,000; shares $5 par; $2,250,500 issued. **Bonds:** authorized, $750,000, 6% convertible; outstanding, $703,400. New York Trust Company, registrar. Stock transferred at company's office. Annual meeting, second Monday in June. Is a holding company, controlling through stock ownership the Mineral Development Co., the Providencia M. & M. Co. of Guanajuato, Mexico; and the Carmen Syndicate, which see under Sonora.

Latest financial report available, year ending May 31, 1914, showed assets: property, $2,249,000; stock, bonds and notes of subsidiary and other companies, $560,542; accounts receivable, $31,076; cash, $5,427; furniture, $313; accounts since organization of company, $132,632; loss and gain $8,700. Liabilities, amounting to $3,737,193, include outstanding stock, $2,250,500; outstanding bonds, $703,400; stock exchanged for Min. Dev. Co. shares, $6,380; accounts payable, $5,996; contingent, $21,417.

The 1915 annual report contains a reference to necessary "additional financing" when the orebodies of the Nueva Luz mine have been more thoroughly developed and when political conditions in Mexico permit the reopening of the Tajo de Dolores mine.

Company has an option on and is developing the **Carmen** mine in the Arizpe district of Sonora, with Frank W. Royer in charge. A 25′ vein has been opened, 15′ assaying 20 to 35 oz. of silver per ton. Conditions on the 150′ level are extremely good.

Mineral Development Co.

Smith K. Hays, in charge, Guanajuato, Mexico. **Cap.**, $1,000,000; shares $1 par; $800,000 issued.

Property: the Nueva Luz mine, the La Planta and Torre mines. La Nueva Luz mine, adjoining the Valenciana, is developed by a 2,035′ shaft and a 1,130′ crosscut, driven through the Veta Madre, below the Valenciana workings, which cut 3 veins reported to be from 5′ to 32′ wide, and to carry iron pyrite, zinc blende, lead sulphide, chalcopyrite, silver and gold. The 3rd vein intersected 1,069′ from the shaft was 5′ wide, and assayed 480 grams silver, ¼ gram gold and 10% zinc, per ton. Management plans drifting on the lowest level and diamond drilling to ascertain dimensions of these orebodies. The mine was closed from 1914 to 1920, as company's model hoisting and compressor plant, supply house, etc., were burned down. Mine kept unwatered, but no work done.

Providencia Mining & Milling Co.

Cap., $1,250,000, of which $250,000 is 7% preferred, convertible at 110, and $1,000,000 common stock, 250,000 shares common in treasury.

Property: the Tajo de Dolores mine at Guanajuato, Mexico. The mine was closed down in April, 1914, and the outlook for an early resumption of operations is not bright. The 200-ton mill and cyanide plant has been leased for 3 years to El Cubo Mining & Milling Co. for a yearly rental of $20,000 U. S. currency and an option to purchase at $100,000. Interest at the rate of 6% is charged until the option is exercised; rent paid is credited to purchase price. The Cubo Co. agrees to mill Tajo de Dolores ore for a period of 7 years at cost plus 10% until exercise of option and at cost plus 20% thereafter. The lease became operative when work was resumed. The Tajo de Dolores mill was being worked in July, and the Cubo M. & M. Co.'s property in October, 1919.

SAN CAYETANO MINES, LTD. GUANAJUATO

Controlled by General Development Co.

Office: 61 Broadway, New York.

Officers: J. H. Susmann, pres.; J. A. Lewisohn, v. p.; Herman Cook, sec.; S. A. Lewisohn, treas.; with J. P. Channing, J. G. Greenburgh, and W. H. Osborne, directors.

Inc. Jan. 24, 1907, in New York. **Cap.**, $1,500,000; $1 par; 51,390 issued.

Property: 341 hectares in La Luz section of Guanajuato district, cut by numerous silver veins.

Development work, consists in a main haulage and development tunnel a mile long, undercutting many quartz veins. Owing to former low price of silver and the low grade of the ore found in the tunnel, operations were suspended. With present silver prices company should be able to have ground worked on a royalty basis by leasers.

SAN LUIS; CIA. BENEFICIADORA GUANAJUATO

San Luis de la Paz, Gto., Mexico. Owns the Ojo de Agua smelters. Idle.

UNITED MINES CO. GUANAJUATO

Office: same as Guanajuato Cons. M. & M. Co., 15 Broad St., New York.

Property: the Melladito, La Lula, San Ramon mines in the Guanajuato district. In June, 1919, 10 oz. silver and 0.97 oz. gold ore was being mined in the last named. A 100-ton mill was erected, and good profits were expected.

STATE OF GUERRERO

PACIFIC COPPER CO., LTD. GUERRERO

Address: F. C. Stephens, P. O. Box 1656, Mexico, D. F. **Mine office:** Petatlan, Galena, Guerrero, Mexico.

Officers: Dr. W. S. Cockrell, pres.; Thos. Milan, v. p.; J. P. Taylor, sec.; H. J. Morden, treas.; F. C. Stephens, gen mgr.; preceding, with J. N. Gilbraith and Carlos Eisenmann, directors.

Inc. May 16, 1906, in Mexico. **Cap.**, 10,000,000 pesos; shares 100 pesos

par; non-assessable; fully issued. Company holds direct title to its property through the Compania de Cobre del Pacifico, and is in turn controlled through stock ownership by the Pacific Copper & Pyrites Co.

Property: 1,000 pertenencias, 2,471 acres, known as El Rey del Cobre group, near the Rio Murga in La Union district, 10 miles north of Petatlan and about 28 miles N. E. of Zihuatanejo, the nearest port. The property shows contact deposits in metamorphic schist, the main lode having a N. E. strike, traceable 3 miles. No. 3 orebody, reported to have a maximum width of 197′, carrying lenses of cupriferous pyrite, is developed by crosscut tunnels, drifts and raises to depth of 234′ below the outcrop. No. 5 orebody, about 1 mile to the S. E., has only been slightly developed; the nature of the ore in both is said to be identical. Ore is estimated to average 1.5% copper and 40c in silver and gold per ton, with 48% sulphur and 42% iron.

Property lies in a very rugged country and is reached only by trails.

Development: by "A" shaft of 109′, "B" shaft of 70′, El Socavon drift tunnel of 400′, No. 3 crosscut tunnel of 404′, No. 4 crosscut tunnel of 486′, No. 5 tunnel of 243′, and No. 1 tunnel of 407′, with a total of 3,050′ of workings.

Ore reserves were estimated at 3,000,000 tons of ore blocked out, January, 1916.

Equipment: includes a hoist, not installed, good for 1,000′ depth, and a small air-compressor. There are about 35 buildings.

Development was continued without interruption until 1915. Company was planning to build a railway to Zihuatanejo and to add equipment at the mines. The mine, though low-grade, apparently contains large orebodies and is considered promising.

PACIFIC COPPER & PYRITES CO. **GUERRERO**

Office: 1429 Monadnock Blk., Chicago. John Howard McElroy, pres.; C. D. Greenleaf, sec.; Eugene Atkins, treas.

Inc. 1913, in Maine. **Cap.**, $7,500,000; shares $50 par. Is a securities-holding company, controlling the Pacific Copper Co., Ltd., through ownership of over two-thirds of that company's outstanding share capital.

RIO GRANDE & DOLORES SILVER MINING CO., LTD.

Office: 37 Old Jewry, London, E. C., England. **Mine office:** Mineral de Guadalupe, La Union, Guerrero, Mex.

Directors: Lieut.-Col. A. B. Haig, and Brooke Mockett; A. Kitching, sec.

Inc. Dec. 11, 1877, in Great Britain. **Cap.**, £17,000; increased, August, 1881, from £10,000; shares £10 par, in £10,000 ordinary shares and £7,000 cumulative preference shares, fully issued and fully paid. After the payment of a 10% dividend on preference shares, remaining profits are divided equally. Debentures, £10,000, at 10%.

Financial statement for year ended June 30, 1918, shows that £2,605 was spent, £220 for mining taxes. Cash on hand amounted to £19. Current expenses are advanced by directors and several shareholders.

Title to property is still intact, but company trying to sell it. In balance sheet, property, rights, and development amount to £27,500.

Property: La Nava mine, at Guadalupe, carrying copper ore, with values mainly in silver, developed by shaft and tunnel.

Equipment: includes steam and water power, with a 20-ton mill and leaching plant. Company employs about 100 men, normally, but for several years active operation has been prevented by the Mexican revolution.

STATE OF HIDALGO

ANTIMONY CORPORATION **HIDALGO**

Address: Room 1209, 71 Broadway, New York City.

Officers: Chas. F. Rand, pres.; Jos. S. Fay and Olof Wenstrom, v. p.'s; Chas. F. Smith, sec.-treas., with Freeman Hinckley, Robt. A. Manning and Geo. Tyson, directors. Olof Wenstrom, mine mgr.

Inc. Feb. 15, 1916, in Delaware. **Cap.**, $1,000,000; shares $5 par; 100,000 preferred; issued 10,000 preferred, 100,000 common, no bonds. Company organized to take over a deposit of jamesonite—a lead-antimony ore—on one of the properties of the Cortez Associated Mines Co., which see, in Zimapan, Mexico.

Property: 48 hectares, 120 acres patented, Zimapan, State of Hidalgo, Mex., said to show ore carrying jamesonite, consisting of 50.8% lead and 29.5% antimony, and carrying silver. The occurrence is fully described by W. Lindgren and W. L. Whitehead, Econ. Geol., July, 1914, p. 435, and R. W. Raymond, E. & M. Journal, January 2, 1915, p. 9.

Operations were conducted under great difficulties in 1916, but were suspended in April, 1917, due to trouble with bandits and excessive taxation. The great lead-antimony mass does not seem to persist, but a silver-lead-antimony vein was disclosed, which would be valuable were it in the United States.

CORTEZ ASSOCIATED MINES **HIDALGO**

Office: 53 State St., Boston, Mass. **Mine office:** Jacala, Hidalgo, Mex.

Officers: Joseph S. Fay, pres.; Olof Wenstrom, v. p.; Freeman Hinckley, sec.-treas.; preceding officers, Wm. F. Ray, Robt. A. Manning and Philip W. Wreen, directors.

Inc. Jan. 3, 1910, in West Virginia. **Cap.**, $1,500,000; shares $3 par, non-assessable; $825,000 issued. Company began business with $275,000 cash, and early in 1919 had about $1,500 cash plus its holdings in the Antimony Corporation. Boston State Safe Deposit & Trust Co., transfer agent. Stock is listed on the Boston Curb. Annual meetings, first Tuesday in March.

The company is primarily a development and holding corporation, formed to explore and develop mining properties until they are ready to produce, and then to promote an operating company.

Property: 1,079 pertenencias, 2,666 acres, in 4 groups, in the districts of Jacala, Zimapan, and Ixmiquilpan, about 20 miles distant. The lands include the entire old mining camp of Jacala.

The Jacala property shows thickly bedded blue limestone intruded by granular monzonite with alteration along the contact and mineralization of the metamorphosed limestone by copper and silver-lead sulphides. The intrusive mass is 1¼ miles long and 700′ wide. The contact zone carries numerous orebodies showing chalcopyrite and magnetite below the 300′ zone of oxidization.

Careful exploration has shown that most of the ore-shoots are low in copper and carry but 1 to 3 oz. in silver. Main development is by the Cortez 1,770′ tunnel, which has opened up about 35,000 tons of pyritic ore containing magnetite and chalcopyrite, the average copper contents being 1.72%. Several hundred thousand tons may possibly be developed here, and as the ore contains 50% iron, it will be valuable for a flux.

The Humboldt, Cortez, Abeja and Santa Maria show promise of making producing mines. The Humboldt has a magnetite-garnet outcrop, explored by the 1,304′ Humboldt tunnel with drifts and a 130′ incline winze, mostly in ore. The Santa Maria 394′ shaft has developed a body of soft, leached copper-bearing gossan of 6,000 sq. ft. area. This shaft will connect with the Humboldt tunnel.

Small replacement deposits of silver-lead ore in limestone also occur at Jacala, but the Carmen mine is the only one of promise. This well-known producer, 1½ miles north of Jacala, yielded 40 oz. silver-lead ore for many years. The mine workings are on the contact between limestone and porphyry and developed a replacement chimney of silver-lead ore in limestone, worked by an incline shaft to a depth of 900′. The company's new work has not yet cut the downward continuation of this ore shoot.

The San Nicholas group includes the Soledad and Ensino Largo mines.

Zimapan lies in a broad, arid valley with the 4,000′ deep Moctezuma canyon 9 miles west and the 3,000′ deep Toliman canyon 6 miles west. The mines lie in the Toliman canyon and on the ridge between it and the Moctezuma river. The ore deposits lie around a large intrusion of monzonite porphyry either as contact deposits carrying copper, or silver-lead deposits in the surrounding limestone, especially along fissures and intrusive dikes. The latter form pipes, or chimneys, either vertical or inclined. The copper properties at this place are

practically undeveloped, but a contact deposit showing disseminated copper pyrite, zinc blende and galena, promises to develop a large tonnage.

The Sirena lead-antimony mine lies 9 miles north of Zimapan. Ore occurs as a replacement deposit, in Cretaceous limestone, cut by a porphyry dike, and apparently follows the bedding of the limestone, dipping about 40° S. The ore is massive and consists of pyrrhotite, arsenopyrite, blende and jamesonite, forming an orebody 700′ long and 30′ thick.

In 1916, the company sold its Sirena property to the Antimony Corporation.

The mines have been closed down since 1913, owing to revolutionary disturbances, during which period all supplies were stolen and machinery destroyed. Taxation became very onerous, and company will have to be reorganized before operations can be resumed.

GRANADENA MINING CO. **HIDALGO**

Closed down by revolution. Mine at Santa Barbara, Hidalgo, Mex., produces silver-lead ore with a small amount of copper. Fully described Vol. X.

HIDALGO COPPER MINING & SMELTING CO. **HIDALGO**

Office: Avenida 16 de Septiembre No. 26, Mexico D. F. **Mine and works office:** Zimapan, Hidalgo, Mexico.

Officers: Sydney Ludlow pres.; Ricardo T. Sobey, v. p.; R. A. Mills, sec.; Hedley Ludlow, treas.; preceding, with George A. Camphuis and W. H. Armstrong, directors; Hedley Ludlow, gen. mgr.; Jas. H. Armstrong, supt.; Plenio Lopez, engr.; Halarion Diaz, chemist.

Inc. Aug. 14, 1907, in Arizona. **Cap.,** $2,000,000; shares $10 par, in $1,000,000 preferred and $1,000,000 common stock. Annual meeting, third Monday in August.

Property: 44 mines, 500 acres, with a 500-acre millsite, said to carry copper ores, with small amounts of lead ore. Lands show monzonite-porphyry and limestone, with contact ore deposits. Copper ores are estimated by the company to average 2.8% copper and 800 grams silver per ton. The mines yield a great variety of ores, including oxides and carbonates, and sulphides of lead and copper.

Development: by shafts and tunnels, with a total of 3,000 meters of workings, estimated to show 50,000 tons of ore, with 20,000 tons blocked out for stoping.

Equipment: includes a small steam plant and 16 buildings. Company employed about 800 men at the mines and works when operating.

The 50-ton smelter, at Zimapan, 5 miles from the mine, received ore by packtrain. Copper is smelted to a 20% matte that is sent to the Aguascalientes smelter. The lead smelter was run after many years' idleness, in 1913, on ore from Nevada group of mines, averaging 25% lead and 900 grams silver. Company planned installing oil engines and electric light, etc., at smelter in 1917. Probably closed down, owing to disturbed conditions in Mexico. No recent returns secured.

PACHUCA; COMPANIA BENEFICIADORA DE **HIDALGO**

See Santa Gertrudis Co., Ltd.

REAL DEL MONTE y PACHUCA; COMPANIA DE **HIDALGO**

Subsidiary of the U. S. Smelting Ref. & Mining Co., 55 Congress St., Boston, Mass. **Directors in Mexico:** Salvador M. Cancino, pres., and D. S. Calland.

Inc. 1867, in Mexico, with 2,554 capital shares; all but 19 owned by the U. S. Sm. Ref. & Mng. Co.

Property: 180 mining claims, 1,736 hectares or 4,270 acres, and approximately 26,000 acres agricultural land, at Real del Monte, 7 miles from Pachuca, Hidalgo, Mexico. In August, 1919, the Santa Ana mine and property of 200 acres, was acquired by purchasing 90% of the $2,200,000 capital of Cia de Minas Santa Ana y Anexas. It contains part of the famous Vizcaina vein. An aerial tram will connect the mine with the Loreto mill.

The first discovery of ore was made shortly after the Conquest of Mexico by the Spaniards, and several of the principal properties were large producers

prior to 1780, and at the time of the visit of Baron Humboldt, in 1790, constituted the most important silver producers in the Western Hemisphere.

Geology: of the district is extremely simple, as the ores occur in fissure veins in andesite. While there are surficial capping rocks of other nature, they have no relation to the veins. Vein filling is quartz with a little calcite. The total mineral content of the veins is never more than 4 or 5%, and aside from the silver and gold minerals is almost wholly composed of iron pyrite with insignificant sprinklings of lead and zinc sulphides.

Development: to depth of 2,000′, with over 100 miles of underground workings in 50 mines, 8 of which are producing at present time. The bulk of the ore now mined comes from below the 1,300′ level.

Ore reserves: owing to the great expense of pumping, the reserves of ore actually blocked have been held for several years past at about 1½ years of full production rate. In 1917, the company opened up the "New" vein, whose ore is much higher grade than the average formerly supplied by the mines, and this ore greatly increased earnings in 1919. The eight operating mines embrace a relatively small proportion of the known mineral bearing territory and operations are assured for many years to come.

Ore is conveyed to company's mills, cyanide plants, one of 800 tons daily capacity in the Real del Monte district, the other 1,200 tons daily capacity in the Pachuca district. Approximately, 90% of the silver and 96% of the gold are extracted by the cyanide process and by concentration. About 20% of the total recovered value is in the form of concentrate shipped to custom smelters; the balance is doré bullion which is exported. A 50-ton Minerals Separation flotation plant was erected at the Omitlan cyanide plant in 1917.

Production: amounts to about 390,000 tons of ore annually, averaging 13.9 oz. of silver and $1.48 gold per ton. Production was greatly reduced by political conditions in 1917, but has been normal or better since 1918. Both mills were enlarged in 1918-19, so that in the first six months of 1919 the mills averaged 68,520 tons a month, increased to 82,000 a month in the latter half of the year. Another mill to handle 15,000 tons per month is to be built to handle the ore from the "new" vein.

Real del Monte is one of the most important properties in Mexico.

SANTA GERTRUDIS CO., LTD. **HIDALGO**

Controlled by Camp Bird, Ltd.

Office: 1 London Wall Bldgs., London, E. C., Eng. A. A. Kelsey, sec.

Directors: F. W. Baker, chairman; L. Clerc, F. A. Govett, F. H. Hamilton, O. deRivaud, and A. S. Elmore.

Technical committee: J. A. Agnew, L. Chevillon. Wm. J. Cox, advisory engr. Hugh Rose, gen. mgr.

Departmental heads: general, C. A. Lantz; gen. supt., T. C. Baker; milling, W. E. Crawford; J. A. Seaver, chemist; J. Jenkins, paymaster; accounting and purchasing, G. F. Johnston; mechanical, electrical, F. H. Walsh.

Inc. Dec. 31, 1909, in England. **Cap.,** £1,500,000; increased Jan., 1911, from £1,275,000; shares £1 par; all issued and fully paid. (Camp Bird, Ltd., owns 960,135 shares.)

Company organized to acquire from Camp Bird, Ltd., a controlling interest in the Compania Minera de Santa Gertrudis y Guadalupe, owning the Santa Gertrudis gold and silver mines, for $9,000,000 Mexican currency, approximately £922,130. Consideration for the option was £222,869, payable £20,000 cash and £202,869 in fully paid shares; the vendors also agreed to provide subscribers for 1,072,131 shares at par, and to provide £150,000 working capital, and also the purchase price of £922,130, the preliminary expenses to be repaid to vendors out of the first profits.

The name of the operating company is **Compania de Santa Gertrudis. Inc.** Jan., 1910, in Mexico. **Cap.,** 250,000 pesos. The company that was formed to treat the ores, is known as **Compania Beneficiadora de Pachuca, inc.** in Mexico. **Cap.,** 500,000 pesos. All shares in both these companies are owned by Santa Gertrudis Co., Ltd.

Balance Sheet, years ending June 31:

Assets.

	Property & Equip.	Invest-ments	Cash	Miscel.	Total
1919	£1,019,343	£609,646	£61,028	£2,370	£1,691,287
1918	1,019,343	541,464	15,732	24,414	1,600,953
1917	1,019,343	405,003	38,668	92,494	1,555,509
1916	1,019,343	431,739	100,982	17,253	1,569,317
1915	1,019,601	503,507	99,459	17,722	1,640,289

Includes cost of shares in Cia. Ben. de Pachuca, Cia. de Santa Gertrudis, Amistad y Concordia Aviado and Recuperadora, and Messina Transvaal Dev. Co., Ltd., Messina, Transvaal.

Liabilities.

Year	Capital	P. & L. Acct.	Miscel.	Total
1919	£1,500,000	£8,322	£182,935	£1,691,287
1918	1,500,000	1,498	99,456	1,600,953
1917	1,500,000	21,329	34,180	1,555,509
1916	1,500,000	22,030	47,287	1,569,317
1915	1,500,000	130,394	9,895	1,640,289

Profit and Loss Account:

Year	Balance from previous year	Profit for year	Total available	Dividends paid	Balance forward
1919	£1,498	£158,409	£159,906	£151,584	£8,322
1918	21,329	112,544	133,873	132,375	1,498
1917	22,030	1,798	21,329	.....	21,329
1916	55,394	42,057	97,451	75,421	22,030

Dividends: 15% in 1911-'12; 15% in 1912-'13; nil in 1913-'14, owing to unsettled conditions in Mexico and Europe; 5% in 1914-'15; 5% in 1915-'16; nil in 1916-'17; 8¾% in 1917-'18; and 10% in 1918-'19 to July; making £806,250 in all.

Property: 626 acres in the Pachuca mining district, State of Hidalgo, about 62 miles from Mexico City, examined by W. J. Cox, R. J. Frecheville, F. J. Pope and E. E. Chase. The ore carries silver and gold in large fissure veins or crush zones, 50′ to 100′ wide in andesite. The great oreshoot is 3,000′ long, 18′ thick and 600′ high and prongs extend upward from the 800′ or 900′ level, but do not reach the surface. Down to No. 18 level the ore maintained its value. On the 19th level the ore was low grade and the values practically ceased on the No. 20 level, though the country rock did not change, nor were the structural conditions different.

During 1918, Santa Gertrudis, through its subsidiary, made a 20-year contract with Compañia Explotadora de Minas to operate the latter's El Bordo, Malinche, El Cristo and La Zorra properties, 431 acres of developed and virgin ground in the most highly-mineralized and productive part of the Pachuca district.

El Bordo mine is on the Vizcaina vein, one of the largest in the district, and from which a great production of ore has been and is being obtained in the neighboring Santa Ana (see Real del Monte), San Rafael, and Camelia mines for a distance along the strike over 8,000′, from ore-shoots recurring with great regularity. El Bordo is a well-developed mine, with a large tonnage of profitable ore blocked out, in addition to having excellent future prospects; it covers 2,500′ on the strike of the Vizcaina and parallel veins.

In March, 1920, the main shaft of El Bordo was burned, with great loss of life and delay in ore extraction.

Malinche covers a large, undeveloped area east of the Camelia and Paraiso mines which have worked in ore to its boundary line, and it covers 5,000′ on the strike of the Vizcaina vein. It also has the eastern extension of the Maravillas vein which has been productive in nearby mines, with frequent ore-shoots for over a length on the strike of 8,000′.

El Cristo is a partly developed mine from which a considerable tonnage of ore has been extracted from El Cristo vein. Other veins in this ground are the Calderona and Maravillas, in which further development should disclose important tonnages of lower grade ore.

La Zorra covers a small vein upon which little development has been done and is a prospect of undetermined value.

El Bordo and Malinche mines will be connected with the new mill by an aerial tram 4 miles long, and a short branch line installed to deliver ore from El Cristo mine to the main line at El Bordo.

By the terms of the working arrangement Santa Gertrudis makes an advance to the Cia Explotadora de Minas of $500,000, to be repaid out of the first profits. It also provides $600,000 for the development of the mines, and the equipment and enlargement of its present milling and treatment plant and receives 40% of the profits for 20 years.

With silver over $1 per oz., and treating 500 tons of ore daily from El Bordo, the monthly profit from this and Santa Gertrudis should eventually reach £30,000 to £35,000. In February, 1920, it was claimed that by increasing El Bordo tonnage to 1,300 daily, the monthly profit would be from £70,000 to £80,000.

Development: at Santa Gertrudis—new openings and reserves may be tabulated thus:

		Reserves		
Year	New Work, feet	Ore, tons	Silver recoverable, oz.	Gold recoverable, oz.
1919	8,162	718,579	7,128,996	40,108
1918	7,014	880,433	9,595,800	53,987
1917	8,856	1,125,000	12,381,080	61,904
1916	14,865	1,214,000	13,392,981	66,964
1915	15,838	1,287,000	14,595,567	72,977
1914	.....	1,194,000	.....	.....
1913	.....	1,047,000	.....	.....
1910 (when purchased)	.....	1,150,000 (containing profit of £1,650,000.)		

At El Bordo, the work is still preparatory, but the mine was expected to be producing ore in January, 1920. Over 5,000′ of work has been done since acquiring the property in 1918, mostly to determine the width of veins, some of which vary from 5½′ of 43-oz. ore up to 36′ of 50-oz. ore, with 44′ of 12½-oz. ore.

Reserves in June, 1919, were 444,000 tons, averaging 14 oz. silver and 0.065 oz. gold per ton.

The Bordo main shaft is 575 meters deep. At Malinche the workings of the Santo Tomas shaft, 230 meters deep, show the vein to assay 20.3 oz. silver and 1.0 dwt. gold across a width of 6.7′, for a length of 200′. In El Cristo there is 125,000 tons of 0.04 oz. gold and 9.5 oz. silver ore, but this mine will not be worked until El Bordo is producing.

Equipment: Santa Gertrudis has a complete electrically-driven mining plant; also the old Guadalupe mill (closed) and the new mill. At El Bordo is a steel head-frame, 300 h. p. electric hoist, 1,400 cu. ft. compressor, machine-shops and 4-mile aerial tram, with branch to Malinche to new mill. The treatment plant can handle 1,500 tons of ore daily. It includes sixty 1,550-lb. stamps, 8′ by 48″ Hardinge ball-mill, 11 tube-mills, elevators, thickeners (the ore is now of a more colloidal nature, so the settling area was increased by re-arrangement of tanks and addition of tanks from the Guadalupe mill), Dorr agitators, 8 filter-presses, vacuum-filter for clarifying cyanide solutions, aluminum dust precipitation (zinc dust superseded), and Crowe vacuum precipitation apparatus. Flotation experiments were concluded in 1918, with results (65% recovery) which showed that the process, in its present stage of development, cannot compete commercially with cyanidation for the treatment of the company's ore.

In February, 1920, it was decided to enlarge the mill to treat 2,000 tons daily.

Production, years ending June 30:

Year	Tons*	Value	Extraction, %	Gold, Oz.	Silver, Oz.	Price of Silver, Cents per oz.
1919..	362,122	£1,037,606	.....	24,359	4,304,812	102.52
1918..	324,762	951,605	87.95	21,856	3,775,745	96.77
1917..	223,736	395,374	89.84	11,154	1,989,761	81.42
1916..	277,616	379,651	.....	12,550	2,286,450	49.68
1915..	211,669	249,728	.....	10,727	2,000,856	65.66
1914..	293,836	498,754	.....	.....	.....	54.81
1913..	263,554	631,718	.....	.....	.....	57.79

*52.7% of capacity in 1915; 56.6% in 1916; 53.2% in 1917; 80.7% in 1918; 90.2% in 1919; and 98.3% by July, 1919. The low capacity was due to the revolution in Mexico, which caused a loss of at least $1,500,000 in possible profit.

From January, 1910, to June, 1919, inclusive, the total output was 30,709,871 oz. of silver and 163,930 oz. of gold from 2,215,399 tons of ore. The average grade was 13.9 oz. silver and 1.48 dwt. gold per ton.

The Santa Gertrudis management has anticipated the depletion of its mine by buying another to take its place, and with its 1,500-ton mill working at full capacity, and present high prices for silver, good dividends should be earned. In November, 1919, through The Mexican Corporation, Ltd., which see, company acquired a 25-year lease on property of the Teziutlan Copper Mining & Smelting Co. The mines, 500-ton mill, power-plants and smelter, are in the State of Oaxaca. Prior to 1913, when the revolution prevented operation, the annual output was 7,000,000 lb. of copper, with a fair quantity of silver and gold. There were 2,500 men employed. Control was also obtained on the Fresnillo Mining Co., which has a mine in Zacatecas.

STATE OF JALISCO

AGUILA CONSOLIDATED MINING CO. — JALISCO

Address: 185 Summer St., Boston, Mass.

Officers: D. E. Makepeace, pres., Attleboro, Mass.; E. B. Estes, sec.; J. A. Floyd, treas.

Inc. 1917, in Arizona. **Cap.,** $1,200,000; shares $1 par. Company is a reorganization of the Aguila Amalgamated Mining Co., described Volume XI, and which succeeded the Mazeppa Cons. Mining Co. Stockholders in the old company were given the option of exchanging their holdings on a basis of 1 share of new for each 5 shares of old and payment of 4c. per share of new stock.

Property: near Cinco Minas, said to have one-half mile of workings and to show ore assaying from $100 to $160 per ton, mainly in gold and silver. Mine is now operated by W. S. King, under a 5-year lease.

AMAJAC MINES CO. — JALISCO

Address: Guadalajara, Mexico.

Officers: W. L. Barclay, pres.; J. I. Higbee, v. p.; W. J. Pentland, gen. mgr.; C. A. Sidler, sec.-treas.

Inc. Dec. 16, 1910, in Delaware. **Cap.,** $2,500,000; shares $1 par. Company was formed for purpose of purchasing the Refugio, Animas, and Tres Estrellas mines in the Hostotipaquillo district. Later an option was taken on the Trinidad and Mexicano mines.

Property: the Refugio mine, 125 acres, was worked for 25 years prior to its acquisition by present owners, down to the 500′ level. The main vein has a width of 5′ to 15′ with well-defined walls. Ore contains gold and silver with average assay value of $15.00 per ton. The Animas property, 144 acres, lies west of the Refugio and is apparently on the same vein. The ore is said to contain 20 ounces silver and $3 to $5 gold per ton.

Development: at both mines is by means of tunnels, the Animas having over 2,500′ of workings. The Tres Estrellas property, 120 acres, is a mile from the mill and has not been developed at depth.

Equipment: includes a 15-stamp mill and a 50-ton cyanide plant in course of construction. Hydro-electric power is used. The revolution in Mexico has interfered with operations, and the mines have only been worked intermittently since 1914. In 1919, the manager wrote that a strong effort was being made to complete the mill during that year.

AMPARO MINING CO. **JALISCO**

Office: 541 Drexel Bldg., Philadelphia, Pa. **Mine office:** Etzatlan, Jalisco, Mexico.

Officers: A. F. Bracher, pres.; W. H. Kister, and A. S. Miller, v. p.'s; Henry Freund, treas., with J. H. Stopp, F. W. Stanton, Alfred Gratz, G. B. Reimensnyder, J. H. Scott, L. H. Adler, Jr., and C. K. Smith, Jr., directors. J. S. Williams, sec.; J. H. Howard, gen. mgr.; W. Howard, asst. mgr.; C. F. Joyce, mine supt.; W. R. Askew, engineer.

Inc. 1902. **Cap.,** $2,000,000; shares $1 par; reduced from $3,000,000 in 1907.

Financial Statement, years ending December 31:

Year	Revenue	Net Profit	Dividends	Balance	Current Assets	Current Liabilities
1918....	$1,707,197	$308,595	$300,000	$8,595	$1,470,256	$174,710
1917....	1,220,964	178,065	320,000	.....	1,293,455	517,850
1916....	1,297,236	456,970	400,000	56,970	1,377,538	428,056

Dividends: the total is not available, but for the last 3 years amounts to $1,020,000. One of 5% was paid in November, 1919.

Property: includes the Canada, La Union, San Juan, Amparo, San Domingo and Natividad mines, and Rancho Embocado of 4,390 pertenencias, 7 to 9 miles S. of Etzatlan, State of Jalisco.

Development: by general shaft to depth of 1,300′; also has an auxiliary shaft. New work in 1916 totaled 10,501′; 9,806′ in 1917; and 13,690′ in 1918. The orebody at 1,100′ was good, but the shoot was very spotty on 1,300′ level. In 1918 further discoveries of good ore were made, and a large tonnage of probable ore developed.

Ore reserves: of positive, probable and prospective ore have varied from 750,000 tons in 1908, to 472,350 in 1916; 481,572 in 1917; and 481,000 in 1918, only there is an increase in positive ore. Shrinkage stoping is practiced, resulting in reduction of costs.

Equipment: electrically driven throughout, including hoists, compressors, 65 drills, underground hoists, pumps, sorting plant, aerial tram, telephone line, crushers, 50 stamps, 4 tube-mills, concentrators, Dorr classifiers, Pachuca tanks, and 3 Oliver filters; also a ranch and hospital.

Production: 50,000 tons in 1908; 63,398 in 1909; 68,217 in 1910; 73,793 in 1911; 92,365 in 1912; 104,330 in 1913; 87,320 in 1914; 114,166 in 1915; 99,040 in 1916; 84,277 in 1917; and 120,046 in 1918. Recent work is given below:

Year	Tonnage	Silver, grams per ton	Gold, grams per ton	Extraction,%	Total Cost
1918.....	120,026	315.7	7.90	89.30	$10.35
1917.....	84,277	326.0	7.93	87.84	10.79
1916.....	99,040	320.0	9.95	91.10	.....
1915.....	114,166	310.0	7.60	.....	.....

CINCO MINAS CO. **JALISCO**

Offices: 61 Broadway, New York; and 1026 Citizens National Bank, Los Angeles, California.

Officers: James W. Gerard, pres.; Marcus Daly, v. p.-treas.; T. D. McCarthy, sec., with Mrs. J. W. Gerard, and H. E. Crawford, mgr., directors. Geo. F. Zoffman, supt.

Inc. March, 1910. **Cap.,** $500,000; $100 par; all issued. **Transfer office:** 61 Broadway, New York.

Property: in the Hostotipaquillo district of Jalisco. Examined by John B. Farish.

Geology: deposit is a fissure vein with andesite hanging and dacite footwall; it is 10 to 40′ wide, dips 65° S.-W., and has a N. 45° W. course. Ore shoots are 500 and 250′ long by 25 and 20′ wide. Ore is a sulphide assaying 12 oz. silver and $2 gold per ton.

Development: by 900′ vertical shaft and 1,000′ of tunnels. Workings aggregate 35,600′. Reserves are estimated as 500,000 tons. Mining is by overhand stoping and back filling.

Equipment: electric power, 500-h. p. hoist, compressor, pump, tram, and 600-ton cyanide mill.

No production figures are obtainable, but mine and mill are operated to full capacity, and little time was lost by the revolution.

EL FAVOR MINING CO. **JALISCO**

Offices: Makeever Bros., Journal Bldg., Boston, Mass., and 170 Broadway, New York. Mine at El Monte, Hostotipaquillo district, Jalisco, Mex.

Officers: Sanford Makeever, pres.; Dr. H. D. Meredith, v. p.; J. L. Makeever, treas.; M. M. Makeever, sec.; Walter Neal, gen. mgr.; J. H. Nelson, supt.; J. G. Murphy, cons. engr.

Inc. July, 1906, in Arizona; protocolized, 1906, in Mexico. **Cap.,** $3,500,000; shares $1 par. Stock not listed. After 6 years of development work, mine paid total dividends of $210,000 in 1913-1914. Property said to represent investment of $1,000,000.

Property: 476 acres mineral land and extensive surface areas at El Monte, 75 miles N. W. of Guadalajara, Jalisco, Mex. A branch line of the Southern Pacific R. R. runs to Quemada, near the mine, and the Chapala Hydro-Electric Co. furnishes power for $50 per h. p. year. Vein reported as 10′ to 14′ thick with shoots of bonanza silver-gold ore workable to 1,300′ by tunnels.

Development: by over 3 miles of workings to No. 7, the deepest, level. By May, 1919, a new orebody assaying $140.80 in silver, free from manganese, was opened on No. 7, also on No. 3; while rich ore was found on No. 5. These discoveries are considered to be of great importance. Reserves are said to be sufficient to supply mill for several years.

Equipment: includes 250-ton cyanide mill, equipped with 35 stamps, crusher, tube-mills, Dorr classifiers and thickeners, Oliver filters, pachuca tanks, Wilfley tables. Extraction claimed to be nearly 90%. Total production to date reported as $1,500,000.

Mill buildings, burned by bandits in 1918, were rebuilt; and in September, 1919, daily output was 55 tons of $12 ore. Capacity of mill is to be increased.

KEYSTONE MINING CO. **JALISCO**

Office: at last report at Shamokin, Penn. Is a reorganization of Keystone Copper Smelter Co., of Philadelphia, and is the holding company for the Mexicana Co., Tapalpa district, Jalisco, Mexico. W. H. Childs, gen. mgr.

Property: about 100 hectares, in 5 groups, in Tapalpa, including the Mexicana, America and Palma groups; also timber rights to 50,000 acres of adjoining lands. Principal development is on La Mexicana group, 82 hectares, 15 miles west of Tapalpa, mine having a 200-metre crosscut tunnel, cutting 4 veins, with about 1 mile of workings. Veins are fissures in porphyry, averaging 5′ width, carrying auriferous and argentiferous chalcopyrite, sphalerite and pyrite.

Equipment: includes steam and electric power and 30-ton mill. The entire plant was enlarged and remodeled and resumed operations in January, 1912. Presumably idle, 1915-19, owing to unsettled conditions in Mexico.

LA REGINA MINING CO. **JALISCO**

Office: 2120 W. Tioga St., Philadelphia, Pa. **Mine office:** San Martin Hidalgo, Jalisco, Mexico.

Officers: Chester P. Ray, pres.; F. W. Schmidt, v. p.; A. W. Brackmeyer, sec.-treas.; M. J. Slattery, gen. mgr.; John P. Delaney, supt.

Inc. Nov. 1, 1909. **Cap.,** $1,000,000; shares $1 par, as successor of Philadelphia Copper & Gold M. M. & Smelter Co. Debentures, $200,000 authorized; issued, $62,000.

Property: 73 hectares, including the San Vicente, La Perla, La Fe, La Concha, Ajax and other mines, shows veins of 3 to 25′ width, carrying auriferous

and slightly argentiferous chalcopyrite. The Ajax mine shows a 12′ vein, estimated to average 4% copper, 2 oz. silver and $1.33 gold per ton.

Development: property as a whole has 8 shafts, of 100′ average depth, with a total of about 1,000′ of workings, claimed to put in sight 125,000 tons of auriferous copper ore. Development in recent years has been confined to the gold-silver vein, said to show at depth of 115′, ore averaging 2 oz. silver and 15 grams gold per ton.

Equipment: includes a steam hoist and air compressor, at the San Vicente group. The mill has a 25-ton Elspass mill, 25-ton experimental cyanide plant, Huntington mill and 3 Pachuca tanks. Idle on account of political disturbances in Mexico.

MAGISTRAL-AMECA COPPER CO. **JALISCO**

Mine office: Ameca, Jalisco, Mexico.

Officers: H. L. Percy, pres.; Fred M. Lyon, v. p.; Geo. C. B. Robinson, sec.-treas.; Jas. P. Harvey, gen. mgr., and H. N. Manington, directors; Percy A. Babb, cons. engr.

Inc. May 20, 1909, in Arizona. **Cap.**, $1,500,000; $1 par; issued, 1,255,300 shares. Holds direct title to lands through Magistral-Ameca Copper Co., S. A., inc. in Mexico. Annual meeting, second Wednesday in November.

Property bought of Las Moras Copper Mining Co., for $100,000 by Patrick Clark, Jas. P. Harvey, H. L. Percy and Fred M. Lyon, the first named selling his quarter interest to his associates for $55,000.

Property: 74 pertenencias, 185 acres, known as the Mina Magistral, on the Hacienda Hegira, 8 miles S. W. of Ameca, has veins in diorite that are cut by porphyry dikes. The veins occur on dike contacts and show outcrops of silicified rock with quartz stringers and hematite. The vein varies from 4 to 25′ in thickness and carries lenticular orebodies connected by mere films of quartz or fissures with wall rock impregnated with chalcopyrite. The Magistral ore shoot occurs where 3 veins intersect. The ore carries copper sulphides (chalcopyrite), and averages from 4 to 7% in copper with about $2 in combined gold and silver value.

Development: by 321′ shaft, and by tunnels with about 1 mile of openings, developing copper ground for width of 5 to 50′, said to assay 4 to 8% copper. The Magistral was worked many years ago for bluestone, used by neighboring mines in the process of treating silver-lead ores.

Equipment: includes two 80-h. p. high-pressure boilers and a 150-h. p. tandem compound engine, with hoist good for 500′, at the Magistral. The mines are connected with Ameca by a good wagon-road, 8 miles long, with a 1½% grade, built with the idea of using it for railway tracks in the future. About 100 men are employed. The concentrator was re-built in 1914. It includes a ball-mill and flotation plants.

Owing to disturbed conditions in Mexico, operations have been greatly interfered with. No recent returns securable, but it was reported in March, 1918, that work had been resumed, treating 100 tons daily. Letters to previous address in Los Angeles returned in March, 1919.

MASCOTA COPPER CO. **JALISCO**

Supposedly dead. **Mine office:** Ameca, Jalisco, Mexico.

Officers: Chris D. O'Brien, Sr., pres.; J. M. Bowler, v. p.; Byron J. Mosier, sec.-treas.; Chris D. O'Brien, Jr., gen. mgr., at last accounts.

Inc. June, 1908, in Arizona, as successor of Independence Mining & Smelting Co. **Cap.**, $1,500,000; shares $1 par.

Lands: 46 hectares, said to include an antigua mine,, in the Guachinango division of the Mascota district, 24 miles from the Mexican Central line. The claims show an 8′ fissure vein in porphyry, said to be traceable about 2,000′ and proved to depth of 486′. The ore is reported to average 5% copper, 7 oz. silver and 6 grams gold per ton.

Development: includes 300′ shaft and 375′ tunnel, with 4,825′ of workings, estimated to show 40,000 tons of ore, with 28,000 tons blocked out for stoping.

Equipment: included 50-h. p. steam plant, with 3-drill air-compressor,

a 25-ton wooden stamp-mill, with 10 Allis-Chalmers gravity stamps, and a small concentrator, equipped with 2 Overstrom tables, a vanner, 4 slime tables and a sizer. Operations suspended for several years on account of revolution.

MEXICANA MINING CO. **JALISCO**

Is the operating subsidiary company of the Keystone Mng. Co., of Shamokin, Pa., which see.

MOLOLOA MINING CO., LTD. **JALISCO**

Controlled by Makeever Bros. of Boston, Mass.

Address: Hostotipaquillo, Jalisco, Mexico.

Officers: W. G. Miller,, pres.; F. G. Stevens, managing director; W. M. Mathews, treas. and gen. mgr.; Edward Fenley, supt., at last accounts.

Inc. 1908, in Canada. **Cap.,** $250,000.

Property: 130 hectares, include antiguas opened by the Spaniards in the 16th century, reopened in 1904. Several fissure veins in andesite carrying gold-silver ore were worked in 1914, and shipments made to the El Favor mill.

Development: by Mololoa tunnel to depth of 800. In 1919 the Soledad shoot of the Mololoa mine was said to show silver ore which, on No. 6 level, beyond the fault, was 12′ wide and assayed $38.50 per ton. The ore carries so little manganese that cyanidation will extract 85% of the silver.

SAN FELIPE MINING CO. **JALISCO**

Address: Hostotipaquillo, Jalisco, Mexico. Col. N. Z. Seitz, pres. and gen. mgr.

Inc. 1902, in Arizona. **Cap.,** $1,000,000; shares $1 par.

Property: includes a 50-ton mill. The company is said to have paid dividends from stock sales and was considered by Horace J. Stevens as a rank bit of stockjobbery. Probably defunct.

MEXICO, D. F.

DOS ESTRELLAS, COMPANIA **MEXICO, D. F.**

Address: El Oro, Mexico.

Property: a large gold-silver mine and extensive equipment adjacent to El Oro and Esperanza. No information procurable.

EL ORO MINING & RAILWAY CO., LTD. **MEXICO, D. F.**

Offices: T. Dundas Pillans, sec., 24 Lombard St., London, E. C. 3, England; 61 Broadway, New York.

Directors: R. T. Bayliss, chairman; H. V. Hart-Davis, Alfred Naylor, L. Breitmeyer, P. L. Foster, J. H. M. Shaw, R. M. Raymond. **Staff:** A. F. Main, gen. mgr.; F. Jenkin, asst. mgr., El Oro, D. F., Mexico.

Inc. July 27, 1899, in Great Britain, to acquire the capital stock of the American Mng. Co. and the American Railroad & Lumber Co., the former owning the El Oro Gold & Silver mine in the El Oro district of Mexico, and the latter owning the railroad connecting the mine with the Mexican National Ry. Purchase price was £886,072; paid £820,084 in cash and £65,988 in stock. The two American companies have since been dissolved. **Cap.,** £1,150,000; outstanding shares £1 par, £1,147,500 issued. Annual meeting in October. Listed on London Stock Exchange.

Accounts for fiscal years ending June 30:

Year	Bullion Recovered	Railway Receipts	Deprec.	Loss on Exch.	Deprec. of Invest's	Profit
1915...	£75,541	£7,944	£25,000	£20,444	£21,343	£78,398*
1914...	415,436	35,497	25,000	23,242	.....	103,690

* Deficit.

No statement of accounts has been rendered since the above.

Dividends: 148% from 1900 to 1913; 1913-'14 to 1915-'16, nil; 1916-'17, 5%; 1917-'18, 5%; 1918-'19, 5%, October 31, 1919. The total is £1,955,750.

The El Oro Mng. & Ry. Co., Ltd., owns 42,687 shares (par £1), and £14,000

7% debentures of the Suchi Timber Co., Ltd., which declared a dividend of 5% on June 30, 1913.

Property: the San Antonio, San Rafael, Trianon, Diamante, Ofir, and Carmen No. 2 claims, 786 acres, at El Oro, 100 miles northwest of Mexico City. In 1912-1913, the adjoining Ofir claim, 11⅛ acres, was bought for £130,000 cash. This claim controls the rights of the San Rafael vein in depth. Ore is gold bearing. Orebodies vary in width from 10′ to 60′.

Development: by shafts from 1,500′ to 1,600′ deep. **Equipment:** includes a 200-stamp mill, 8 tube-mills and a cyanide plant. Mine and mill operations were resumed October, 1916, with 100 stamps and 70 were in operation at last accounts.

Production for years ending June 30:

Year	Tons Milled	Value	Costs	Profit	Yield
1913	433,708	$5.04	$3.59	$1.45	$2,188,723
1912	387,157	5.75	3.79	1.96	2,228,190
1911	360,294	6.63	3.90	2.73	2,389,340
1910	316,138	8.10	5.17	2.93	2,562,705
1909	285,181	8.56	5.42	3.14	2,442,374

No later information is available, save that at the end of 1918 the monthly output was 30,000 tons of ore, and that costs were $7 per ton. The usual annual reports are being withheld on account of the political situation.

ESPERANZA, LTD. MEXICO, D. F.

Office: C. L. Johnson, sec., No. 1 London Wall Bldgs., London, E. C. 2, England. **Office of American company:** E. L. Gruver, pres., care Hayden Stone & Co., 25 Broad St., New York City.

Directors: R. J. Frechevillé, chairman; F. W. Baker, Sir F. M. Crisp, A. A. Kelsey. Charles Hoyle, gen. mgr.; E. Ph. Herivel, asst. mgr.

Reg. Oct. 6, 1913, in Great Britain. **Cap.,** £455,000; shares £1 par; all issued and credited, except seven, as fully paid. Acquired by agreement with the Guggenheim Exploration Co., and the Venture Corporation, Ltd., 449,800 shares of $5 each, all the capital except 200 shares, in the Esperanza Mng. Co. of New York, inc. in New Jersey, and owning gold and silver mines covering 390 acres, adjoining the El Oro mine at El Oro, Mexico. Purchase price was £454,993 in fully paid shares.

Financial Statement, years ending December 31:

Assets.

Year	Invested in Esperanza M. Co., etc.	Cash and Materials	Total
1918	£459,933	£7,730	£467,723
1917	459,243	8,711	467,954
1916	464,992	4,655	469,647

Liabilities.

Year	Capital	Creditors, etc.	Surplus	Total
1918	£455,000	£8,233	£4,491	£467,723
1917	455,000	11,263	1,690	467,954
1916	455,000	11,055	3,592	469,647

Profit and Loss.

Year	Dividends from Esperanza M. Co.	Total Income	Expenses, taxes	Balance
1918	£27,680	£29,576	£8,876	£20,700
1917	23,067	27,002	8,248	18,753
1916	11,609	16,499	12,907	3,592

Dividends: 1903-'04, 10%; 1904-'05, 14 months, 82½%; 1906, 160%; 1907, 105%; 1908, 70%; 1909, 25%; 1910, 30%; 1911, 30%; 1912, 15%; 1913, 10%; 1914, 5%; 1915, 5%; 1916, nil; 1917, 5%; 1918, 5%. To June, 1918, 60 dividends totaled 557½%, equal to £2,536,625.

Esperanza Mining Co.

Controlled by Esperanza, Limited, which see.

Inc. in New Jersey. **Cap.**, $2,250,000; shares $5 par; all issued.

Dividends are paid to Esperanza, Limited.

Financial Statement, years ending December 31:

Assets.

Year	Property	Absorptions, etc.	Deferred charges	Current	Total
1918.....	$2,006,687	$64,447	$8,459	$1,139,236	$3,218,830
1917.....	2,006,221	61,441	24,472	1,074,458	3,166,592
1916.....	2,003,835	104,887	269	901,413	3,010,405

Liabilities.

Year	Capital	Reserve for Deplet., etc.	Esperanza Ltd.	Current	Surplus	Total
1918.....	$2,250,000	$742,888	$13,585	$37,307	$175,051	$3,218,830
1917.....	2,250,000	505,176	.....	61,359	350,056	3,166,592
1916.....	2,250,000	345,816	.....	112,857	301,732	3,010,405

Profit and Loss.

Year	Gold receipts, etc.	Expenses	Reserves for dep. & deprec.	Profit or loss	Dividends paid	Surplus
1918...	$1,681,827	$1,484,111	$237,721	—$40,005	$135,000	$175,051
1917...	1,822,895	1,463,967	236,963	+121,965	112,500	350,056
1916...	892,085	702,234	.....	+189,851	56,250	301,732

Property: 6 patented claims, 390 acres, adjoining El Oro mine, at El Oro, shows fissure veins in shale, cut by andesite intrusions. The dip is 70° to the S. W., and course N. 45° W. The ore shoots are from 50 to 150′ long, and from 2 to 100′ thick.

The San Rafael vein is traceable for 10,000′ through El Oro district, but is cut by many transverse faults which displace the orebodies. The Esperanza vein fills a fault that has a displacement of 500′. The San Rafael vein fills a fault fissure whose displacement is approximately 1,000′ vertical. This vein narrows at depth of 2,000′ in the Esperanza mine and extends for 2,500′ through the property, with 7 payable branch veins.

Company has under option and made first payment on the Union en Cuale mines, near Banderos bay, 25 miles from Las Pinas, Jalisco. The property shows very large and persistent veins of zinc ore carrying silver and gold, as well as lead ore. These veins were worked until 1893 for the silver only, two of the mines yielding about 6,000,000 ounces up to that date.

If the Esperanza completes payment, and spends approximately $2,000,000 on equipment, development, etc., the mines should produce 2,000 tons of ore daily.

Development: at El Oro, by vertical shafts, 1,600, 1,000, and 400′ deep, and a 1,000′ tunnel for tramming. Deep work on the San Rafael and San Carlos veins showed that the limit of pay ore had been reached.

Recent work shows the following results:

Year	Feet	Total, feet	Reserves, tons	Profit in reserves
1918.....	4,817	183,637	35,131*	£19,322
1917.....	9,908	178,820	65,368	39,727
1916.....	8,900	168,912	111,723	.....

* Plus 50,000 to 100,000 tons of payable fills.

Equipment: electric power, 400-h. p. hoist, and cyanide mill, using 120 stamps and 14 tube-mills of 1,000 tons daily capacity. The stamps are being replaced by ball-mills.

Production:

Year	Tons Milled	Value per Ton	Year	Milled Tons	per Ton Value
1918.....	200,589	$9.88	1916.....	113,921	$6.67
1917.....	200,548	10.00	1915.....	22,684	.....

During most of the years, 1914 and 1915, revolutionary disturbances prevented work, production being 143,670 tons ore, yielding $1,180,184. Operations were suspended from February 25, 1915, until April 23, 1916.

Extraction in 1918 was 86.43% of the gold and 68.25% of the silver. To end of 1918 the total output was $78,003,993 (Mexican gold currency) from 2,826,041 tons ore.

MEXICO MINES OF EL ORO, LTD. MEXICO, D. F.

Officers: 2 St. Helen's Place, London, E. C. 3, England; and 18 Rue Chaveau-Lagarde, Paris, France.

Directors: Sir E. M. Clarke, Don Guillermo de Landa y Escandon, F. J. Fournier, H. Higgins, and Sir R. J. Price, F. L. Allan, resident manager, El Oro, Mexico; J. Vincent, asst. mgr.; C. R. Pinder, cons. engr.

Reg. Oct. 14, 1904, in England. **Cap.,** £210,000. shares £1 par; increased from £180,000 in July, 1914; 180,000 shares issued and fully paid; 30,000 to be issued for acquisition of the Nolan properties.

Financial statement for year ending June 30, 1916, showed that owing to suspension of operations due to the revolution, there was a loss of £21,855. Balance forward on June 30, 1916, was £59,073, compared with £91,127 the previous year. For 1917 there was a profit of £271,174, of which £115,500 was distributed. Balance forward was £214,747. Assets exceeded liabilities by about £295,000. For 1918 the profit was £264,606. Dividends absorbed £199,500, and £179,465 was carried forward. In 1919 the profit was £196,222, of which £189,000 was paid in dividends.

Dividends, including bonuses:

Year		Year		Year	
1907-'08	5s.	1911-'12	16s.	1915-'16	nil
1908-'09	12s. 6d.	1912-'13	18s.	1916-'17	11s.
1909-'10	14s.	1913-'14	18s.	1917-'18	19s.
1910-'11	16s.	1914-'15	nil	1918-'19	10s.

Property: company was formed to acquire by agreement with the Exploration Co., Ltd., 26.63 hectares (65.79 acres), total with surface rights, 75 acres, adjoining the Esperanza mine, near El Oro, Mexico. The land, formerly held by the Mexico Venture Syndicate, Ltd., includes the Mexico gold and silver mine. The properties of the Compania Miniera de Oro Nolan were acquired in January, 1915, for 30,000 fully paid shares. The ore is gold and silver bearing, occurring in fissure veins.

Development: by the North shaft 1,574′ deep, and the South shaft, 1,687′.
Ore reserves: on June 30, 1917, were estimated at 457,100 tons, $11.89 gold, and 8 oz. silver; while in 1918 they were 416,200 tons, and 379,000 tons in 1919.
Equipment: includes a 40-stamp mill, 7 tube mills, and a cyanide plant.

Production: Year	Tons Milled	Yield	Value per Ton	Costs per Ton	Profit per Ton
1918-'19	130,665	£509,000	.....	.....	.....
1917-'18	121,793	520,000	.....	.....	.....
1915-'16	84,030	440,818	.....	.....	.....
1914-'15	30,825	84,650	.....	.....	.....
1912-'13	158,395	1,669,540	$10.50	$4.10	$6.50
1911-'12	142,884	1,555,095	10.80	4.30	6.50
1910-'11	136,408	1,528,229	11.20	4.30	6.90
1909-'10	136,372	1,392,336	10.20	4.70	5.50
1908-'09	101,105	1,257,560	12.40	5.60	6.70
1907-'08	62,394	807,971	12.90	6.30	6.60

This famous and efficiently managed property appears to have passed the zenith of its career and to have become a liquidating asset.

STATE OF MICHOACAN

ARIO COPPER CO. **MICHOACÁN**

Idle owing to political disturbances in Mexico. **Mine office:** Ario de Rosales, Ario, Michoacán, Mexico.

Officers: Frederick Moser, pres.; Geo. H. Walsh, Jr., treas.; A. P. Stramler, supt.

Cap., $2,000,000; shares $10 par. Holds lands through Ario Copper Co., S. A. **Inc.** April 13, 1907, in Mexico. **Cap.,** 500,000 pesos.

Property: 126 hectares, including the Flora, Roma, Bohemia, San Antonio and San Valentin mines, old properties showing silver and copper ores, about 5 miles from the Inguaran mines, on the projected line of the Morelia y Tacambaro railway, partly constructed.

Development: principal work is on the Flora and Bohemia mines, with 7 shafts aggregating 500′ depth, and 12 tunnels, aggregating 2,600′ length. La Roma has ore assaying up to 25% copper. Equipment includes steam and gasoline power. Patzcuaro, 70 miles distant, is the nearest railway point.

INGUARAN; COMPAGNIE D'. **MICHOACÁN**

Office: 56 Rue de Provence, Paris, France. **Mine office:** Inguarán, Ario, Michoacán, Mex. Ch. Laforgue, gen. mgr.; Maurice Armand de Lille, agt.; J. L. Phillips, supt.

Inc. Jan. 15, 1898, in France. **Cap.,** 12,000,000 francs, shares 500 francs par. Is controlled jointly by the French house of Rothschild and the Banque Mirabaud; a considerable portion of the company's stock is owned by the Compagnie du Boleo. Property is said to have cost 1,500,000 pesos, and company reported to have expended about $8,000,000 thereon, which is undoubtedly an overestimate.

Property: 185 hectares, and a mineral zone of 5,000 additional hectares, in the Tacambaro district 70 miles north of the Balsas river, Michoacán, lying on the plateau of the volcano Jorullo, 1,500′ above the plains.

Geology: the Inguarán mountain is traversed by a dike 2,000 to 3,000′ wide, of fine-grained pink granite, traceable several miles across country. The granite rock is sprinkled with specks of chalcocite and chalcopyrite forming a disseminated, or so-called porphyry deposit whose payable ores occur in belts or bands in the dike. Proved depth of the ore is about 300 meters, at which point it apparently cuts off.

Development: by a 2,500′ tunnel and 2 main shafts, deepest 350, with levels opened at 80′ intervals. Both ore and country rock are exceedingly firm, little timbering being required. Estimates of size and value of the orebodies vary greatly, but the best authorities estimate an average of 3.25% copper, with 2,000,000 to 3,000,000 metric tons of ore blocked out. The ore is not well adapted to wet concentration as the metallic sulphides are firmly interlocked with the granite minerals, but it is admirably adapted to treatment by froth flotation, and apparently could be put about 8 or 10 into 1.

The Inguarán was the particular bugaboo of the copper situation at the end of the nineteenth century, the exigencies of the buyer's demanding that there always be some mine, just about to begin production, that can make several hundred million pounds of copper yearly at a merely nominal cost. The Inguarán has a large body of low-grade ore, but it is not equal in quantity or quality to that of any of our "porphyry coppers."

The property has been idle some years and cannot become a serious producer until rail connections are secured.

MICHOACAN RAILWAY & MINING CO., LTD. **MICHOACÁN**

Address: G. A. Mitchell & Co., secretaries, 2 Suffolk Lane, Cannon St., London, E. C. 4, England. **Mine office:** Angangueo, Michoacán, Mexico. **Works office:** Ocampo, Zitacuaro, Michoacán, Mexico.

Directors: G. A. Mitchell, chairman; C. H. Potter, W. J. H. Moll, and T. B. R. Scott.

Inc. Jan. 29, 1889, in Great Britain. **Cap.,** £105,364; £1 par; in £21,015

A non-cumulative 7% preference shares, £12,190 B non-cumulative 7% preference shares, £70,745 ordinary shares, and £1,414 founders' shares; all issued, save 6,094 ordinary shares. Total capital issued is £99,370. Debentures: the prior lien debentures were paid off, but £103,000 of 4% mortgage bonds remain. Company is £67,980 in arrears for interest on bonds. The railway rights originally held have been disposed of to the Michoacán & Pacific Railway Co., in which the company has a £60,000 share interest in addition to £18,600 bonds held.

Income during 1917 was £7,820, of which £807 was profit, after paying £5,475 for interest. Assets, consisting of investments, securities, stores, advances, rental accrued, etc., totaled £145,960 at end of 1917. Against this were debentures, interest, and creditors of £218,574. At mid-1919 it was proposed to consolidate the debts and reduce the capital.

Property: 537 hectares known as the Anganueo silver mines, opened by tunnels and variously reported to have 14 to 30 kilometers of workings. Mine was leased, 1909, for 10 years, to the American Smelting & Refining Co., and this lease has been extended until July, 1936, at a minimum annual rent of $50,000 (Mexican) plus half the net profits.

Conditions in Mexico resulted in intermittent work by the A. S. & R. Co. The government operates the railway in a limited way, but pays nothing to the owners.

NAYARIT

MONJARAS MINING CO. **NAYARIT**

Office: 1535 Chestnut St., Philadelphia, Pa.

Officers: Judge Wescott, pres., Trenton, N. J.; W. A. Benjamin, sec.

Inc. in 1919. **Cap.,** $2,500,000. Property is practically clear of debt.

Property: nearly 100 acres; 10 kilometers south of Ixtlan del Rio, Nayarit, the new State of Mexico. **Geology:** fissure veins traverse granitoid rocks, porphyry and limestone.

Development: by adits or tunnels. High-grade shipping ore has been opened. **Equipment:** mine cars, tracks, houses for officers and miners.

Production: 100 tons of silver ore a day, late in 1919.

STATE OF NUEVO LEON

MONTEREY MINING, SMELTING & REFINING CO., S. A.

(Compania Minera, Fundidora y Afinadora, S. A.) Monterrey, Nuevo León, Mex. Juan M. Weber, general manager.

Cap., $8,000,000; shares $100 par.

Property: includes the Ocampo and Santa Elena mines, at Mineral de la Mula, carrying gold, copper and lead ores; La Cruz y Anexas mines, at Panuco de Coronado, carrying silver-lead and copper ores; the Cinco de Mayo group at Lampazos, Nuevo Leon, producing iron fluxing ores; and a mine at Naica, Chihuahua, Mexico.

Company operates a lead smelter and silver-lead refinery, but its operations are principally confined to refining, and its business is quite small compared with that of the A. S. & R. Co.

Smelter: has 9 blast furances, which can reduce 90 tons of charge daily. The refinery buys base bullion and cyanide-mill precipitates, and delivers pure and hard lead, silver, and gold. (See article in "Min. and Sci. Press," Nov. 22, 1919, by R. B. Brinsmade.)

Production: the only figures available are those for 1912, when the yield was 13,919,107 kg. of lead, 238,555 kg. of silver, and 3,158 kg. of gold.

MONTEREY SMELTING & REFINING CO. **NUEVO LEON**

Monterrey, Nuevo León, Mex. Controlled by American Smelting & Refining Co., which see.

STATE OF OAXACA

LA FORTUNA MINING CO. **OAXACA**

Idle. **Mine office:** Apartado 21, Ocotlan, Oaxaca, Mexico.

Officers: C. E. Miller, pres.; Wm. H. Brown, 1st v. p.; E. D. Stinson, 2nd v. p.; Amos Tyree, sec.; W. H. Brown, treas., at last accounts.

Inc. 1906, in South Dakota. **Cap.,** $250,000; shares $10 par; outstanding, $230,000.

Property: 30 hectares, the Treadwell group, 3 miles from Ocotlan, shows a vertical fissure vein of 2 to 12′ width, cutting bedded andesite tuffs, leached and oxidized to depth of 300′.

Development: by a 400′ vertical shaft, with 700′ of workings, showing chalcopyrite, with quartz gangue, estimated by company to average 4.5% copper and 200 grams silver per metric ton. Some ore was shipped returning 14% copper and 600 grams silver per metric ton.

Equipment: includes a 30-h. p. boiler, hoist and a small air-compressor for hammer drills.

Idle since 1912 owing to conditions in Mexico.

LA LEONA SILVER MINING CO. **OAXACA**

Address: Mirabeau C. Towns, 3 Maiden Lane, New York; or Rickards Hermanos, Mexico City.

Property: 11 claims, 80 miles from City of Oaxaca. According to the "New York Curb" of August 24, 1918, Louis Roumagnac and associates, of the Tuxpam Star Oil Corporation scandal, advertised that they owned the claims and incorporated a company under the above title, and stated that whoever put money into it would get a fortune. The promoters simply held an option. Fairly large blocks of the $1,200,000 outstanding shares, $5 par, were sold at prices up to $1 a share. The bubble burst when a judgment was obtained by the real owners of the mines—Rickards Hermanos of Mexico City.

SAN MARTIN y ANEXAS, S. A.; COMPANIA MINERA **OAXACA**

Office: Aptdo 145, Oaxaca, Mexico. **Mine office:** San Martin de los Cansecos, Oaxaca, Mexico.

Officers: Frank M. Leonard, pres. and gen. mgr., Lakeshore mine, Casa Grande, Arizona; Lic. Jesús Acevedo, v. p.; Ranulfo Bravo, sec.-treas. and supt., with Frank J. Woods and Alfredo Castillo, directors, at last accounts.

Inc. Jan. 15, 1907, in Mexico. **Cap.,** 400,000 pesos; shares 10 pesos par, in 35,000 fully paid shares and 5,000 assessable shares, issued 37,995 shares.

Property: 53 pertenencias, including El Billete de Banco, King Dodo, La Liga, Las Virginias, La Maria and La Roseta mines, about 10 miles from Ocotlan. Property shows diorite cut by a 6′ vein carrying silver ore assaying 5 kgs. silver and 50 grams gold per ton.

Development: a 160′ shaft, on the Maria, an 80′ shaft on the Billete de Banco and a 350′ tunnel on La Liga claims.

The unsettled conditions in Mexico stopped operations and mine is filled with water, but company keeps up tax payments and keeps watchmen at the mine. The region is infested by bandits.

STATE OF PUEBLA

AJUICHITLAN MINING & MILLING CO. **PUEBLA**

Probably dead. Property at Toliman, Queretero, Mexico. Described in Vol. XIII.

PUEBLA SMELTING & REFINING CO. **PUEBLA**

Office: 2 Rector St., New York.

Officers: C. H. Bassford, pres.-treas.; J. L. Lawrence, v. p.; L. F. Reed, sec., with J. A. Osborne, and L. S. Rogers, directors.

Inc. Oct., 1912, in Delaware. **Cap.,** $5,000,000; shares $5 par; non-

assessable. Debentures, $1,000,000 at 6%. Owns a 72% stock interest in the Cia. Minera Explotadora El Magistral y Anexas, and also sundry lands acquired from the Bankers Mining & Development Co.

Property in the Magistral district shows contact deposits between limestone and diorite. The deeper workings show chalcopyrite associated with hematite having garnetiferous quartz gangue in the sulphide zone.

Due to the revolution the property has not been operated since 1913.

TEZIUTLAN COPPER CO. **PUEBLA**

Inc. in New Jersey. **Cap.**, $1,000,000; shares $100 par. Entire stock issue owned by Teziutlán Copper Mining & Smelting Co. Fully described Vol. V, Copper Handbook.

TEZIUTLAN COPPER MNG. & SM. CO. **PUEBLA**

Office: 82 Beaver St., New York. R. E. Safford, sec.

Property leased for 25 years to The Mexican Corporation, Ltd. (which see), company receiving 37½ per cent. of the net profit of operations. See Vol. XIII for details of organization.

STATE OF SAN LUIS POTOSI

DOLORES MINE **SAN LUIS POTOSI**

Address: American Smelting & Refining Co., Matehuala, San Luis Potosi, Mexico.

Geology: ore occurs as contact deposits in limestone and porphyry. The shoots are large for this type, one being 300′ long, 70″ thick, and 300′ deep. The contact rock contains pyrite and chalcopyrite, and averages 3% copper, $1.50 gold, and 2 oz. silver per ton, with 40% silica.

Development: by 326′ shaft and crosscut adits. Underground work is done on contract.

Equipment: is driven by power from the Matehuala smelter, 8 miles distant. Mine has 25-drill air-compressor, side-dump steel cars, machine-shop, assay-office and hospital, and employs 700 Mexicans.

Production: averages 500 tons daily, but can be increased to 1,000 tons.

MATEHUALA SMELTER **SAN LUIS POTOSI**

Owned by American Smelting & Refining Co.

Address: 120 Broadway, New York; and Matehuala, San Luis Potosi, Mexico.

Company operates a smelter, acquired in 1910 from National Metallurgical Co., drawing ores from the nearby mines of La Paz and Catorce.

The smelter on the Mexican Central railway, has a complete plant including jaw-crusher, sampler, ore-bedding plant, 4 hand-fed blast-furnaces, total capacity of 400,000 tons annually, 3 cycloidal blowers giving 24-oz. blast pressure driven by 180 and 200-h. p. steam engines, 5 boilers, forehearths, slag-cars, electric locos for slag dump, generators, machine-shops, and 30-ton reverberatory furnace for smelting flue-dust. The plant turns out a matte averaging 45% copper and 42% sulphur, which is sent to the Aguascalientes smelter for conversion. The smelter was idle in 1916, but was blown-in early in 1917, and operated continuously since then.

NATIONAL METALLURGICAL CO. **SAN LUIS POTOSI**

Smelter was acquired 1910, by A. S. & R. Co., which see.

SANTA MARIA DE LA PAZ Y ANEXAS; NEGOC. MIN. DE

Office: Avenida Uruguay 70, Mexico City, Mexico.

Officers: José de Caso, pres.; Vincente Etchegaray, Deogrocias Alonso, Adolfo Prieto, Baltoasar Màrquez, Jose Sainz, and Eusebio Gomez Allende, assistant presidents; Manuel F. Garrido, mgr. and cons. engr.; Geoffrey M. Wasteneys, managing director.

Inc. in Mexico, in 1864. Reincorporated March 29, 1917, and capitalization changed from 240,000 pesos to 625,000 pesos; 25 pesos par. Listed on Mexico City Exchange.

Net profit in 1918 was 947,377 pesos. Monthly expenses are 125,000 pesos.

Dividends: from 1895 to 1904, inclusive, 5,778,270 pesos. A distribution of 2 pesos per share is paid monthly besides extras, the total being from 30 to 35 pesos per annum.

Property: 282 hectares in the Matehuala district of San Luis Potosi. The mines are opened to depth of 1,500′. The ore, which is a hard quartz with calcite, occurs in fissures along porphyry dikes, averaging 32 oz. silver per ton.

Equipment: steam, air, and electric power, with total capacity of 2,500-h. p. The 300-ton concentrating mill and 80-ton smelter are idle as ore is sent to smelters at Matehuala and Monterrey.

Production: in 1918, 54,267 kg. (1,728,000 oz.) of silver. Monthly output is 6,000 kg., to be increased in 1920 to 8,000 kg. There are 1,600 men employed.

TIRO GENERAL; CIA. MINERA DEL **SAN LUIS POTOSI**

Sold property to the Cia. Metalurgica Nacional de Matehuala, San Luis Potosi, Mex., which is controlled by the American Smelting & Refining Co.

TIRO GENERAL De CHARCAS MINE **SAN LUIS POTOSI**

Mine address: Charcas, San Luis Potosi, Mexico. Owned by Cia. Metalurgica Nacional de Matehuala, controlled by the American Smelting & Refining Co. Mine was formerly owned by the Cia. Minera del Tiro General, S. A.

Property: 72 pertenencias, 178 acres, with 46-acre millsite, and 50-acre farm, in the Venado district. The mine was worked on a small scale for 3 centuries, and in a larger way since 1859. It shows 2 main ore zones, carrying fissure veins in porphyry, near a limestone contact, with a generally E.-W. strike and dip of about 70°. The N. vein, of 3 to 8 meters width, with known length of 500 meters, is opened to depth of 1,361′, showing chalcopyrite and sphalerite estimated by the management to average 2% zinc, 430 grams silver and 8 grams gold per metric ton. There are 9 tunnels with 13,123′ of workings.

Equipment: includes a 700-h. p. steam plant, with hoists of 100-h. p. and 175-h. p. and a 10-drill air compressor. There is a 10-stamp mill and a 150-ton concentrator, having crushers and 5 sets of rolls, with trommels and other necessary equipment. The mill has 10 pneumatic dry concentrators, which treat sulphide ores and give a preliminary lead concentrate cut out from the final zinc concentrate, the latter being a 45% zinc product, secured largely from rosin jack.

STATE OF SINALOA

CHOIX CONSOLIDATED MINING CO., LTD. **SINALOA**

Office 516 Grant Bldg., Los Angeles, Cal. **Mine office:** Choix, Sinaloa, Mexico.

Officers: C. J. Heyler, pres.; A. E. Pomeroy, 1st v. p.; J. R. Thomas, sec.; A. M. McDermott, supt., with Richard Lamson, directors.

Inc. May, 1902, in Arizona. **Cap.**, $5,000,000; shares $1 par; non-assessable; issued, $3,155,534. Is protocolized under laws of Mexico. Owns 45% of the stock issue of Los Platanos Development Co. Annual meeting, first Monday in October.

Property: 269 hectares, in El Fuerte district or Sinaloa and Urique district of Chihuahua. Orebodies are contact deposits between diorite and limestone and porphyry and limestone, with fissure veins in granite and quartzite carrying gold and silver.

Shipments of 1,062 tons of ore, to the Aguascalientes smelter, gave returns of 19.5 to 28% copper, with gross values of $127,915, and net value of $47,940.

A 100-ton smelting plant, purchased 1911, has never been erected owing to revolutionary disturbances.

In March, 1919, secretary reported that half of property had been leased to El Fuerte Mining & Smelting Co. (which see).

EL FUERTE MINING & SMELTING CO. **SINALOA**

Address: care Choix Consolidated Mining Co., 516 Grant Bldg., Los Angeles, Cal. A. M. McDermott, gen. mgr.

Inc. 1919, in California.

Property: a lease on half of property of Choix Cons. Mng. Co. Agreement provides for erection and operation of smelter.

EL MAGISTRAL COPPER CO. **SINALOA**

Probably dead. See Vol. XIII.

ESTACA MINING CO. **SINALOA**

Address: Roy A. Sulliger, Contra Estaca, Sinaloa, Mexico, who was appointed general superintendent in October, 1919. No further details are available.

LOS PLATANOS MINING CO. **SINALOA**

Idle. **Address:** A. M. McDermott, former president, 516 Grant Bldg., Los Angeles, Calif. See Vol. XIII for description.

SAN LUCAS COPPER CO. **SINALOA**

See El Magistral Copper Co.

SINALOA SMELTING & REFINING CO., S. A. **SINALOA**

Subsidiary of the Pacific Smelting & Mining Co.

TAJO; MINAS DEL. **SINALOA**

Mine at Rosario, Sinaloa, Mexico. Owned by the Bradbury Estate, Bradbury Bldg., Los Angeles, Calif. Is one of the large gold-silver mines of Mexico, showing a big fissure vein in andesite, developed to 1,000′ in depth. Working $8 ore from old fills and pillars, above 600′ level, at last reports. Has a complete equipment with 1,000-k. w. gas-producer electric plant.

The mill handled about 250 tons per day in 1916. In 1917, milling was restricted by shortage of cyanide.

WEST COAST MINING & SMELTING CO. **SINALOA**

Idle many years. **Office:** Mocorito, Sinaloa, Mexico. Howard L. Haines, pres.; Chas. M. Hicks, sec., at last accounts.

Inc. 1906, in Maine. **Cap.,** $2,500,000; shares $1 par; in $500,000 of 7% cumulative preferred stock and $2,000,000 of common stock.

Property: 6 groups, 387 acres, 5 to 20 miles from Mocorito, and 12 to 40 miles from Carbo. Principal property is Los Tajos group, 357 acres, showing andesite, cut by narrow fissure veins of 4′ average width that are said to carry chalcopyrite ore. The River mine, has a 150′ shaft, on a vein of 5 to 8′ reported width, carrying ore said to average about 5% copper and $3 per ton in gold and silver.

Equipment: a 70-h. p. steam plant, a small compressor and 6 drills. The 30-ton experimental concentrator has a crusher, 2 rolls, 2 Bartlett tables and 3 screens. The smelter, at the mine, has a 50-ton water-jacket blast furnace.

STATE OF SONORA

ABUNDANCIA MINE **SONORA**

Address: Estate of Juan G. Cabral, Cananea, Sonora.

This copper mine, near Puertocitos, 5 miles west of Cananea, was under option to Abundancia Mining Co., in 1918.

ABUNDANCIA MINING CO., S. A. **SONORA**

Option on Abundancia claim surrendered and company out of existence. See Vol. XIII.

AMERICAN-MEXICAN SMELTING & REFINING CO. **SONORA**

A subsidiary company of the Pacific Smelting & Mng. Co. T. C. Kirkland, mgr., Fundicion, Sonora, Mexico. Idle.

ANITA COPPER MINES CO., S. A. **SONORA**

Office: Fundicion, Sonora, Mexico. Geo. M. Ryall, pres.; T. C. Kirkland, asst. gen. mgr.

Inc. 1904, in Mexico, and controlled by Pacific Smelting & Mining Co.

ARNOLD MINING CO. **SONORA**

Mine office: Santa Cruz, Sonora, Mexico. E. D. Arnold, pres.; A. O. Koppes, mgr., at last accounts.

Property: Del Pilar mine, about 35 miles N. W. of Cananea, developed by a 400′ shaft, showing ore said to carry 10% copper. **Employs about 25 men.**

Property reported sold to the Manhattan Development Co., for $88,000, May, 1913, but no recent information has been obtained.

AURORA SILVER MINES CORPORATION **SONORA**

Office: H. J. Schwarz & Co., fiscal agent, 25 Broad St., New York.

Officers: B. G. Warner, pres.; A. C. Bauer, v. p.; W. D. Murray, sec.; William Kinnie, treas., with George Greig and Charles Brophy, directors.

Inc. in Delaware. **Cap.**, $1,000,000; $5 par; fully paid. U. S. Corporation Co., New York, registrar and transfer office. Listed on New York Curb.

Property: a group of silver mines at Tecoripa, Sonora, Mexico, including La Aurora, La Providencia, El Pilar, and Aurora Anexas, 12 hectares, situated 20 miles from Cumuripa, on the Southern Pacific. Under Mexican ownership the mines produced rich ore.

Development: to depth of 400′ and 60′ winze. Four headings were in rich ore at last reports, with good shoots of milling ore. The main vein is 3 to 4′ wide. Dumps contain 10,000 tons of $34 ore, which it is estimated can be treated at $8 per ton.

Equipment: steam power, hoist good for 1,000′, and mill moved from another mine 18 miles distant.

AZTEC CONSOLIDATED MINING CO. **SONORA**

Offices: Illinois National Bank Bldg., Springfield, Ill.; Las Cruces, New Mexico; and Tucson, Arizona.

Officers: F. C. Emery, pres.-mgr.; Harris Krupp, v. p.; W. W. Beckley, sec.-treas., with D. G. Campbell and L. R. Taylor, directors.

Inc. March 16, 1915, as Aztec Silver Mining Co., but name changed Feb. 25, 1916. **Cap.**, $500,000; 10c par. In May, 1918, company offered shares at 60 cents.

Company controls the Sonora Exploration Co. and Compañia Minera Consolida Los Aztecas, S. A., which see.

Property: the Aztec group, about 18 miles N. W. of Hermosillo.

The company's holdings embrace 241 claims, covering the 22 mines enumerated in the company's circular. The workings are shallow, but are said to show either copper, gold, or silver-lead ores at nearly every mine.

Development: it is claimed that there is a total of 30,000′ of work showing 6 to 8% copper ore, carrying silver and gold. One property carries mica, another molybdenite, and another manganese. Private advices state that merely a few men were working to hold title.

La Cobriza mine, of 350 acres, in the Altar district near Puerto, shows contact deposits between limestone, quartzite and granite. The main orebody was reported 40′ wide, traceable 1,500′ on surface, carrying carbonates to 100′, underlain by chalcopyrite ore.

Development: by 500′ shaft and 7,500′ of workings, on the 500′ level, a vein 4′ wide, said to show ore assaying from 3-15% copper.

Equipment: includes a 300-h. p. steam plant, with hoist installed in 1912, and a 10-drill air-compressor. There are 20 buildings, including an engine-house, shops, store, office and about 15 dwellings. The smelter has a 100-ton hot-blast pyrite furnace and was operating steadily in 1917.

Management estimated 70,000 tons of ore in the mine.

Company has an immense area to exploit and to pay taxes on.

AZTEC SILVER MINING CO. **SONORA**

Name changed to Aztec Consolidated Mining Co., which see, in 1916.

BARRANCA MINES (MEXICO), LTD. **SONORA**

Office: A. Robertson, sec., 80 Gracechurch St., London, E. C. 3, England.

Directors: G. A. Stockfield, chairman; A. Bulle, and W. Blount.

Inc. Oct. 2, 1906, in Great Britain. **Cap.**, £190,000 in 120,000 10% cum. preference shares, 5 s. par; and 160,000 ordinary shares of £1 par; 87,500 preference, and all ordinary shares issued.

Property: 150 acres of gold and silver-bearing claims in the Hermosillo district. A concentrating mill and cyanide plant is available. Work was suspended from mid-1913 to mid-1918; no recent information is available.

BONANZA MINING CO. **SONORA**

Office: Cananea, Sonora, Mexico.

Officers: T. Evans, pres.; C. T. Knapp, v. p.; Geo. Young, sec.-treas.; Casey Stites, asst. sec.-treas.; and R. E. Howe, directors. Is the operating Mexican corporation of the Superior Bonanza Mining Co., which see.

Inc. June 7, 1904, in Mexico. **Cap.**, authorized and issued, 10,000 pesos; par value of shares $1 (Mexican). Holds title to the mineral properties of that company, located near Imuris, Sonora, Mex., consisting of 198 pertenencias, or approximately 491 acres. Controlled through stock ownership by Greene Cananea Copper Co. Contains a silicious ore, low in copper content, but with some gold. Mine has been worked for the past two years, to provide a reserve of flux for the Cananea ores.

BOSTON-MOCTEZUMA MINING CO. **SONORA**

Address: W. C. Humphrey, Nacozari, Sonora.

Directors: C. P. Vaughn, Ira Vaughn, and Oliver Cutts of Philadelphia; and L. V. Banker of Newton, Mass. Organized in Mass., December, 1919.

Property: the Cieneguita silver mine, 20 miles S. of Nacozari, developed by several thousand feet of tunnels, opening large quantities of $10 ore.

BOSTON SONORA MINES CO. **SONORA**

Probably dead.

Inc. about Dec., 1911, in Arizona, by Thomas Patterson, Wm. A. Clark, H. C. Wilderson, James V. Howard and Royal B. Young, all of Massachusetts. **Cap.**, $1,000,000; shares $5 par.

Property: at Cananea, Mexico, includes several claims near the Calumet-Sonora (Carnegie Lead & Zinc Co.) ground, crossed by several replacement veins showing bunches of good ore in the shallow pits and prospect shafts thus far put down. Is a prospect only.

BUFA MINING, MILLING & SMELTING CO. **SONORA**

Office: 1030 Van Nuys Bldg., Los Angeles, California. Mine at La Bufa, Sahuaripa, Sonora, Mexico.

Officers: Wm. E. Richardson, pres. and gen. mgr.; H. A. Sibbet, v. p.; Baron W. Riley, sec.

Inc. 1902, in Arizona. **Cap.**, $1,500,000; shares $1 par. Has paid 5 dividends, last being $60,000, July, 1905.

Property: 123 acres, showing 6 fissure veins, 2 of which average 4′ width, are opened by a 600′ incline.

Ore: said to assay 10% copper, 10% lead, 4% zinc, 150 oz. silver and $2.50 gold per ton. Values are in argentiferous tetrahedrite and copper sulphides.

Development: shafts of 300′ and 600′, and a 225′ tunnel, with 8,000′ of workings; 20,000 tons of high-grade ore said to be blocked out, with low-grade ore on the dump.

Equipment: includes a 120-h. p. plant, with hoists, air compressors and 7 power drills.

The 35-ton concentrator has a small sampling mill attached. There also is a 20-ton leaching plant. The smelter, at the mine, includes 10-ton and 25-ton reverberatory furnaces. Product is matte carrying 50% copper, 600 to 800 oz. silver and 1.5 oz. gold per ton, shipped by burro, to Aguascalientes, via Guaymas, for refining. Production, 1906, was about 750,000 lb. fine copper.

Secretary reported in June, 1919, that mine had not been operated for over 8 years, due to the revolution.

CADENA DE COBRE MINING CO. **SONORA**

Address: care C. A. McDonald, sec.; Bisbee, Ariz. **Mine office:** Sahuaripa, Sonora, Mexico.

Officers: Emil Marks, pres.; C. H. Holz, v. p.; M. Newman, treas.; R. F. Koehler, J. Pennypacker and John Treu, directors; Arthur Houle, cons. engr.

Inc. Jan. 5, 1905. **Cap.**, $1,000,000; shares $1 par.

Property: 83 hectares, in Los Chinos mountains, on the Yaqui river, shows iron outcrops up to 300′ in width.

Development: by the 96′ Bisbee tunnel, showing ore assaying 4 to 25% copper. Idle on account of revolutionary disturbances in Mexico.

CANANEA CONSOLIDATED COPPER CO. SONORA

Owned by Greene Cons. Copper Co., which is controlled by the Greene-Cananea Copper Co. (q. v.).

CANARIO COPPER CO. SONORA

Address: care Cameron Michel & Co., 8 West 40th St., New York, and Room 23, First National Bank Bldg., Douglas, Arizona.

Officers: James P. Harvey, pres. and mgr.; F. O. Schellenberg, v. p.; T. M. Simonton, sec.; Jacob Schaefer, Jr., treas. Directors: James P. Harvey, F. O. Schellenberg, Hon. John B. Wright, Wm. McDermott and B. A. Packard.

Inc. in Arizona, with capital of 2,000,000 $1 shares; 600,000 issued; but re-incorporated in Delaware, with capital of $20,000,000; shares $10 par value; 800,000 issued. Registrar & Transfer Co., New York, transfer agent. Commercial Trust Co., New Jersey, registrar. The company owns all the capital stock of El Canario Copper Co., S. A., and Mountain Consolidated Copper Co., S. A., both of Mexico, which see.

CARACAHUI MOUNTAIN COPPER CO., LTD. SONORA

Office: 3222 Jefferson St., Kansas City, Mo. Mine near Llano, Magdalena, Sonora, Mexico.

Officers: M. H. Greene, pres. and gen. mgr.; Chas. M. Howell, v. p.; H. J. Sprink, sec.-treas., with T. McClure, J. C. Brewer, Thos. James and Wm. R. Berryhill, directors.

Inc. May 20, 1907, in Arizona. **Cap.,** $1,500,000; $1 par; issued 964,000. Annual meeting, first Tuesday in June.

Property: 2 groups, 50 hectares, 9 miles S. E. of Llano, shows copper-bearing veins in granite.

Development: by shafts of 50′ and 410′, and a 195′ crosscut tunnel.

Equipment: includes a 40-h. p. boiler and 8x10″ hoist good for 1,000′ depth. Idle since 1910, but company has no bonded indebtedness, pays all taxes and expects to resume work as soon as peace is restored in Mexico.

CARMAN CONSOLIDATED COPPER CO. SONORA

Mine near Arizpe, Sonora, Mex. Joseph Backus, of Virginia, Minn., pres., reported to have taken over the property for an indebtedness of $50,000 in 1916, and to be planning organization of new company.

Inc. 1906. **Cap.,** $500,000, increased to $750,000; shares $2.50 par. Held title to lands through Compania de Oro y Plata, S. A., inc. in Mexico.

Property: 351 pertenencias, 877 acres, in 9 groups, in the vicinity of the Pedrazzini and Chispas mines, show several strong silver veins, with 1,911′ of workings. The Carman and Don Placidio groups have dumps carrying about 1,100 tons of ore, claimed to average 4.65% copper, 62.2 oz. silver and 0.21 oz. gold per ton. Shipments to El Paso smelter have given returns ranging from $82.98 to $4,575 per ton.

CARMEN SYNDICATE SONORA

Subsidiary of Proprietary Mines Co. of America, in Guanajuato, Mexico.

Office: D. C. Catlin, 60 Broadway, New York. Original members of Syndicate were D. C. Catlin, E. B. Kirby, C. E. Knox, and G. W. Cannon, who subscribed $19,000 to take up property.

The Proprietary Mines Co. issued $35,000 two-year, 7% notes due May 25, 1921, convertible into shares of a company to be organized if the Carmen property is purchased, on the basis of $8 par value for each dollar of notes subscribed. The privilege of conversion may be exercised up to April 10, 1921. Capital of new corporation will be $1,500,000.

Property: 136 acres, includes the Carmen, Chonita, Carmen Anexas, and Los Angeles mines in the Arizpe district, Sonora, 58 miles by road from Cananea to Arizpe, thence 15 to 18 miles to the mine; or 32 miles from Nacozari. Cost of freight from Nacozari is $7 to $8 per ton. Examined by N. H. Burley, H. V. Wallace, F. W. Royer, and Sill & Sill.

Geology: the main vein, 15 to 24′ wide, outcropping for a length of 1,000′, appears to be a contact between andesite and rhyolite or latite; other veins

are mineralized shear-zones in rhyolite. Silver occurs as argentite, accompanied by a little gold, and ore averages over 20 oz. per ton. The gangue is silicified rhyolite containing stringers of quartz and calcite.

Development: prior to 1919, two 100′ shafts were sunk, and several hundred feet driven from the main shaft. Probable reserves exposed and on dumps total 10,751 tons, assaying $25.80 per ton, with silver at $1 per oz., plus another 5,250 tons probable. Another shaft is being sunk, also the B shaft workings are being continued.

Equipment: steam power, hoist, head-frame, tools, and necessary accessories.

CARNEGIE LEAD & ZINC CO. — SONORA

Office: 602 Palladio Bldg., Duluth, Minn.

Officers: pres., vacant; D. T. Helm, v. p.; W. W. Wells, treas.; with J. H. Sanford (gen. mgr.); C. W. Stilson, J. L. Crawford, and J. F. Edwards, directors. Caroline Peterson, sec.; J. H. Sanford, Jr., mine engr.

Inc. March 3, 1915, in Arizona.; amended July 17, 1918. **Cap.**, $1,000,000; $5 par; 77,730 issued. Bonds authorized, $250,000 first-mortgage, 10-year, 7%, dated October 1, 1917; $245,000 issued. Registrar and Transfer Co., New York, transfer agent and registrar. Annual meeting second Tuesday in June. Fiscal year ends March 31. Listed on New York Curb.

Company is a reorganization of the Calumet & Sonora Mining & Milling Co., described in Vol. XI, which defaulted on payment of interest on the bond issue. Bonds were foreclosed February 13, 1915, and on February 27 the property was sold for $82,000, to R. P. Burgan, who immediately organized the present company. Shareholders in the Calumet & Sonora Co. were allowed to subscribe for stock in the new company for from 10 to 15% of their holdings in the old company.

Financial Statement, years ended March 31:

Assets.

Year	Current	C. & S. Acct.	C. & S. Stock	Accumulated Earnings, etc.	Bonds and ore reserve	Property, Construction, etc.	Total
1919	$17,530	$330,064	$120,316	$40,479	.....	.....	$508,390
1918	171,253	.....	.....	.....	$86,429	248,281	505,963
1917	102,926	.....	.....	.....	122,450	151,964	377,340
1916	72,620	.....	.....	.....	66,200	578,249	717,070

Liabilities.

Year	Current	Capital Stock	Bonds due in 1927, etc.	Deferred Charges	Acc. Earn. C. & S., Excess. Value of Stock	Total
1919...	$114,462	$379,220	$245,000	$277,905	$46,613	$508,390
1918...	25,079	.....	250,000	.....	.....	.....
1917...	11,202	.....	100,000	.....	.....	.....
1916...	39,500	500,000	100,000	.....	.....	.....

Revenue account:

Receipts.

Year	Cash on Hand	Sale of Shares and Bonds, etc.	Sale of Ore	Transfer from C. & S.	Total
1919..	$36,254	$195,580	$98,694	.....	$330,528
1918..	31,556	184,616	128,840	$16,894	361,906
1915-'17	2,794	140,022	348,236	.....	491,054

Disbursements.

Year	Notes Paid, etc.	Interest	C. & S. Operations	General	Balance	Total
1919..	$22,087	$19,123	$261,755	$33,559	$16,090	$330,528
1918..	13,950	2,497	288,555	14,300	42,604	361,906
1915-'17	32,000	6,321	387,238	33,939	31,556	491,054

Calumet & Sonora of Cananea Mining Co.

Subsidiary of Carnegie Lead & Zinc Co. of Arizona.

Offices: 602 Palladio Bldg., Duluth, Minn.; and Box 35, Cananea, Sonora, Mexico.

Officers: pres., vacant; D. T. Helm, v. p.; Caroline Peterson, sec.; W. W. Wells, treas., with C. W. Stilson, J. L. Crawford, J. H. Sanford, and J. F. Edmonds, directors. J. H. Sanford, Jr., mgr.

Inc. March 3, 1915, in Arizona. **Cap.,** $1,000,000; shares $5 par; non-assessable; 85,305 issued. Bonds: $250,000 authorized, and $245,000 outstanding. Colonial Trust Co., Pittsburgh, and Registrar & Transfer Co., New York, transfer agents and registrars. Annual meeting, second Tuesday in June.

Property: 641 acres, 2 miles N. and slightly W. of Cananea, Sonora, at elevation of 5,500′.

Geology: the group shows a variety of rocks, including Mariquita diabase, Mesa tuffs, San Pedro andesite, Henrietta diorite-porphyry, and Elisa quartz-porphyry. The two last named are the chief ore-forming rocks of the Cananea district.

Ore in the Chivera and Catalina No. 2 claims occurs in diorite-porphyry, which cuts through the tuffs. The ore is a mixture of galena, sphalerite, and chalcopyrite, with scanty tetrahedrite.

Development: to a depth of 719′ at the Chivera shaft, with levels at 200, 300, 400, 525, and 600′. Reserves above 600′ are estimated as 350,000 tons, of which 130,000 tons is broken. Mining by shrinkage stoping costs but 70 cents per ton for breaking. Openings total 10,416′ to the 600′ level. At 700′, the ore cut at 129′ from shaft assayed 5.81% lead, with a little zinc and copper. A winze below 600′ sampled 11% lead and 9 oz. of silver. At the Catalina No. 2 shaft, 241′ deep, there is another orebody with 10,000 to 50,000 tons of complex ore developed.

Equipment: includes one 1,500 cu. ft. and one 600 cu. ft. compressor, one 200 ft. oil-driven compressor, jack-hammers, stoping drills, and fully-equipped machine-shops. A new 500-ton gravity and flotation mill was completed in 1919. The flow-sheet of treatment is Farrell jaw-crusher and Traylor rolls at Chivera shaft and aerial tram to 1,000-ton bin at mill. Then follow belt-conveyors, automatic weighers, samplers, Hancock jig, and Deister-Overstrom tables. Products are high-grade lead concentrate and zinc-copper concentrate. The latter passes through a Huff electrostatic plant, making a 17% copper concentrate and a 48 to 54% zinc concentrate. Tailings and middlings from the tables are re-ground in Allis-Chalmers ball-mills, whence the pulp goes to a flotation plant. Final recoveries are 90% lead, 90% copper, and 90% zinc. The machinery described above cost $200,000. Electric power is purchased.

Employment is given to 225 men, including 14 American officials.

CHICAGO EXPLORATION & DEVELOPMENT CO. SONORA

Address: Mina Mexico, Sonora, Mexico. F. B. Harding, cons. engr.; W. E. Pomeroy, mgr.; Geo. Squire, smelter supt.; Chas. Gercken, mine supt., at last account.

Property: 45 miles N. E. of Tonichi, the end of a branch line of the S. P. de M. R. R., produces silver-copper ore and concentrates.

Mine plant robbed by bandits June, 1919.

CIENEGUITA CONSOLIDATED MINES SONORA

Office: 25 Broad St., New York. Is a reorganization of the Cieneguita Copper and Cieneguita Securities companies.

Officers: James F. Whitney, pres.; August Gauch, v. p.; R. C. Davenport, sec.; with Theodore Martin, Geo. D. Christy, and F. W. Hunt, directors.

Property: 1,100 hectares, about 40 miles S. W. of Sahuaripa, Sonora, is covered by rhyolitic rocks, mostly fragmental, cut by a diabase dike. The Chipiona and the Cargona groups lie close together and the Ostimuri-Tayapa group about 2 miles to the S. E. The rocks are cut by vertical veins, one reported to be from 3′ to 50′ wide, traceable 3 miles and to carry ore shoots averaging about 2½% copper and 40 oz. in silver.

Development: mainly by tunnels, one of 1,200′ with 2 shallow shafts and a total of about 3 miles of workings. These workings are not sufficient to block out any large amount of ore, but show that the property has merit.

Equipment: includes 100-h. p. steam plant, a 6-drill compressor and all necessary mine buildings and houses for employes.

A small smelter has crushers and rolls, a 75-ton calcining furnace and two 50-ton reverberatory furnaces, burning wood. Smelting plant inadequate and poorly adapted for the ore. Idle, pending restoration of peace in Mexico.

CONSOLIDATED SONORA MINES CO. **SONORA**

Address: C. P. Shaver, sec., care Bank of Thibodaux, Thibodaux, La., who says nothing has been done at the mine near Fronteras since 1914. See Vol. XIII.

COPETE CONSOLIDATED COPPER CO. **SONORA**

Office: 15 William St., New York.

Officers: Wm. T. Read, pres.; F. C. Hanford, v. p.; Myra B. Martin, sec.-treas., with Ralph Melczer and John C. Morrow, directors.

Inc. March, 1906, in West Virginia. **Cap.**, $1,000,000; shares $1 par, non-assessable; issued 549,170½ shares. Annual meeting, first Wednesday in March.

The company was organized to develop the property owned by the Melczer Mining Co., legalized in Mexico, the entire stock issue of which is held by the Copete Consolidated Copper Co.

Property: 70 pertenencias, comprising the Last Chance, Copetito, Jalisco, Santiago, and El Copete claims, about 173 acres, at El Copete, Sonora, shows an immense gossan capping, apparently the remnant of a great blanket vein, the greater part of which has been eroded away.

Development: by several tunnels and a 615′ shaft with about 7,000′ of workings. Ores are mainly low-grade copper with considerable iron pyrite, gold and silver, giving average assay value of $6 per ton. The bottom of the ore zone seems to have been reached at about 300′.

It is believed that those in control of the company will use every effort to bring the enterprise to a successful issue and the past may be considered a closed chapter. Those interested in the history of the company will find it given in Vols. X and XI, The Copper Handbook.

Idle on account of the revolution.

COPETE MINING CO. **SONORA**

Office: 15 William St., New York. Myra B. Martin, sec.

Inc. 1900, in West Virginia. **Cap.**, $5,000,000; shares $5 par. Owned stock of the Melczer Mining Co., transferred, 1906, to Copete Consolidated Copper Co., which see.

CUBANA CONSOLIDATED COPPER CO. **SONORA**

Mine near Arizpe, Sonora, Mexico.

Inc. Jan. 6, 1903, in Arizona. **Cap.**, $500,000; shares $1 par.

Lands: 244 hectares, bought for $20,000; show 6 orebodies, of 4′ to 20′ width, of which 3 carry estimated values of 12% copper, 10 oz. silver and $2 gold per ton.

Development: 6 shafts, deepest 102′, and a number of tunnels, longest 250′ and 575′, with a total of 1,415′ of underground openings. Mine is about 30 miles from Cananea. Sample carload smelter shipments returned 23% copper, with fair gold and silver values. Property considered promising, but idle at last accounts.

DEMOCRATA CANANEA SONORA COPPER CO. **SONORA**

Office: Fourth National Bank Bldg., Cincinnati, Ohio. Mine at Cananea, Sonora, Mexico.

Officers: H. H. Hoffman, pres.; C. E. Hoffman, v. p. and gen. mgr.; Herbert H. Hoffman, treas.; H. W. Santen, sec., with R. C. Swing, directors.

Inc. May 8, 1905, in Arizona. **Cap.**, $3,000,000; shares $10 par; issued $2,869,970. Central Trust Co., registrar. Annual meeting, last Tuesday in May.

Property: 18 hectares, 44.5 acres, lying between the Copote and Veta Grande, in the heart of the Greene Cananea mines. Orebody is of contact meta-

morphic origin, consisting of a breccia of fragments of altered limestone, cemented by quartz, bornite and copper pyrite, in a fracture zone 50′ wide in limestone. The orebody lies about 300′ north of the Democrata shaft and also outcrops in 2 patches of garnet rock surrounded by diorite porphyry, good carbonates being mined at the surface.

Development: comprises a 700′ shaft and 1,600′ tunnel, with 5 miles of workings. On the 500′ level, the known orebody proved to be larger than previously estimated and the stopes yielded 5% ore. The East orebody near the Kirk mine, developed by tunnel workings, has also materially increased the proven ore reserves. Average assays at present are 3½% copper and 1.5 oz. silver per ton.

Equipment: includes electrically-operated hoists and air-compressor. Smelter contains 3 blast-furnaces of 250 and 300 tons daily capacity. A converter and electric power plant were completed in November, 1917.

When in full operation company employs 600 men.

Production: in 1916, 8,950,000 lb. copper; 306,000 oz. silver; 1,265 oz. gold; and from November 1, 1917, to December 31, 1918, a total of 15,221,504 lb. of copper, 8,877 oz. of silver, and 334 oz. of gold.

Operations have been intermittent due to the revolution. Work was resumed in 1915, and continued until March, 1919; there was a suspension until October, when one furnace was blown-in and 300 men employed. Property is a valuable one.

DOLORES MINING & DEVELOPMENT CO. SONORA

Dead. Described in Vol. XIII. See Empire Mining Co.

DULUTH-MOCTEZUMA MINING CO. SONORA

Inactive. **Office:** Room 610 Lonsdale Bldg., Duluth, Minn.

Officers: Geo. H. Crosby, pres.; Cassius Bagley, v. p.; A. O. Rabideau, sec.; all of Duluth.

Inc. 1909, in Minnesota. **Cap.,** $500,000; shares $10 par; $300,000 issued. Mexican holdings forfeited on account of excessive taxes. Minnesota iron lease sold for enough to clear up indebtedness on same.

DULUTH-SONORA COPPER CO. SONORA

Address: 602 Palladio Bldg., Duluth, Minn. Mine near Cananea, Sonora, Mexico.

Officers: B. Silberstein, vice-president, preceding with W. D. Underhill, sec.. Theron H. Hawkes,, treas, with Geo. M. Tallant and A. F. Norton, directors. P. C. Probert, mine and smelter supt. and purch. agt.

Property: about 3,621 acres, embracing a part of the former holdings of the Calumet & Sonora Co., and the South Cananea, or Mitchell property. The latter shows a strong vein with wide silicious outcrop and has been developed by a 400′ shaft and some underground work, but an examination of dumps fails to show ore. Norton shaft, one-fourth mile distant, said to be 293′ deep and to show good ore. Remainder of property considered of questionable value. Idle since 1910. Is a prospect only.

EASTERN CANANEA DEVELOPMENT CO. SONORA

Mine about 18 miles N. E. of Cananea, Sonora, Mexico. John Martin, supt., at last accounts.

Property: said to show copper sulphide ore, is developed by shaft, held under lease and bond from M. L. Fay, of Duluth, Minn., who controls the Fay Cananea Copper Co., the owner of the mine through the Cananea Eastern Mining Co., S. A., a Mexican corporation. No returns secured, and idle for years.

EL CANARIO COPPER CO. SONORA

Owned by Canario Copper Co., which see.

Address: Nacozari, Sonora, Mexico; and Room 23 First National Bank Bldg., Douglas, Arizona.

Management: James P. Harvey, res. mgr.; S. H. Pyle, supt.; C. H. Dunning, min. engr.; John H. Banks, cons. engr.

Property: includes El Canario mine, 15 miles east; and the Lillie and the Lillie Segunda mines, 3 miles west of Nacozari, Sonora. El Canario adjoins

La Caridad of the Moctezuma Copper Co. Geologic report of the Lillie made by C. H. Dunning, gives but little data on which to base an opinion.

El Canario ores carry enargite, and run from 2 to 18% copper, with some silver. The property is crossed by the El Caridad vein and two east-west cross-veins. An 800′ tunnel, whose face is 500′ below outcrop, has not yet cut the intersection of veins as planned. Work temporarily discontinued to carry on development of the Lillie mine near Nacozari.

The Lillie Mine has a vein from 40 to 60′ wide, which consists of a replacement of limestone between quartzite, intersected and parallelel by acid-porphyry dikes. The vein outcrops boldly for several thousand feet.

Development is by tunnels; No. 3 will gain a vertical depth of 600′, and is expected to enter the ore-zone 500 to 600′ from the portal, and 500′ under the large high-grade ore stope above in the No. 1 tunnel. Thirty-three cars of high-grade ore have been shipped to the Copper Queen smelter at Douglas, Arizona, from surface workings.

The Lillie Segunda mine joins the Lillie mine on the south. The geologic conditions are said to be similar to that of the Pilares mine in the same district, owned by the Moctezuma Copper Co. The main 250′ shaft on the north end of the orebody, encountered sulphide ore at a depth of 20′ and extending to a depth of 100′, where the foot-wall zone was encountered. The ore averaged 2.25% copper with 1.75 oz. silver per ton. The 100′ crosscut shows ore for 110′, and was extended to intercept another ore-shoot. The 250′ level encountered commercial ore at a point 310′ from the shaft. By January, 1920, the heading had averaged 4½% copper and 2 oz. silver.

Equipment: the main shaft is equipped with 60-h. p. hoist and compressor, capable of furnishing about 1,300 cu. ft. of air per minute. An air pipeline has also been extended to the Lillie No. 3 tunnel.

The Lillie and Lillie Segunda mines embrace 278 pertenencias. A tunnel-site has been located on the east side of Lillie Segunda mountain, where an air-compressor and other machinery will be installed to drive a 3,000′ tunnel to crosscut the Segunda orebody 700′ below the surface. The tunnel-site is 1½ miles from Nacozari. Recent development is said to be highly favorable, and it looks as if the Lillie Segunda would make up for the disappointing results in other properties owned by this company.

ELENITA DEVELOPMENT CO. **SONORA**

Office: Room 3300, 120 Broadway, New York.

Officers: Henry B. Paull, pres.; Thomas H. Collins, v. p.; Frederic R. Kennedy, sec.-treas., with Thomas F. Cole, and John F. Bankerd, directors.

Inc. March 15, 1907, in Arizona. **Cap.**, authorized 40,000 shares, par $10, $400,000; issued 6,000 shares at $10; 21,310 shares at $9 paid in; part paid stock subject to final call of $1 per share; in treasury 12,690 shares.

Property: Bonanza de Cobre mining claim, 182 pertenencias, approximately 450 acres at Cananea, Sonora, Mexico. Title to property held by the Lomita Mining Company, S. A., a Mexican corporation.

EL GLOBO MINING & MILLING CO. **SONORA**

Probably dead. Mine near Nacozari, Sonora, Mexico. See Vol. XIII.

EL PROGRESO SILVER CO. **SONORA**

Offices; 4108 Dupont Bldg., Wilmington, Dela.; and Box 744 Nogales, Arizona.

Officers: E. D. Dier, pres.; Andrew Macfarlane, v. p.-gen. mgr.; Maurice Brooke, sec.-treas., with E. W. Wilson, and T. M. Johnson, directors.

Inc. in Delaware. **Cap.**, $2,000,000: $1 par; non-assessable; 1,000,000 outstanding.

Company owns entire capital of Compañia de Plata El Progreso, a Mexican corporation, which see.

El Progresso, Compania de Plata.

Subsidiary of El Progresso Silver Co., which see for address and officers.

Staff: Andrew Marfarlane, gen. mgr.; W. C. Laughlin, cons, met. eng.;

H. C. Shotwell, cons. min. eng.; Jackson Elliott, mill supt.; E. E. Noon, mine supt.; J. V. Macfarlane, engr.; John Logan, assayer; A. C. Burnett, accountant.

Property: the Progreso-Colorada mine of 28 acres, opened in 1895, and adjacent ground acquired in 1919, in the central part of Sonora, near junction of the Yaqui and Sonora rivers, and 160 miles S. of the international boundary. Nearest town is Suaqui de Batuc. Nearest rail is Verde, on the Mina Prietas line, a narrow-gauge road joining the Southern Pacific at Torres. In 1919 a 35-mile wagon-road was built to connect with the Moctezuma-Lampazos wagon-road, giving a direct route to Nacozari, 110 miles distant. Economic conditions in the district are generally favorable. Shallow workings on the vein have yielded silver worth $1,500,000. Mine examined by W. A. Farish, James Macfarlane, W. C. Laughlin, and Walter Harvey Weed (May, 1919).

Geology: the district shows uptilted limestones and overlying tuff beds, cut by intrusive igneous rocks and by andesites; the fissure veins are in the intrusives. At Progreso-Colorada, the country rock is quartz-diorite. The rock north of the Progreso vein is a porphyritic andesite, badly altered by vein-forming agencies, and impregnated with magnetite, pyrite and chalcopyrite. Numerous well-mineralized fissure veins, characterized by banded quartz, cut these two rocks, and carry shoots of rich silver-gold ore. Five nearly parallel veins which occur in a zone 500′ wide, are of the typical silver-gold type, run E. and W., and dip N. Only two, the Progreso and Colorada veins, 200′ apart and parallel, have been mined, but all five can be developed and mined from the new shaft now being sunk, and all five may be expected to show ore to depths of 500 to 1,000′.

Progreso vein is developed to depth of 300′ by 2 shafts developing the vein for a length of 500′ or more. The ore shoot is from 7.8 to 13′ wide in the old stopes, and is continuous for a length of 500′ on the 215′ level.

Reserves, above 215′ level total 21,800 tons, averaging 33 oz. silver and $6 gold per ton. There is also about 10,000 tons of indicated ore in the mine, and 5,100 tons of $26.25 ore on dumps.

The **Colorada** vein has been opened to a depth of 130′ and a length along its outcrop of 355′. On the 130′ level continuous ore is exposed for a length of 147′. Samples cut for a length of 100′ along this level averaged 6′ wide and assayed 24.5 oz. silver and $1.60 gold. Reserves in Colorada mine, as of March, 1919, are 5,00 tons of $25.25 ore, plus 2,600 tons on dumps containing 46.17 oz. silver and $2.75 gold per ton.

Old Colorada and San Jose veins also show very promising outcrops opened by shallow shafts.

The new 500′ shaft now being sunk will have levels at 100′ intervals, beginning at 200′. New work late in 1919 cut ore 9′ wide, that assayed $15 to $45 per ton. The San Fernando vein south of the main shaft, was opened in 1919 by a 30′ shaft in $22 ore.

Equipment: is complete for an output of 300 tons per day, including 80-h. p. hoist, 8-drill compressor, sinking pump, 10 machine-drills, and 100-ton mill consisting of stamps, tube-mill, concentrates, and cyanide plant, to be enlarged to 300 tons.

The mill started in October, 1919, and has treated dump ore from El Progreso averaging $26.66 per ton. Profits are expected by manager to be over $1,500 daily when the mill is fully equipped.

Progreso-Colorada is considered a promising young mine, containing a good tonnage of high-grade ore and a mill in which to treat it.

EL TRIUNFO CONSOLIDATED MINING CO. SONORA

Mine office: Bacoachi, Arizpe, Sonora, Mexico.

Officers: at last accounts, A. C. Chalot, pres. and gen. mgr.; Dr. S. Newton Leo., v. p.; A. L. King, treas.; preceding, with T. B. Johnstone, Albert Reineman, Julius G. Miller, Henry Stern, Wm. H. Freystadt, I. Neuberger, A. H. Wand, D. Powdermaker, Dr. Moritz Gross, Adolph Oltmann and John H. Brown, directors; John Martin, supt.

Inc. in Arizona. **Cap.**, $2,000,000; shares $1 par. Property is held through a Mexican corporation with capital of 10,000 pesos, shares 100 pesos

par, entire stock issue of which is owned by El Triunfo. Annual meeting, first Monday in October.

Property: 136 acres, in 12 different groups, principal property, about 4 miles from the Picacho mines, about 8 miles S. W. of Bacoachi, 2 miles from the Sonora river and about 75 miles by wagon road from Cananea. Lands carry 5 veins 2′ to 5′ wide, said to be traceable 2 miles, and to carry azurite, malachite, bornite, chalcopyrite and chrysocolla, all silicious, and occasional native silver, with a claimed average value of 5% copper, 25 to 600 oz. silver and $3 gold per ton.

Development: about 7,000′ of workings, main shaft 400′ deep, connecting with a tunnel for extraction.

Equipment: includes a 90-h. p. steam plant at the mine, small sawmill, 50-ton reverberatory furnace and 26 buildings. Wells provide water for boilers and potable use.

A 50-ton mill has a 25-h. p. steam engine and 4 Behrend tables, with a 3-mile pipe-line to the Sonora river, where there is a small pumping station.

Company paid a dividend of 1% in August, 1911. During 1912, company operated its smelter (reverberatory), shipping matte to El Paso, running $625 per ton.

Transportation facilities are poor, nearest railroad station being at Cos, 38 miles distant by mule trail.

Closed down since 1913 on account of unsettled political conditions and insecurity of property rights during revolution.

EL VAN COPPER CO., S. A. **SONORA**

Mine near Nacozari, Sonora, Mexico. Not operated for several years and several claims forfeited to government for non-payment of taxes.

EMPIRE MINING CO. **SONORA**

Mine address: care Ben Bound, supt., Cananea, Sonora, Mexico. Is the Mexican holding company of the **Dolores Mining Development Co.**

Property: the Major Domo copper mine, 85 hectares, a few miles from Cananea. A 200′ shaft shows a N. E.-S. W. vein, 2½′ to 3′ wide. Company also owns the Dolores, Empire, Bonanza, Spanish, Golden Cross and Providencia, silver-gold properties, 65 hectares, in the Magdalena district, Sonora, Mexico. Planned erecting a 3-unit Pittman mill at the Golden Cross property, 14 miles S. W. of Cananea. No recent reports received; presumably idle.

ESMERALDA COPPER CO. **SONORA**

Has no representative at former mine office: Llano, Magdalena, Sonora, Mexico. F. C. Emery, pres.; W. D. Fredericks, mgr., at last accounts.

Property: 88 hectares, has about 300′ of workings, showing copper ore, with silver said to increase at depth. Presumably idle.

ESQUER y CIA; ALEXANDER **SONORA**

Mine at Baroyeca, Alamos, Sonora, Mexico. J. J. Esquer, mgr., at last accounts.

Property: the Mexicana, Esperanza and other mines, developed by shafts and tunnels, carries auriferous and argentiferous copper ores. Idle for years.

FAY-CANANEA COPPER CO. **SONORA**

Probably dead. Last address: 2105 East Superior St., Duluth, Minn. Mine near Cananea, Sonora, Mexico. Described in Vol. XII.

GARRETSON-SAHUARIPA CO. **SONORA**

Probably dead. Mine at Calera, Sahuaripa, Sonora, Mexico. W. H. Farnsworth, pres.; Laurens Enos, v. p.; W. H. H. Davenport, sec.; D. B. Sherman, treas.; John A. Moore, supt., at last accounts.

Inc. 1903, in Arizona. **Cap.,** $600,000; shares $100 par; non-assessable; issued, $450,000.

Property: 96 hectares, and 14,000 acres of surface rights, about 30 miles S. E. of Sahuaripa, includes La Calera mine, having 6 orebodies, 2 under development, of 3′ to 6′ width, estimated by company to average 2% copper,

45 oz. silver and $14 gold per ton, which is interesting, if true. Mine has about 1,200′ of workings.

The smelter, 1 mile from the mine, has a 50-ton 29″x48″ Garretson pyritic blast furnace. Idle for years awaiting construction of the Sonora Central railway from Tonichi, which has been surveyed to pass through this property.

GREENE CANANEA COPPER CO. **SONORA**

Office: 42 Broadway, New York.

Officers: W. D. Thornton, pres.; Cornelius F. Kelley, v. p.; Jos. W. Allen, sec.-treas.; E. J. Dudley, asst. sec.; W. S. Harper, asst. treas.; H. B. Paull, aud.; Robert M. Raymond, Cornelius F. Kelley, Walter Douglas, W. D. Thornton, Wm. E. Corey, John D. Ryan, Jos. B. Cotton, Jos. W. Harriman and L. D. Ricketts, directors.

Inc. Dec. 26, 1906, in Minnesota. **Cap.** $60,000,000; shares $100 par; issued $50,000,000. The New York Trust Co. and Old Colony Trust Co., Boston, transfer agents; Bankers Trust Co., New York, and State Street Trust Co., Boston, registrars. Shares listed on the New York and Boston Stock Exchanges.

The Greene Cananea owns practically entire stock issue of Cananea Consol. Copper Co., the operating company which holds title to the Mexican properties. The steps by which this result was reached are given in Vol. XIII.

Balance Sheet, years ending December 31, for Greene Cananea and subsidiaries:

Assets.

Year	Mines, railways, buildings, equipment	Current	Total
1918	$50,992,008	$8,032,608	$59,024,625
1917	50,787,446	8,405,579	59,193,025

Liabilities.

Year	Capital	Reserves	Current	Surplus	Total
1918	$50,000,000	$636,352	$905,001	$7,483,272	$59,024,625
1917	50,000,000	251,990	892,384	8,048,652	59,193,025

Income Account.

	Sales of Metals etc.	Net Charges	Depreciation	Net Balance	Total Surplus	Dividends	Final Surplus
1918	$10,801,766	$6,916,251	$528,734	$3,434,620	$11,483,272	$4,000,000	$7,483,272
1917	9,392,639	6,623,137	350,455	2,497,888	12,002,867	3,954,215	8,048,652

Dividends:

	Rate	Par Value Shares	Amount
1919* (February)	$1.50	$100	$750,000
1918	8.00	100	4,000,000
1917	7.90	100	3,954,215
1916	7.00	100	3,418,947
1915	.....	100	.....
1914	2.00	100	972,645
1913	1.25	100	1,093,143
1912	0.75	20	1,819,877

* None since.

Property: mineral lands held under title from the Mexican government amount to 14,062 hectares, or approximately 34,738 acres. The surface lands owned by the company comprise 130.414 hectares, or approximately 322,123 acres. All of the mines, works, offices, warehouses, stores, etc., of the company are located on its own land and in addition the company owns valuable residence properties in Cananea, which are occupied by its local officials and employees.

Cananea is a community of 16,000 inhabitants, located 40 miles south

of the international boundary line, on a branch railway of the Southern Pacific lines of Mexico.

Geology: the producing mines of the company are situated in the Cananea mountains, which rise from the headwater valleys of the San Pedro and Sonora rivers in northern Sonora. The mines are distributed along a mineral belt, or series of belts, about 6 miles long, in a N. W.-S. E. direction, and about 2 miles wide. The oldest rock is pre-Cambrian granite, which is overlaid by Cambrian quartzite, in turn overlaid by Cambrian limestone. Breaking through these rocks, and covering much of the mineral belt, is a series of eruptives of Tertiary age, in which 12 different rocks may be recognized, one, a bedded tuff, the others massive. Three main classes of ore deposits may be recognized: (1) Deposits containing secondary chalcocite together with iron pyrite either massive or disseminated along shear zones in diorite porphyry; (2) Contact deposits containing chalcopyrite associated with iron pyrites and some zinc blende in a matrix of altered limestone; (3) Disseminated chalcopyrite associated with zinc blende in a diorite porphyry breccia.

The great mines of Cananea are the **Veta Grande, Oversight** and **Capote,** which have had large bodies of high-grade ore and now have large bodies of direct smelting ore and also contain great deposits of concentrating bodies. This ore contains copper as chalcocite, disseminated through diorite porphyry in broad shear zones.

The Capote mine differs from the Veta Grande and Oversight in that the ore occurs not only disseminated in diorite porphyry but also in the underlying granite. There are 3 principal ore shoots connected by continuous ore on the various levels. The ore in the upper levels is chiefly chalcocite, but the new shoot consists of massive pyrite with primary chalcopyrite and bornite in granite. This mine has attained a depth of over 1,050′, and has ore on each level from the 1st to the 10th. The Capote mine yields both concentrating and direct smelting ores. A new 5-compartment shaft was completed to the 12th level in 1916, to provide an outlet for the new orebody on the lower levels, and has been completely equipped. The pumping stations at Capote No. 15 shaft were completed in 1917 and 1918, while No. 16 was equipped with a hoist, ore-pockets, and stations in 1919.

The **Cobre Grande** mine, the original mine of the Cananea Consolidated Copper Co., has been idle for some years, save to supply converter lining. The ore occurred in a wide vein traversing both altered limestones and igneous rocks.

The **Kirk** mine is situated in an extensive area of highly-altered limestone capped with diorite porphyry and cut by small, irregular dikes and intrusions of the same material. The ore is not adapted to concentration and it is necessary to hand-pick it as mined. The sorted ore carries a desirable high percentage of lime and iron.

The **Chivatera** has a large body of oxidized ore containing about 2% copper, but averages 12 to 15 oz. silver and some gold. As the orebody now stands it contains several years' reserves on the basis of 150 to 200 tons daily production, and there is a considerable territory lying ahead of present exploration that gives promise of important development.

The **Sierra de Cobre** property was acquired by purchase from the Phelps-Dodge interests several years ago, and since its acquisition has proved to be one of the largest and most profitable productive mines.

The ore from this mine occurs in limestone. Fissures extending out from the Eureka fault have acted as channels for mineralizing solutions, making ore along the veins and for a considerable distance into the walls, replacing the limestone by pyrite and chalcopyrite along the bedding planes. There appear to be notable bodies of heavy sulphides on and below the level of the Combination tunnel and these sulphides have been developed with very satisfactory results. The Sierra de Cobre property also has an

extensive area of undeveloped ground lying in the limestone areas, along which smelting ore has been found in the Kirk mine and elsewhere.

The **Elisa** mine contains a number of lenses of ore lying approximately parallel to a nearly vertical fault between limestone and the diorite porphyry. These lenses occur in the limestone at the fault and back of it for a distance of 150′, along a zone some 1,500′ in length. The ore consists of a garnet matrix containing chalcopyrite and iron pyrite. It is a desirable ore for the smelter, being more than self-fluxing, containing about 20% of lime in addition to the iron. Recent developments in the Elisa mine have been satisfactory and a large amount of first-class ore has been opened up on the deeper levels. The ore from this mine is now delivered through the Combination tunnel to bins at the Capote mine.

The **Henrietta** is a small mine whose ore occurs on a contact between diorite porphyry and quartz porphyry. The orebodies are not large and the ore is silicious. New development work in the vicinity of Henrietta has not yet shown workable orebodies.

The **Puertecitos** mine and the town of that name are located at the N. W. end of the mineral belt and at the terminus of the narrow-gauge railroad of the company. The Puertecitos ore deposit has a great outcrop of limestone altered by igneous contact metamorphic action to lime-iron-garnet rock and containing carbonates of copper and some chalcopyrite and bornite. Large areas of this outcrop contain enough copper to warrant mining, which is carried on by means of large quarries. The ore as mined is not sufficiently rich to be sent direct to the smelter, but has to be broken and hand-sorted, yielding about 4 tons of waste material to each ton of ore.

During 1917 an important development was made near the Campaña shaft, in a hitherto unproductive zone of large extent. Orebins were completed, and in 1918 a 3,000 cu. ft. compressor was installed.

The **Elenita** mine, one of the earliest producers of the camp, located southwest of Puertecitos, has been reopened with a view to again putting it in the producing class. The ore from the mine is similar to that of Puertecitos.

The **Cananea Duluth** mine has an orebody about 1,200′ long with a maximum width of 200′. This orebody is a neck of diorite intruded in bedded tuffs. The intrusion is shattered, altered and for 200′ to 300′ below the surface is impregnated throughout with pyrite and copper minerals. On the 600′, the lowest level, the central portion is not commercial; the values being concentrated around the border of this long canoe-shaped orebody. The ore carries good silver and gold values, with about 2% copper. Practically all of the product of this mine is concentrated before smelting. The shaft is being sunk below 600′.

The **American** mine, idle since 1907, produced only such ore as was obtained through development work. Not fully developed, though there are sufficient indications of ore occurrences to warrant a resumption of development operations. Mine has a 3-compartment shaft to the 100′ level and ore bins of 900 tons capacity.

Development: total development work since the organization of the company, December, 1906, to 1918, is 100 miles, which does not include 53 miles done under previous management. Development work done in 1918 amounted to 13⅓ miles, compared with 5 miles in 1917, 11 in 1916 and 1½ in 1915. Development of new ore has kept pace with that extracted.

Equipment: power is delivered from a central power plant at the smelter, and electrical power is used exclusively except for the steam pumping plant at Ojo de Agua. The power house, also containing the boiler plant, has three 1,500 k. w. and one 3,000 k. w. horizontal Curtis turbines, delivering current to the switchboard at 2,300 volts. Electrical energy is transmitted to various parts of the property at from 2,300 to 11,000 volts. The furnace blast is supplied by 7 Curtis engines and 1 piston blower, having a combined capacity of 176,000 cu. ft. of free air per minute. The blast

is conveyed to the furnace through a pipe 6′ in diameter. Converter blast is supplied by 5 blowing engines having a total piston displacement of 55,000 cu. ft. of free air per minute, and is conveyed to the converters through two 30″ pipes. In the power house there is also one 6,000-cu. ft. capacity compound condensing air compressor, furnishing air to the mines for drilling and other purposes; also one 1,200-cu. ft. compressor, used to furnish air for ramming converter lining and for sundry pneumatic tools around the works. Condenser water is cooled in a spray-pond.

There are 16 boilers, with a total capacity of 6,034 b. h. p. Crude oil, imported free from the United States, under a Federal concession, is used as fuel. The waste-heat boiler plant nearby consists of 7 Stirling water-tube boilers having a combined nominal capacity of 2,700 b. h. p., heated by the waste gases of 2 reverberatory furnaces. In connection with this waste-heat plant there is a battery of 4 Green economizers, consisting of 288 tubes each. All boilers are equipped with Foster superheaters. The feed water is carefully measured after a simple treatment for the removal of scale-forming material, and is fed to the boilers by means of electrically-operated plunger pumps. The power house is equipped with 2 counter-current barometric condensers, each having a separate water pump and separate dry air-pump. All engines are operated condensing excepting those whose exhaust is used in heaters.

At the Sierra de Cobre mine, in the Capote basin, there is an Ingersoll-Rand air-compressor having a capacity of 2,500 cu. ft. of free air per minute, which is directly connected to a 2,300-volt A. C. motor. This machine is used to boost the pressure in the mains in the outlying districts. There is also a 3,000-cu. ft. machine erected in 1918. Fuel oil is stored in 3 main tanks with a capacity of 10,000 bbl. each.

The main shops near the smelter include a 200-ton hydraulic press, milling machine, 1,500-lb. steam hammer, foundry, pattern and electric shops.

Water supply: the principal supply of the company comes from Ojo de Agua, 9 miles from the town, where a pumping plant, with water-tube boilers, using crude oil as fuel, runs a Reidler high-duty compound condensing engine delivering 1,500,000 gal. of water per day against a pressure of 967′. A 10″ main connects the pumping plant with a 600,000 gal. tank on a hill near the concentrators. The Ojo de Agua supply is used exclusively for domestic purposes and for feed water for the boilers and is delivered under substantial working pressure. A very well equipped fire department, with a complete system of mains to pressure tanks, is maintained. Water from the mines is delivered to the concentrator through wooden pipes and is there used in milling operations.

Reduction works: the concentrating department has a capacity of 2,800 tons per day, including a crushing plant, sampling mill, gravity and flotation plant.

The crushing plant has storage bins holding 2,000 tons, ore from the mines being delivered in Ingoldsby side-dump cars of 30 tons capacity each. From the storage bins ore is fed to a 30″ conveying belt by automatic feeder. This belt delivers the ore to 2 grizzlies, inclined at 48° with 1″ openings. The screened ore falls on an 18″ conveyor, transferring it to a 24″ conveyor, taking it to the mill bins of 4,800 tons capacity.

The oversize from the grizzly goes to two 36″ picking belts, where first-class ore and also pieces of wood and steel are sorted out. The ore left on belt is then delivered to crushing bins and fed by automatic plunger feed to five 10x20″ Blake crushers of the Cananea type, which reduce the ore to 1½″ size. This crushed ore passes to 16x36″ rolls, breaking to pieces which pass a 2-inch ring. This product is delivered to a 24″ conveyor, which delivers to the mill bins, together with the grizzly undersize. The crushing plant is electrically driven and has a capacity of 2,000 tons per 10 hours. An automatic sampler at the head of the 24″ conveyor cuts one-

fortieth of the total ore, which is ground and automatically cut to sample. All rejects drops to elevator and return by conveyor to mill bins.

Ore from the 4,800-ton storage bins is fed by automatic feeders into each section. Concentration begins on all material finer than 2" ring. The course of the ore is as follows:

The ore is delivered to two ⅝" trommels, the undersize passing to two ⅜" trommels. The undersize of the latter goes to two 3/16" trommels and the undersize from these to four 2 mm. trommels. The various coarse sizes from screenings are passed to Hartz jigs, and all tailings from jigs coarser than ⅜" ring are passed through rolls, elevated and returned to screen, so that no material coarser than ⅜" goes to the Hardinge mills. The coarser material is concentrated on 20 concrete Hartz jigs in each section. The jig tailings finer than ⅜" pass to 3 Hardinge mills and are ground to about 2mm. The discharge from the Hardinge mills is deslimed in a drag-belt classifier, the coarser sands are classified, the resulting product being treated on 30 tables. The fine sands and slimes are treated on 36 vanners. Tailings from tables and vanners are settled out and sent to the slime plant for further treatment. The mills are 8′ by 28", and are driven by 150-h. p. Allis-Chalmers motors.

The tailings, containing a gross value of nearly $2 per ton in copper, silver, and gold, are impounded in a dam, the slime settling. The clear water is pumped back for re-use in the mills but is first passed through precipitating tanks, where the dissolved copper is precipitated and recovered. Concentrates are delivered in narrow-gauge cars to the spreading beds.

All ores, concentrates, fluxes and secondaries for blast-furnace treatment are weighed and delivered to the main receiving bins by the company's narrow-gauge railroad. The bin system consists of 11 wooden and 8 steel bins, having a combined capacity of about 3,000 tons. From the receiving bins all material is discharged on a conveyor belt which passes through the sample mill on its way to the ore-bedding plant, described by Price in "Min. and Sci. Press" of November 8, 1919. In the sample mill the ore is crushed to about 4" through a 24x36" Farrel crusher. One-tenth of the ore stream is cut out and passes through a 10x20" crusher of the Cananea type; one-tenth of this is cut and passed through a Gates gyratory crusher, one-fifth is cut and passed through a set of 17x27" rolls, when the final sample is cut out, amounting to about one-four-thousandth of the original material. This final sample is quartered down, dried and prepared for the laboratory. The reject from the sample mill is elevated back to the main conveyor system. All material is sampled in this manner with the exception of concentrates, which are hand-sampled.

The ore after passing the sampling mill is conveyed to the spreading beds and distributed evenly over the entire length of the bed by an overhead belt which is automatically tripped. The bedding plant is of steel construction being 453′ long, and 198′ wide, and contains 3 ore beds of about 9,000 tons capacity each. The composition of each bed is known in advance and in this way an even mixture is assured to the furnaces. When a bed is completed it is reclaimed by a machine which advances into the face of the pile and discharges on to a conveyor which delivers the mixed charge into bins over the blast furnaces, each bin having a capacity of 75 tons. The reclaiming machine has a capacity of about 175 tons per hour. The charge is dropped by gravity from the 75-ton bins above the furnaces into measuring hoppers holding 2,000 lb. There are 5 such hoppers to each furnace, and these are discharged either directly into the furnace or on to the feed floor by means of arc-gates.

Smelter: the blast-furnace contains 8 blast-furnaces, 48x210" at the tuyeres. There are 4 settlers, 10′ 5"x19′ inside of brick lining, each settler serving 2 furnaces. The slag overflows continuously into self-dumping slag cars of 45-cu. ft. capacity. Trains of 6 to 8 cars are hauled to the dump

by electric locomotives. The matte is tapped from the settlers into 66-cu. ft. cast-steel ladles and transferred to the converters by electric cranes.

Gases from the furnaces are discharged into a steel balloon flue, thence through 2 cross-flues and 2 goose-necks into the main brick dust chamber. From here the gases pass through a flue to another chamber, thence to a brick-lined steel stack. All flue-dust is drawn from the dust chamber and balloon flue into small cars and trammed to the reverberatory furnaces. The coke bins at the west end of the furnace building have a capacity of about 3,000 tons.

The roaster building contains ten 18′ six-hearth McDougal and 2 Wedge calciners. There is a special bedding plant for the roasters, consisting of 4 bins of 500 tons capacity and 2 beds of 3,000 tons each. The mixed roaster charge is reclaimed and delivered by conveyor belts into 60-ton bins over and charging into the roasters. The roaster product is hauled by electric motor in 5-ton cars to the reverberatory furnaces.

The reverberatory plant consists of two 19′ 6″x100′ oil-fired furnaces. Waste gases fire two 250, three 300, and two 500-h. p. Stirling boilers placed parallel, and then pass through 4 units of Green economizers containing 1,152 tubes, thence through a brick flue 130′ long to a stack 12′ 6″ in diameter by 152′ in height. Slag is skimmed into 112-cu. ft. electrically-tilted slag cars and hauled to the dump by electric locomotive. Matte is tapped into 66-cu. ft. ladles and hauled to converter buildings in ladle cars, from which it is transferred to the converters by electric cranes.

The converter building contains 3 electric cranes of 40, 50, and 60 tons capacity, 6 electrically-operated stands of the Great Falls type of converter, with 7 basic-lined shells, 12′ in diameter, for same.

The copper from the Bessemer converters is poured into the ladles of 2 straight-line electrically-operated casting machines, each equipped with tilting ladles of 66 cu. ft. capacity. Each machine has a chain of 39 molds, casting bars weighing about 260 lb., dumping into bosh from which they are removed by drag conveyor to the buillion platform. The bar bullion is then stacked by an air-operated radial crane, picked up on trucks, weighed, and loadde into standard-gauge railroad cars. The converter slag is skimmed into ladles, transferred by crane to slag cars, hauled by electric motor to pits and reclaimed by a 10-ton steam shovel. It is then delivered in narrow-gauge cars to the receiving bins of the main spreading bed system.

The converter gases pass through balloon flues of steel construction and enter into a steel dust chamber, with a circular arch roof having a 13′ radius. The gases then pass to a steel stack 12′ in diameter by 125′ high.

The company owns and operates 36 miles of standard and narrow-gauge railway, including branches, spurs and sidings. The narrow-gauge line is double-tracked from the smelter to Capote basin, and laid with 50, 65, and 70-lb. steel rails. The equipment includes 3 standard-gauge and 9 narrow-gauge locomotives, all oil burners, and about 140 cars, most of which are 25 and 30-ton steel ore cars. The railway system has direct connection with the Nogales and Naco branches of the Southern Pacific lines of Mexico, and by this line with the El Paso & Southwestern railroad at Naco, Ariz. In 1918 the railway handled 1,838,256 tons of freight.

The Cananea Consolidated Copper Co. operates practically all of the public utilities in Cananea. Its Public Service Department operates the water system; an electric light system; a telephone system operating 200 drops and approximately 450 telephones; and sundry other minor public utilities. The company's Mercantile Department operates a lumber-yard, a large department store located near the smelter, and 9 branch stores scattered throughout the various camps. The rental properties of the company include 619 buildings, consisting of rooming houses for its employees, residences, bunkhouses, etc.

The following table summarizes operations:

Year	Ore Concentrated tons	Cost of Milling	Products Smelted, tons	Cost of Smelting
1918	289,098	$1.25	902,520	$3.38
1917	171,202		481,632	2.61

Production: output and earnings since beginning of operations:

Year	Tons Mined	Mng. Cost per Ton	% Cu.	Copper, Lb.	Silver, Oz.	Gold, Oz.	Cost per Lb. Cu, Cents	Earnings
1919	.....	.....	.....	41,300,000	1,709,000	.....	.....	.....
1918	1,169,998	$3.240	2.430	52,694,731	1,666,993	9,846	15.082	$3,434,620
1917	574,582	2.900	2.273	24,711,204	655,656	3,804	17.951	2,497,888
1916	1,143,508	2.612	2.258	48,663,381	1,464,808	8,710	11.395	6,908,513
1915	285,701	2.493	2.700	16,335,081	635,997	3,773	11.086	1,410,543
1914	413,766	3.146	2.201	21,858,920	907,310	6,055	10.724	638,955
1913	765,063	2.854	2.363	44,480,513	1,497,938	8,021	9.631	2,344,592
1912	1,121,346	2.902	2.146	48,157,847	1,559,996	7,232	10.310	2,580,749
1911	945,160	2.355	2.414	44,897,466	1,339,839	5,892	9.483	1,318,473
1910	.....	.....	.....	45,771,925	1,187,820	5,483	11.437	459,202
1909	.....	.....	.....	44,547,689	933,549	5,887	11.612	544,107
1908	.....	.....	.....	18,619,609	447,663	2,879	.....	214,141
(b)	.....	.....	.....	58,180,856	766,422	6,100	.....	3,220,247
(a)	.....	.....	.....	247,144,706	2,006,679	13,795	.....	9,870,762

(a) To July 31, 1906. (b) August 1, 1906, to December 31, 1907.

First quarter of 1920 yielded 10,000,000 lb. copper and 400,000 oz. silver.

The Cananea Consolidated Copper Co., S. A.

Mines and works: Cananea, Sonora, Mexico. C. E. Mills, pres.; T. Evans, v. p. and gen. supt.; Geo. Young, sec.-treas.; Casey Stites and W. S. Harper, asst. sec'ys; T. Evans, traffic mgr. and purch. agt.; G. W. Prince, smelter supt.; F. J. Strachan, mill supt.

Inc. Sept. 30, 1899, in Mexico. **Cap.**, 20,000 pesos, shares $1 gold par. Entire stock owned by Greene Cananea Copper Co., the C. C. C. Co. being merely the operating company, holding direct title and right to operate the property, as is necessary under the laws of Mexico.

GUERRERO MINING CO. SONORA

Is the Mexican incorporation of the Victor Mining & Smelting Co., which owns 2 properties in Magdalena district, Sonora, Mexico, 10 miles S. W. of Cananea. Properties about one-half mile apart, contain 15 and 32 pertenencias, respectively.

HARRIS COPPER CO. SONORA

Sold its property, El Caridad group, to the Moctezuma Copper Co., of Phelps-Dodge Corp'n, February, 1916. Company has no assets.

HARTFORD MINING & MILLING CO. SONORA

Address: H. B. Brandenburg, Nogales, Arizona; or Mark Wondless, Hermosillo, Sonora.

Property: a silver mine, 34 miles N. W. of Hermosillo.

Development: by over 3,000' of workings, opening milling and shipping ore.

Equipment: 20-ton plant using Hardinge mill and a cyanide installation.

HERMOSILLO COPPER CO. SONORA

Office: 914 Columbus Savings & Trust Bldg., Columbus, Ohio. **Operating office:** Aptdo. 98, Hermosillo, Sonora, Mexico.

Officers: J. L. Zimmerman, pres.; C. P. West, v. p.; F. E. Resler, sec.; H. W. Whitaker, treas., with A. J. Rushing, R. D. Wood, L. A. Clark, A. W. Pence, and E. C. Plyley, directors. R. D. Wood, gen. mgr., and James Penman, supt.

Inc. Feb. 13, 1909, in Mexico. **Cap.**, $1,500,000; shares $1 par; non-assessable; issued $1,047,267. Authorized bond issue, $200,000 of 7% convertible gold bonds, amount outstanding $85,860.

Property: about 1,300 acres, with 200 acres of mill and smelter sites, in the Hermosillo district, about 28 miles N. W. of Hermosillo, consists of 9 claims, reported to carry porphyry and lime cut by granite. The Picacho

and Verde Grande have contact deposits in limestone, near igneous intrusives, carrying oxidized ore giving assays of 6% copper, 8 oz. silver and $1 gold per ton. La Cobriza group and La Verde have contact deposits between granite and quartzite, of 30′ to 60′ claimed width, traceable 7,000′, carrying auriferous and argentiferous copper ore said to assay 5.5 to 20% copper, with gangue of talcose limestone. Company reports 7 orebodies under development of 10 to 100′ width, averaging 5.44% copper, 8.66 oz. silver, and 75c gold per ton.

Development: by 20 shafts and tunnels with over 7,000′ of workings, reported to show over 200,000 tons of ore. Some shipments made carrying 20% copper, 30 oz. silver, and $1.25 gold per ton.

Equipment. includes a 100-ton Allis-Chalmers blast-furnace and several hundred horse-power of boilers, 40-h. p. hoist, 6-drill air-compressor, a large churn-drill, 22-h. p. traction engine, boilers, etc. Smelter is 1½ miles from principal workings, consisting of large buildings, assay office, large machine and blacksmith shop, 3 large boilers in engine room, coal and ore-bins and reservoirs holding thousands of barrels of water, and with an inexhaustible supply of good water.

Company recently installed an oil engine and rock-drills for sinking shafts and crosscutting sulphide orebody.

Management expects to continue development but will not mine ore until the smelter and oil flotation plants are in operation, and the company is in shape to handle its own concentrates.

Company recently acquired a ranch of 25,000 acres lying between the mines and Hermosillo for the timber and agricultural land, and the new road through this tract will shorten the haul to Hermosillo several miles.

INTERNATIONAL COPPER ORE CORPORATION **SONORA**

Office: 424 Scarrit Bldg., Kansas City, Mo. A. M. Conard, Nogales, Ariz., was president at last accounts. **Mine office:** Noria, Sonora, Mexico. Is the Mexican operating corporation of the Sonora Copper Smelting Co.

INTERNATIONAL MINES DEVELOPMENT CO. **SONORA**

Main office: 523 Los Angeles Investment Bldg., Los Angeles, Calif. **Eastern office:** Room 1606, 20 Broad St., New York.

Officers: Max Muller, pres.; P. Schabarium, v. p.; N. S. Haughwout, sec.-treas.; above with Augustin Freese, H. J. Wendler, S. A. Josephi and C. F. O'Brien, directors. A. C. Barke, mgr.

Cap., $3,000,000; shares $1 par: $2,400,000 issued. Stock listed on New York Curb.

Property: the Santa Rita, Santa Gertrudis, Santa Ana and El Carmen mines, 160 acres in Sonora, Mexico, about 200 miles from Bisbee, Ariz. Company also reported to have a 5-year option on the Ash Peak mine near Clifton, Arizona. The Mexican properties have been silver-gold producers in the past, but are undeveloped and owing to revolutionary conditions will probably remain undeveloped for some time to come. Their position is aggravated by being in the Yaqui zone. The Santa Rita is an "antiqua," or old Spanish mine. It was worked by a 1,500′ open-cut and numerous narrow drifts, etc. The veins contain a number of pockets of rich ore. Seventeen adobe furnaces were kept in blast in the early times. The future of all the Mexican mines of this company, which are close together, lies in the treatment of large bodies of milling ore amenable to cyanidation.

JUANITA MINING CO., S. A. **SONORA**

Office: Sellwood Bldg., Duluth, Minn. **Operating address:** Bisbee, Ariz.

Officers: Byron M. Pattison, v. p. and mgr.; Lemuel E. Shattuck, sec.-treas.

Property: about 1,000 hectares, known as the Juanita group, adjoining the Carnegie L. & Z. Co. property, 3 miles N. W. of Cananea, is traversed by several narrow fissure veins in volcanic tuff beds. These veins carry small oreshoots with chalcopyrite, galena and sphalerite. No. 1 shaft is 220′ deep and there also is a 75′ shaft. Work suspended since 1912 owing to political disturbances in Mexico. Is an undeveloped prospect.

LA COBRIZA DE COBRE **SONORA**

Address. Rafael Elias, Cananea, Sonora, Mexico.

Property: 14 claims, adjoining Carnegie L. & Z. property on S. E., shows several veins in bedded volcanic tuffs with complex, silicious lead-copper-silver ore. Developed by 200′ shaft with short drifts in ore.

LA COBRIZA MINING CO. **SONORA**

Described in Volume XIII. Property acquired by Aztec Consolidated Mining Co., which see.

LA EXPOSICION MINING CO. **SONORA**

No information about this company has been obtained since 1917. See Vol. XIII.

LAMPAZOS SILVER MINES CO. **SONORA**

The only data obtainable about this corporation is from George Graham Rice's "Industrial and Mining Age."

Office: formerly at 40 Exchange Place, New York; or the Registrar & Transfer Co., 900 Market St., Wilmington, Del.

Officers: at last accounts, W. Barrett Ridgely, pres.; Newhouse Hotel, Salt Lake City, Utah. H. J. Wendler, v. p.-gen. mgr.; I. H. Weinberg, sec.; with C. S. Herzig and J. J. Harper, directors. Judge H. D. Rummel, Charleston, W. Va., attorney.

Inc. Jan. 15, 1918, in Delaware. **Cap.**, $3,000,0000; $1 par; 2,000,000 issued.

Property: the Lampazos mine, now owned by Max Muller and Epes Randolph, 443 acres, containing 17 mines, 4 of which have been developed. The mine is reported to have 200,000 tons of 30-oz. silver ore, blocked out with continuous bands of ore for 1,500 to 2,000′, that extend down to bottom of mine, 750′ below surface. A 12-mile wagon-road was constructed.

The Lampazos is a good mine whose name has been clouded by scandalous promotion methods.

LANITA MINING CO. **SONORA**

Holding company for the Elenita Development Co., which see.

LA MINA MEXICO **SONORA**

Address: Potter Palmer, 144 S. Wabash Ave., Chicago, Ill. E. P. Ryan, mgr.; C. D. Cline, cons. engr.

Property: closed for 4 years owing to the revolution, but reopened early in 1920. The workings and machinery are said to be in good condition. A 50-ton flotation plant is to be added. The smelter will not be used for the present.

LA REINA UNION MINING & REDUCTION CO. **SONORA**

Property: near San Javier, Hermosillo, Sonora, Mexico, includes the Mimbres mine, said to show a fissure vein carrying lenses of complex lead-copper-sulphide ore with gold and silver.

Development: by shaft, cut a vein that assayed from 15 to 30 grams gold and 400 grams silver per ton.

Equipment: includes steam and electric power, and an air compressor. Idle for several years, owing to revolution in Mexico.

LAUGHLIN MINING CO. **SONORA**

Address: W. C. Laughlin, or George Schrotter, San Javier, Sonora, Mexico.

Property: Las Animas silver mine at San Javier, leased from the Wyman Mining Co., of Cleveland, Ohio. A leaching plant to handle 50 to 100 tons of ore a day was put in operation early in 1918.

LA UNION CONSOLIDATED COPPER CO. **SONORA**

Address: C. B. Bell, Douglas, Ariz., owner.

Property: 660 acres, in Cerro Tordillo section of the Ajo mountains, W. of Fronteras, Sonora, Mexico, shows a 3′ to 20′ vein traceable a mile, that carries high-grade copper, gold, silver, zinc ore in a contact deposit in lime near an intrusion of porphyry.

Development: by 5,000′ of tunnels and shafts to depth of 500′. Shipments of 1,500 tons made 1914, returned 15% copper, 15 oz. silver and 0.1

oz. gold. The property was worked in 1882-'86, acquired by present owner in 1906, and considerable work done in 1912-'13-'14. C. B. Bell plans resuming operations when peace is restored in Mexico.

LOUISE MINING CO. SONORA

Address: H. J. Wendler, mgr.; Buena Vista, Montezuma district, Sonora; and Charleston, W. Va.

Property: a silver mine on which a 50-ton flotation mill was erected in 1919 and a large quantity of silver ore developed to depth of 300'. Company plans construction of a reverberatory matting furnace in 1920.

LUCKY TIGER COMBINATION GOLD MINING CO. SONORA

Office: 1012 Baltimore Ave., Kansas City, Mo. **Mine office:** Esqueda, Sonora, Mexico.

Officers: J. Z. Miller, Jr., pres.; W. A. Moses, E. D. Fisher, and A. E. Mosier, v. p's.; O. V. Dodge, sec.; H. Vanderslice, treas., with F. D. Whiting, asst. treas.; G. M. Smith, W. G. Catron, John Kelley, J. T. McCormick, L. R. Budrow, gen. mgr., and H. B. Duke, directors; D. J. Haff, gen. counsel; O. E. McMullen, asst. sec. and auditor

Inc. March 16, 1903, in Arizona. **Cap.**, 800,000 shares; $10 par; 715,337 shares issued Annual meeting, third Monday in March. Company owns the entire capital stock of Tigre Mining Co., S. A.

Financial Statement, years ending December 31:

Year	Revenue	Operating Charges	Operating Profit	Dividends	Current Assets	Current Liabilities
1918.	$2,636,810	$1,351,539	$1,251,583	$786,871	$768,363	$205,746
1917.	.....	.....	.....	422,049	.....	.....
1916.	1,624,817	979,697	645,120	515,042	423,268	161,694

Dividends, paid since organization of the company:

Year	per Share	Number	Amount
1918	$1.10	93-104	$786,871
1917	.59	86- 92	422,049
1916	.72	77- 85	515,042
1915	.69	69- 76	493,582
1914	1.00	58- 68	715,337
1913	.63	46- 57	450,662
1912	.47	40- 45	336,208
1911	.50	30- 39	357,601
1910	.60	18- 29	429,000
1909	.10	6- 17	409,500
1908		1- 5	71,500
Total			$4,987,354

Property: the El Tigre mine, 6 claims, 587 acres, at El Tigre, Montezuma district, Sonora, Mexico, contains veins of gold-silver-lead-copper ore cutting through rhyolite. Vein is 25' wide, proved for 4,000' in length, and runs N.-S. with average dip of 65°.

Development: by 1,300' incline shaft and 5,000' tunnel, with over 15 miles of workings. Ore is mined mostly by overhand shrinkage, and electric haulage is employed underground. Company also has zinc leases in Oklahoma, and to the end of 1918 had spent $180.558 on their development.

Equipment: includes electric power, 25-h. p. electric hoist, 250-ton concentrating mill and cyanide plant. Reported extraction in 1916 was 93.6%, concentrates averaging 2.17 oz. gold, 683 oz. silver, 2.93% copper, 11.4% lead. Experiments with flotation being satisfactory, a plant was erected, resulting in a decreased cyanide consumption and lower costs.

Production: 83,000 tons in 1912; 90,000 tons in 1913; 88,000 tons in 1914. In 1918, concentrate was valued at $2,638,937. Ore averaged 31 oz. silver, 0.01 oz. gold at last accounts. In September, 1919, the mill treated 6,367 tons of ore, yielding 12 cars of concentrates.

Company has been able to continue operations and shipments more or less regularly, notwithstanding disturbed conditions in Mexico during the past years, but it issues no production figures, merely a balance sheet.

MANHATTAN DEVELOPMENT CO. SONORA

Owns Arnold Mining Co. property near Santa Cruz, Sonora, Mexico.

MANHATTAN EXPLORATION CO. SONORA

Office: 52 Broadway, New York. **Mine:** at Hermosillo, Sonora, Mex.

Officers: John M. Bishop, pres., Washington, D. C.; A. H. McCarthy, v. p.; T. Addison Bell, sec.-treas.; with Gen. Jas. S. Clarkston and Wm. Tierney, directors.

Inc. Feb. 6, 1909, in Maine. **Cap.**, $2,000,000; shares $100 par; $1,806,000 outstanding. Company is a close corporation.

Property: several valuable properties near La Dura in the Yaqui River district, Central Sonora. Two of the properties, the Promontorios, silver-lead and the Mesita, copper-silver-lead ore, had just reached the shipping stage when the Mexican revolution stopped all operations, May, 1912. Company expects to resume operations as soon as country is once more safe.

MANTO MINE SONORA

Address: D. L. Fain, mgr., Carbo, Mexico. J. C. Underwood, pres. Late in 1918 it was reported that this property had been reopened.

MARIA MINING CO. SONORA

Office: 516 Providence Bldg., Duluth, Minn.

Officers: Joseph Backus, pres., Virginia, Minn.; Jas. A. Butchart, sec.-treas.; with Thos. F. Brady, Martin Trewhella and Thos. A. Armstrong, directors.

Cap., $500,000; shares $1 par.

Property: the Carmen mine, in Arizpe mining district, Sonora.

Ore: silver, gold, in veins in andesite and rhyolite.

Development: by shaft; greatest depth 350', with 3,000' of underground workings. Had been idle 4 years, owing to the revolution, but resumed work in February, 1917. Rich silver ore was extracted but on account of bandits work was again suspended.

MELCZER MINING CO. SONORA

See Copete Consolidated Copper Co.

MESA RICA GOLD CO. SONORA

Address: A. G. Frick, sec., Freeport, Ill.

Inc. 1905, in South Dakota. **Cap.**, $3,000,000; $3 par; 700,000 issued to J. J. Smith, A. F. Tanner, and others of Chicago, the organizers.

Property: 415 acres, 40 miles E. from Sahuaripa, Sonora. About 3,000' of development has been done, mainly on the surface. No work is being done, but taxes are paid and a caretaker is in charge.

MEXICANA DESSARALLADORA DE MINAS (MEXICAN DEV. & MNG. CO.) SONORA

Address: C. N. Knutsen, mgr., Cumpas, Sonora, Mexico.

In May, 1919, it was reported that this company, headed by L. G. Cloud, had leased the San Nicholas silver mines from the Transvaal Co. The property is 15 miles west of Cumpas, in the Moctezuma district, and has been examined by W. H. Weed for the Transvaal Co.

Equipment: includes a 50-ton flotation plant yielding 2 tons of concentrate daily assaying 800 oz. silver, 80% lead, and 6% copper. Concentrate is sent to El Paso. Fifty men are employed.

MEXICAN EXPLORATION & MINING CO. SONORA

Controlled by Pacific Smelting & Mining Co.

MEXICAN METALS CO. SONORA

Office: 35 Congress St., Boston, Mass.

Officers: Geo. E. Keith, pres.; Geo. H. Woodman, v. p.; Sumner M. Teele, sec.; Harold C. Keith, treas.; with Eldon B. Keith, directors.

Inc. Aug., 1916, in Arizona. **Cap.**, $5,000,000; shares $5 par; assessable; 538,824 issued; $2.55 paid.

Company succeeded the Arizpe Mines Co. and holds title to property

through the Moctezuma-Arizpe Development Co., legalized in Mexico. Fully described in Vol. XI, Copper Handbook.

Old Colony Trust Co., registrar; Federal Trust Co., transfer agt. Annual meeting, second Monday in September. Listed on Boston Curb.

Mexican property near Cananea, Sonora, Mexico, closed down in autumn of 1914. After geological survey of property made by J. M. Little, checked by A. H. Rogers, Boston, and Franklin W. Smith, of Bisbee, it was decided to sell or abandon such property as directors considered unworthy and to purchase new properties.

Company took a 5-year lease in 1917 on the Ajax property at Cripple Creek, Colo. The ore assays $25 to $40 per ton, and is said to have yielded about $20,000 net monthly.

MEXICO MINING, REFINING & EXPLORATION CO. SONORA

Mail unclaimed, at former office. 501 I. W. Hellman Bldg., Los Angeles, California.

Officers: Wm. T. Calderwood, pres. and gen. mgr.; Dr. Chas. B. Nichols, v. p.; F. C. Lamb, sec.-treas.; preceding with E. B. Lovie, C. A. Neil, L. A. Davis and A. A. Snodgrass, directors. B. A. Ogden, supt.; A. Wainwright, engineer.

Inc. 1905, in Arizona. **Cap.**, $5,000,000; $1 par. Annual meeting, second Monday in April, at Nogales, Ariz.

Property: El Creston de Cobre mine, 35 miles west of Hermosillo, an antigua dating from the eighteenth century. The property carries orebodies, 2 of which are said to be 30′ wide, and traceable 1,400′, with ores averaging 4% copper, 8 oz. silver and $1 gold per ton.

Development: by 8 shafts, deepest 300′, and 4 tunnels with 1,000′ of workings estimated by the company to show 100,000 tons of ore.

Le Cobriza mine, at Soyopa, is said to show a 16′ vein with a 7′ paystreak, carrying copper-silver ore.

Equipment: includes 235-h. p. steam plant, 2 hoists, 6-drill air compressor, and 20-ton mill. Company was planning to erect a 100-ton smelter, but revolution interfered. No recent information secured.

MINA MEXICO MINING CO. SONORA

Out of business. Succeeded by the Minas de Mexico, S. A., Compania de, which see.

MINAS DE MEXICO, COMPANIA DE SONORA

Office: Mina Mexico, Sonora, Mexico.

Officers: H. L. Hollis, pres., 1025 Peoples Gas Bldg., Chicago, Ill.; E. P. Ryan, v. p.-gen. mgr., 1202 Mills Bldg., El Paso, Texas; J. M. Gondara, sec.; E. F. Bryant, treas.

Property: the copper mine formerly worked by the Mina Mexico Mining Co. at Mina Mexico, Sahuaripa district, Sonora, Mex.

Equipment: includes a power plant, small mill and smelting plant. Property has been in charge of caretaker for several years, will be operated when Yaqui River branch of the Southern Pacific has been rebuilt.

MINERA CONSOLIDA LOS AZTECAS, S. A., COMPANIA SONORA

Controlled by Aztec Consolidated Mining Co., which see.

Inc. in Mexico. **Cap.**, 10,000 pesos; 1 peso par; 9,997 held by Aztec Cons. M. Co. Company holds title to Mina Verde and La Polka mines.

MINES COMPANY OF AMERICA SONORA

Acquired by Dolores Esperanza Corporation, which see.

In a statement dated January 25, 1919, company said that on account of the revolution in Mexico, it had been unable to operate, was subjected to great expense, and had incurred debts the inability to pay which endangered company's title to its property.

In 1910 and 1911, a total of 581,014 tons of ore yielded $5,670,641, of which $1,933,053 was profit. Raids occurred at Dolores and El Rayo in 1912. The latter was closed for some months in 1913, but was re-opened in February, 1914, for a time. Efforts to work El Rayo and Creston in 1915 were suspended, but in 1916 the latter was operated at a loss of $239,866.

MINNEAPOLIS COPPER CO. **SONORA**

Mine address: Cumpas, via Nacozari, Sonora, Mexico.

Officers: J. W. Christy, pres.; James Thompson, sec.; F. A. Guice, gen. mgr.

Inc. June, 1906, in South Dakota. **Cap.** $1,000,000; shares, $10 par; also inc. in Mexico as Minneapolis Copper Co., S. A., the South Dakota corporation being a holding company. Is operated in the United States under the title of Minneapolis Copper Development Co., the reason for which has not been explained.

Property: 277 hectares, about 30 miles S. E. of Cumpas. Property carries several fissure veins, in andesite, with N. E. strike, of which 4, under development, are of 5′ to 8′ estimated average width, carrying tetrahedrite, estimated by company to average 10% copper, with traces of lead and zinc, 5 to 40 oz. silver, and $1 and upwards in gold, with occasional very high assays.

Development: the Archipelago mine, the principal property, has a 250′ incline shaft, and the mine as a whole has about 8,000′ of workings, mostly in ore.

Equipment: includes a 35-h. p. gasoline hoist and 5 buildings. There is also a 75-ton smelter, built in 1912. Transportation is by wagon-road to Cumpas, freight being carried in two 90-h. p. gaso-electric trucks.

Operated under lease, 1917, by Samuel E. Greenidge, of Douglas, Arizona. No later returns received.

MOCTEZUMA COPPER CO. **SONORA**

Fully described under title of Phelps Dodge Corporation, U. S.

MOUNTAIN CONSOLIDATED COPPER CO., S. A. **SONORA**

Owned by Canario Copper Co., which see.

Office: Room 23 First National Bank Bldg., Douglas, Ariz. **Mine address:** Nacozari, Sonora, Mexico.

Officers: same as Canario Copper Co. **Management:** same as El Canario Copper Co.

Property: Batamoti mine, containing 63 pertenencias, situated about 7 miles west of Purica station which is on Nacozari railroad, about 10 miles north of Nacozari, Sonora, Mexico.

Geology: the Batamoti vein is from 350 to 500′ wide and heavily mineralized on the surface for a length of 2,000′. The wall rocks consist of andesite and monzonite. The mineralization occurs in acid-porphyry and tufaceous rocks. The orebody is cut off on the west by a large quartz-porphyry dike, and on the east by an extensive granite-porphyry intrusion.

Development: old workings consist of 300′ shaft and several tunnels embracing about 6,000′ mining work, mostly in the andesite on the foot-wall side of the main orebody. New work consists of 350′ crosscut tunnel to cut the orezone the full width of 500′. Tunnel is said to be in ore, sampling from 1.5 to 9.9% copper. Upon completion of tunnel, a drift will be run from the bottom of the old shaft 1,100′ west to intercept the main orebody at a depth of about 1,000′.

A road has been surveyed from Purica to the mine, a distance of 8 miles. The maximum grade will be 8%. Work was started on road-building May, 1919.

NACOZARI CONSOLIDATED COPPER CO. **SONORA**

Controls the Tharsis-York Co., which see.

Office: First National Bank Bldg., or P. O. Box 1074, Douglas, Ariz. **Mine office:** Pilares de Nacozari, Sonora, Mexico.

Officers: John G. Alexander, pres.-gen. mgr.; T. D. East, v. p.; B. R. Russell, sec.; Roy Hiatt, treas.; with L. M. Williams and R. C. Heath, directors. Fred Alexander, mill supt.; George Motz, mine supt. and purch agt.

Inc. July, 1907, in Arizona. **Cap.,** $6,000,000; $5 par; increased Feb., 1919, from $3,000,000; 658,848 issued; 541,516 shares in treasury, February 15, 1919. Annual meeting, second Monday in July.

Balance sheet of February 14, 1919, showed cash on hand, $2,969. Oper-

ating expenses at the mine from November, 1917, to February, 1919, totaled $15,899. Mine expenses for year ending November 1, 1919, were $28,684.

Property: 17 claims, 502 acres, in 3 contiguous groups, adjoining the Pilares mine of the Moctezuma Copper Co. on the E. and S. The Galera tract shows andesite and brecciated rhyolite cut by several large quartz veins containing copper, lead and zinc sulphides, with gold-silver values. The Tharsis-York or Central group was acquired by the company in December, 1918, by purchase of a majority of the Tharsis-York stock. This land, with that of the Copper King group, to the east, contains a big outcrop or red "reef", 600′ wide, of brecciated silicious vein-matter, which is regarded by the Nacozari Cons. management as an extension of the Pilares deposit.

Development: by a main crosscut tunnel to cut the Pilares reef at a depth of 600′. This tunnel was advanced 1,440′ in 1919, and at 4,000′ from portal cut a diabase dike forming south wall of Pilares lode. On the main tunnel level 100′ of drifting was done; total work, 11,500′, including shafts, crosscuts and tunnels. The workings of the 400′ San Pablo shaft on the Galera group develop ore that is mined for shipment, the last carload being said to assay 0.89 oz. gold, 98.89 oz. silver, 21.6% lead and 1.04% copper, or a value of $113 per ton.

The San Pedro claims of the Moctezuma Copper Company, have been leased to this company and a drainage-tunnel is being driven to connect with the San Pablo shaft. By acquiring control of the Tharsis-York property, the company was able to resume work on the main tunnel, stopped since April, 1917. Total development work for year 1919 was 2,140′.

Ore reserves: reported to be 15,000 tons of $35 ore; 60,000 tons of $20 ore; and about 500,000 tons of $10 to $12 ore.

Equipment: includes compressor, air drills, and a 100-ton concentrator with flotation unit. Company plans erection of a 200-ton smelter.

NORTHERN SIERRA MADRE MINING CO. SONORA

Address: D. E. Alexander, Humboldt Savings Bank Bldg., San Francisco, Cal. Mine near Soyopa, Sonora, Mex.

Officers: Chas. K. Blender, pres.; Carlo Giovannetti, v. p.; John O'Donnell, sec.; Fred Townsend, treas.; preceding, with D. E. Alexander, Fred Trevarrow and E. C. Curtis, directors, at last report.

Inc. Aug. 2, 1901, in California. **Cap.**, $300,000; shares $1 par.

Property: La Reina de Cobre and Providencia copper mines and El Colosus silver-lead mine, 25 miles west of Suaqui de Batuc. La Reina shows diabase, shale and limestone, carrying orebodies of sulphide ores, with quartz gangue.

Development: by 633′ of workings. Management estimates 4,854 tons of ore in sight, with 3,214 tons blocked out for stoping. Idle some years.

NORTH TIGRE MINING CO. SONORA

Address: R. D. Brown, pres.; and F. J. Holmes, mgr., Douglas, Ariz.

Property: La Protectora, La Protectora No. 2, and the Esperanza groups, leased to North Tigre Leasing Co., of Bisbee and Douglas, for 2½ years. The mine is said to be located on the Lucky Tigre lode, which on this group is 4 to 20′ wide and carries ore said to assay over 100 oz. silver, 6 to 7% copper and 25% lead.

Development: is by tunnels, the lowest, No. 8 tunnel, having a vertical depth of 800′, with total of 5,000′ of underground workings. Ore in sight is said to total 30,000 tons, worth $1,250,000. A 5′ vein of ore carrying up to 2,000 ounces native silver per ton, was cut early in 1920.

Equipment: includes a 50-ton mill with flotation unit, completed in February, 1920. Power is purchased from the Copper Queen plant at Douglas over a branch line run from El Tigre mine.

PACIFIC SMELTING & MINING CO. SONORA

Office: 20 Broad St., New York. **Mine and smelter office:** Fundicion, Sonora, Mex.

Officers: Melbert B. Cary, pres.; Geo. M. Ryall, v. p.; Nelson S. Haugh-

wout, sec.-treas.; preceding, with Ronald E. Curtis, Howard McWilliams and Charles E. Wetmore, directors. Thornton C. Kirkland, asst. gen. mgr.

Inc. Oct. 6, 1909, in Maine. **Cap.**, $8,000,000; shares, $5 par, issued in $1,737,850 convertible cumulative 7% preferred stock and $6,262,150 common stock; all issued. United States Corporation Co., New York, registrar. Annual meeting, third Monday in January, at Augusta, Maine. Listed on New York Curb.

Holdings: company controls the Douglas Copper Co. and Mexican Exploration & Mining Co. by ownership of 98% of the capital of each company. These companies hold practically the whole of the capital of 5 subsidiary Mexican corporations, viz.: the Anita Mines Co., Yaqui Mining Co. and the following smelting companies: Compania Metalurgica y Refinadora del Pacifico, S. A., owning the Fundicion smelter; the Mexican American Smelting & Refining Co., S. A., owning the Guaymas smelter and the Sinaloa Smelting Co., holding the Mazatlan, or Sinaloa smelter concession.

Anita Copper Mines Co., S. A., owns the Anita mine with 330 acres, 25 miles north of the Fundicion smelter and station of that name on the Southern Pacific Railroad of Mexico. Mine has been developed to a depth of 900′ on the dip of the vein and ore reserves above the 7th level were estimated by Courtney de Kalb at 55,000 tons, that average $2.58 gold, $1.17 in silver and 3.99% copper.

Geology: the Anita (or El Cobre mine), has a shear zone 115′ wide with a diorite foot and rhyolite hanging wall. This zone traceable for several thousand feet, with N.-S. strike and dip of about 45° W., carries ore in 5 lenses, or chimneys, the principal one being opened from the surface down to the 8th level, branching at the 6th level. Faulting, cross-faulting and brecciation occur with displacements up to 200′. Ore is said to be a metasomatic replacement of diorite accompanied by a contact metamorphic deposit. It contains the usual oxide minerals succeeded in depth by chalcopyrite.

Development: comprises a 900′ inclined main shaft with 9 levels opened and about 7,415′ of workings. There are also 4 other shafts.

The surface equipment consists of 2 cross-compound 2-stage Rand compressors of 3,000-cu. ft. combined capacity; a Risdon second-motion duplex hoist, 14x21″; three 150-h. p. boilers; generator for light and power; rock-crushers, picking tables, shops, assay office, office buildings, warehouses, dwellings, supplies, etc.

The Pirita mine, 81 acres, 5 to 7 miles from Victoria station contains pyritic ore having small values in gold, silver and copper. The deposit will eventually become of value to the company for fluxing purposes.

Yaqui Mining Co., S. A., owns several slightly developed mining properties including the Rosamond and Aurora mines with about 1,600′ of development work, exposing commercial copper-silver ore.

Compania Metalurgica y Refinadora del Pacifico, S. A., owns the Fundicion smelter, built originally to treat the ores of the Anita mine and to do custom business. The plant has a capacity of 350 tons a day, but was designed and in part equipped for 3 times that amount. It has one 42x160″ blast furnace, sampling mill, power house, shops, administration buildings, and an electric plant for lighting and power purposes, all machinery excepting yard locomotives being motor driven. The plant is of modern design and in excellent condition. Plant idle for 5 years.

The L'Aime lime quarry, has 75 acres of limestone averaging 1.2% silica, with about $1 in gold.

Mexican-American Smelting & Refining Co., S. A., owns the Guaymas smelter with 250 acres, at Batuecas, a suburb of Guaymas, on tide water, lying between the Bay of Guaymas and the S. P. R. R. of Mexico. The plant was erected by William C. Greene, founder of the Greene-Cananea Copper Co.

The **Sinaloa Smelting & Refining Co., S. A.,** owns a concession from

the Government for a smelter at Mazatlan, or elsewhere in the State, for a period of 20 years from the 27th day of April, 1906, and is particularly exclusive in its terms.

The Anita mine has been operated on a modest scale for the past five years, meeting upkeep expenses by ore shipments.

PEDRAZZINI GOLD & SILVER MNG. CO., MINAS **SONORA**

Address: Postal Telegraph Bldg,, San Francisco, Calif.

Officers: F. Montizo, v. p.-treas.; F. A. Denicke, sec. Ant. Pedrazzini, supt.

Inc. in Arizona. **Cap.**, $1,250,000; $1 par

Property: the Chispas mine with about 650 acres at Las Chispas, Arizpe district, Sonora, Mex., about 15 miles from Arizpe and 60 miles from Nacozari. This mine famous for its high grade silver ore, has been worked since 1890, though only since 1908 by this company. The claims show rhyolite cut by a series of 14 parallel fissure veins including the Chispas and the Wm. Tell veins. The vein-filling is rhyolite-breccia and quartz. In the upper workings of the Chispas mine the silver occurs as cerargyrite but below water level it forms argentite, polybasite, stephanite and ruby silver. The ore as milled averages 60 oz. silver and 2.5 gold, while the rich ore that is sacked for export averages 500 oz. silver and 40 oz. gold per ton.

Development: by 4,000′ tunnel, 700 to 900′ below outcrop, and about 15,000′ of workings, including a shaft 875′ deep.

Equipment: includes a 4-mile aerial tram, 30-ton mill with cyanide plant, compressor, ice plant, and 150 h. p. Hamilton Corliss engine. Water is pumped from the river through 13,000′ of line. Mill extraction is said to be about 90%.

Production: amounts to many millions of dollars, but details are not obtainable owing to private ownership of property. Gross returns were given as $200,000 for 1917, when operations were intermittent owing to bandits, etc.

PHELPS DODGE CORPORATION **SONORA**

Owns Moctezuma Copper Co., or Nacozari branch of the P. D. Corp'n. See same title in United States Section of this book.

PICACHO MINING CO. (CIA. MINERA DE PICACHO) **SONORA**

Capital stock owned by Almagre Mining Co., 99 John St., New York City.

Property: 35 miles S. E. of Cananea, has a deposit of auriferous ore that has been under development since about 1900 and has been shipping ore to the Copper Queen smelter at Douglas.

PIEDRAS VERDES y ANEXAS; COMPANIA MINERA **SONORA**

Alamos, Sonora, Mex. Angel Almado, pres., at last accounts.

Property: the Piedras Verdes, Union and Sonora mines, covering a mineralized zone about a mile wide, and 4 miles long. Claims show red schists and veins 10 to 40′ wide carrying oxidized ore, with occasional native copper.

Development: by a 350′ shaft and a 375′ tunnel.

Equipment: includes steam power, and a small matting furnace.

PLATA-FINA MINING & DEVELOPMENT CO. **SONORA**

Office: Baldwin, Kan. **Mine office:** Alamos, Sonora, Mexico.

Officers: E. G. Swayze, pres.; Dr. L. R. King, v. p.; C. N. Emery, sec.; E. A. May, treas.; T. P. Brinegar, mgr.; with J. M. Nolan, A. P. Elder, and J. W. Churchill, directors.

Inc. March, 1911, in Arizona. **Cap.**, $500,000; $2 par; 150,000 shares issued.

For the year ended September 1, 1918, company expended $7,000 on the property, leaving a cash balance of about $23,000. No debts.

Property: includes the *Plata-Fina* group, 9¼ hectares, *Cacharamba* group, 8 hectares; *Otilla group*, 10 hectares, about 100 acres in all, 3½ miles from a railway and 8 miles west of city of Alamos. Ground shows copper-bearing veins in a zone 40′ wide between granite and porphyry.

Development: by 8,000′ of underground work, with 8 shafts, deepest 115′,

blocking out 10,000 tons of silver-copper ore said to assay over $25 per ton. In 1919, development work only was done. Company plans to sink 2 shafts to the 200′ level during 1920.

Equipment: includes 2 hoists and a pump. Compressor and mill are to be installed when conditions permit.

QUINTERA MINING CO., LTD. **SONORA**

London secretary and office: J. G. Mills, 8 Crosby Square, London, E. C., England. **Paris office:** 1 Rue des Mathurins, Paris, IXe, France. **Mine:** at Aduana, Alamos, Sonora, Mex. Jacques F. Kulp, chairman; A. Dubois, S. Einhorn and Ernest May, directors.

Inc. May 4, 1888, in Great Britain. **Cap.,** £52,000, increased Nov. 18, 1901, from £40,000; shares £1 par, fully paid; all issued.

Annual meeting in June. Shares listed on the Paris coulisse. Operations suspended since 1911, owing to Mexican revolutions.

Dividends: 25% in 1900; 22.5% in 1901; 17.5% in 1902; 17.5% in 1903; 7.5% in 1905; 11.25% in 1906, and 5%, or 2s. 3d. in 1907; none since.

Property: the Quintera mine, 26 claims, 134 hectares, in the Alamos district, Sonora, and in the Fuerte district, State of Sinaloa, Mex., with ranches of about 7,400 acres.

Some 40 to 50 years ago a Frenchman owned this and the Rosario, a lead-silver property on Rosario mountain, where the States of Sonora, Sinaloa and Chihuahua touch. He had worked the Rosario extensively, the ore being a lead carbonate containing much silver, and finally went to Paris, mortgaged both properties to the Egyptian-Paris Bank for $250,000 and skipped out to South America. He has never been heard from since. After the bank acquired the properties, it sent engineers out to examine and report and about 30 years ago, after several engineers had reported favorably upon the mine, work was commenced.

The vein, which is 18 to 20′ wide, lies between granite and andesite. It showed low silver values and 2 to 3% lead at surface, but the value improved in depth and mine paid $50,000 to $100,000 yearly in dividends.

The ore is 20 to 30′ wide in the deeper levels and assayed 40 to 50 oz. in silver, lead being replaced by 8 to 9% copper ore as depth increased. A shaft 500′ deep was sunk at the north end of the property, from which a drift was driven 1,300′ south and a winze sunk to a depth of 1,000′ below the surface. Property considered valuable, but in consequence of the unsettled state of affairs in Mexico, mine is shut down indefinitely.

RICHFIELD COPPER CO. **SONORA**

Office: 812 Mears Bldg., Scranton, Pa.

Officers: Dr. J. K. Bentley, pres.; Dalbys L. Fickes, sec.; Otto Robinson, treas.; preceding, with Harry Witter, R. H. Gay, Geo. Stark, John Hershberger, Philip Robinson, J. A. Schadt, R. E. Mikesell, W. O. Smith, J. H. Wood and Jacob Huffer, directors.

Inc. 1902, in Arizona, as successor of Richfield Mining Co. **Cap.,** $5,000,000; shares $1 par; issued, 4,000,000. Bonds, $250,000, authorized, at 6%; issued, $230,000. Scranton Trust Co., registrar. Annual meeting, 2nd Saturday in October.

Property: 1,300 acres of mineral property, with timber and ranch lands, totaling 26,512 acres in the Ures district. The Dos Naciones group, 12 miles east of Tuape and 35 miles from a railway, is said to have 7 contact deposits between granite and limestone, of 10′ to 60′ estimated average width.

Development: includes about 10,000′ of underground work, showing oxidized ores and chalcopyrite, reported by present management to assay 4 to 15% copper, 7 to 40 oz. silver and $2 to $5 gold per ton.

Equipment: includes two 25-h. p. hoists and a 5-drill air compressor, several mine buildings and an 80-ton water-jacket smelter.

Idle owing to revolutionary disturbances in Mexico.

ROY MINE **SONORA**

Address: W. R. Moycumber, supt., Pilares de Teras, Sonora, Mexico. Has 50-ton flotation plant.

SALTILLO, S. A.; COMPANIA MINERA DEL. **SONORA**

Office: Primera de Galeana No. 2, Saltillo, Coahuila. Mine near Mazapil, Zacatecas, Mexico. Lic. Miguel Cárdenas, pres.

Inc. June 15, 1899, in Mexico. **Cap.**, 100,000 pesos; shares 100 pesos par; fully paid.

Dividends: were 10,000 pesos in 1907; 15,000 pesos in 1908. Annual meeting, January 31, each year.

Property: the Jesus Nazareno mine, in the Nazareno mining district of Mazapil, 10 miles from a railway. The mine produces 1,000 metric tons of silver-lead ore monthly, when conditions are normal.

Equipment: includes 5- mile private tram line, and 135h. p. gas and electric plant. Apparently connected with Compania Minera Nazareno y Alicante, S. A., which see.

SAN AGUILAR DE CANANEA, S. A., COMPANIA MINERA **SONORA**

Address: George Young, sec.-treas., Cananea, Sonora, Mexico.

Officers: G. H. English, pres.; C. E. Hoffman, v. p. **Cap.**, 7,500 pesos.

Property: 10 pertenencias, 15 miles S. E. of Cananea, developed to a depth of 250′ by workings that show high-grade stringers of argentiferous bornite. Mine has been operated on a small scale, making ore shipments that returned about $20,000.

SAN ANTONIO COPPER CO. **SONORA**

Address: Geo. J. Eisele, sec.-treas., Iron Mountain, Mich. **Mine office:** San Antonio de la Huerta, Sonora, Mex.

Officers: Otto C. Davidson, pres.; Dr. J. A. Crowell, v. p.; preceding, with John Uno Sebenius, D. M. Clemson, Hon. Richard C. Flanagan, E. G. Kingsford and W. H. Johnston, directors; John E. McIntyre, supt.

Inc. Sept. 23, 1908, in Arizona. **Cap.**, $2,500,000; shares $10 par; issued, $1,000,000 full paid and $1,000,000 with $3.50 paid. Title is through the San Antonio Copper Co., S. A., inc. April 12, 1908, in Mexico, all stock being owned by this company. Annual meeting, 2nd Monday in April.

Property: 9 groups, about 7,500 acres, with 2,000 acres about 3 miles from San Antonio de la Huerta, near the Yaqui river. The property was worked 1862 in a small way.

Lands show a mineralized zone 200′ to 500′ wide, with veins containing copper oxides and carbonates, with a considerable quantity of chalcocite, giving assays up to 11% copper.

Development: consists of tunnels with 15,000′ total workings, opening 7 separate orebodies, with 4,000′ of workings in ore. Dwight E. Woodbridge estimated that the San Antonio had 300,000 tons of ore, averaging 7% copper. Railway connections to within 2.2 miles of the main tunnels were secured, 1910. Operations suspended on account of revolutionary disturbances since August, 1917. Property considered promising.

SAN GERONIMO MINES & METALS CORP. **SONORA**

Office: 74 Broadway, New York City.

Officers: M. P. Dalton, pres.; F. B. Spalding, and G. F. Powell, eng. Is a close corporation.

Property: 80 pertenencias, containing a large silver-bearing vein near the San Miguel river, about 25 miles N. E. of Poza.

Equipment: includes a 200-ton reduction plant.

SAN PEDRO COPPER CO., S. A. **SONORA**

Company dissolved after absorption by Cananea Consolidated Copper Co.

SAN XAVIER COPPER CO. **SONORA**

Probably dead. Formerly operated mine near San Xavier, Sonora, Mex. See Vol. XIII.

SILVER SEAL MINING CO. **SONORA**

Mine at Pilares de Teras, Sonora, Mex. Fred O. Colsen, lessee at last accounts.

Property: El Aguaje mine, 12 miles east of Nacozari, showing a fissure vein in andesite rock, carrying narrow paystreaks of gray copper, chalcopy-

rite and galena ore. The mine yielded ore which assayed up to 15% copper and 20 oz. silver per metric ton.

SOMBRERETILLO MINING CO., S. A. **SONORA**

Dead. Was controlled by Sonora Central Mines Co., also defunct.

SONORA CENTRAL MINES CO. **SONORA**

Dead. See Vol. XIII, also Vol. XI of Copper Handbook.

SONORA CHIEF MINING CO. **SONORA**

Probably dead. Mail returned unclaimed March, 1919, from former address, 219 Argyle Bldg., Kansas City, Mo. Mine near Suaqui de Batuc, Sonora, Mex.

Officers: Jas. E. Crosby, pres.; Dr. Moses T. Runnels, v. p. and treas.; R. A. Bruns, sec.; preceding with C. D. Stoll and I. D. Waggener, directors.

Inc. July 18, 1904, in Arizona. **Cap.**, $1,500,000; $1 par.

Property: the Phoenix and Lakeside groups, 464 acres. The flotation was, it is believed, a crooked one. The property had no such showing as reported and described. Such veins as existed were tiny streaks, a few inches wide, which in places contained very high-grade ore, chalcocite and perhaps whitneyite. Its location, on the far side of the Yaqui river, is such that even a remarkably good showing would not have been worth development at the time the company was active. The property is totally devoid of merit.

SONORA COPPER MINING CO. **SONORA**

Idle and probably dead. Mail unclaimed, March, 1919, at last office, 895 So. Clarkson Ave., Denver, Colo.

Officers: Edward J. Wilcox, pres.; H. L. Peebles, v. p.; Fred W. Webber, sec.: C. A. Parker, treas., and L. J. Stark, directors, at last accounts.

Inc. May 17, 1910, in Colorado. **Cap.**, $10,000; shares $1 par.

Property: 10 claims, 4 miles from San Felipe, in the Arizpe district, Sonora, developed by 820' of underground workings, showing a 12' vein, with some complex silver-lead zinc ore.

SONORA COPPER SMELTING CO. **SONORA**

Idle and not favorably regarded. **Last address:** 424 Scarritt Bldg., Kansas City, Mo. **Mine office:** Noria, Sonora, Mex.

Officers: A. M. Conard, pres. and gen. mgr., at last accounts; J. M. Lowe, v. p.; C. E. Kroh, sec.; W. R. Moore, treas.

Inc. June 25, 1908, in Arizona. **Cap.**, $3,000,000; shares $10 par.

Company supposed to have been organized as successor of the Sonora Copper Co., but apparently owns only a 50% stock interest in that company, and title to the Mexican property is held in the name of the International Copper Ore Corporation, which is controlled, in some manner, by this company, the corporate relations being neither clear nor satisfactory.

Property: about 500 acres, including the Cobre Grande, 123 acres, 5 miles east of Noria, the principal mine, is not considered worthy of the money spent upon it and the past history of the president is such that the company is regarded with much suspicion.

SONORA DEVELOPMENT CO. **SONORA**

Office: 500 New Ridge Bldg., Kansas City, Mo. **Mine office:** Cumpas, Sonora, Mex.

Officers: H. P. Wright, pres.; D. J. Haff, 1st v. p.; H. C. Page, 2nd v. p.; W. A. Rule, treas.; J. W. Amerman, sec.; with William Huttig, directors. International Commission Co., Y. Soto, mgr. agents.

Inc. in Arizona. **Cap.**, $2,500,000. Reorganization completed in 1919, and outstanding shares reduced to 500,000. Company absorbed the Goodlander Mining & Milling Co.

Property: 320 acres, includes Don Genario 50 acres; Nacozari Copper Queen, 65 acres; La Madrugada, 40 acres; El Nocturno, 40 acres; La Gran Republica, 25 acres; Lady Goodlander, 65 acres; and Wostenholm, 35 acres. Properties show silver, copper, lead and zinc ore.

Company plans a resumption of development for 1920.

SONORA EXPLORATION CO **SONORA**

Controlled by Aztec Consolidated Mining Co., which see.

Inc. in Arizona and legalized in Mexico. **Cap.**, $10,000; shares $1 par; 9,997 held by Aztec Cons. Mining Co.

SONORA EXPLORATION CO. **SONORA**

Address: Estación Yzabal, via Agua Prieta, Mexico.

Property: once owned by the Florida Copper Co., includes El Temblor, Last Chance, Texas, and other properties, carrying copper ore, developed by shaft.

Equipment: includes steam power and an air compressor. Idle and probably dead.

SONORA MEXICAN SILVER MINES, LTD. **SONORA**

Organized in October, 1919, with capital of 85,000 £1 shares by T. W. Brown, of 39 Albert Hall Mansions, Kensington, London, W. C., to acquire mines near the town of Minas Nuevas, in the Alamos district of Sonora. The property, 125 acres, was worked before the revolution by Amos Yaeger. W. Moulton Clarke examined the Quintera, Zambora and Purisima mines which with the San Antonio, Zambora No. 3, Fortuna, and La Purisima Conception mines, comprise the group.

SONORA MINING & DEVELOPMENT CO. **SONORA**

Idle since 1910. **Office:** 207 Spitzer Bldg., Toledo, Ohio. **Works office:** Toledo, Sonora, Mex.

Officers: A. E. Klauser, pres.; H. R. Klauser, v. p. and gen. mgr.; J. G. Meilink, sec.-treas.; and A. V. Baumann, directors, at last report.

Inc. 1904, in Arizona. **Cap.**, $5,000,000; shares $1 par. Company operated in Mexico under the name of the Yaqui Smelting & Refining Co., S. A., inc. in Mexico; **cap.**, 100,000 pesos. Company is exempt from the payment of property tax for 20 years and also enjoys a 50% reduction on the state tax for 20 years. International Trust Co., Boston, registrar; Frederick R. Tibbetts, Boston, transfer agent.

Property: about 154 hectares, about 80 miles east of Torres and 60 miles below Campo Santo Nino. The principal property is the Veta Grande mine, about 10 miles from the smelter, said to show a gossan 40′ wide, outcropping for a quarter mile.

Equipment: the reduction works include a sampler, smelter and power plant, with necessary adjuncts. The 150-ton smelter has a 36″ circular Allis-Chalmers blast furnace, for use interchangeably on lead and copper ores, and a small furnace for copper only. The power plant includes two 80-h. p. water-tube boilers, 2 engines, an Erie high-speed engine and a No. 7 Connersville blower, for furnace blast. The lead refinery building has a softening furnace, refining furnace and 2 desilverizing kettles, operating on the Parks process. The silver refining plant includes 2 cupel furnaces, with blast attachments, 1 bullion furnace, 1 muffle furnace, and necessary pots and moulds, with a bullion vault.

SONORA-PACIFIC MINING CO. **SONORA**

Idle. Noria, Sonora, Mexico. Ira E. Bowers, gen. mgr.

Inc. 1911, as the successor of the Llano Copper Co.

Property: 10 groups, 526 hectares on Caracahui mountain, 3 miles east of Noria, the nearest rail point. Lands show limestone cut by intrusions of diorite and porphyry, with a quartz vein of 3′ to 50′ estimated width, traceable 6,000′ on the company's claims, which is reported to show bunches of ore carrying chalcocite, bornite and chalcopyrite, with a little native copper, 6 to 10 oz. silver and $2 to $5 gold per ton, as developed.

Development: consists of the 105′ No. 1 shaft, No. 4 shaft of 800′, and No. 7 shaft of 600′, with tunnels of 50′, 200′, 577′ and 750′. Orebodies developed so far are too small and too few for commercial production.

Equipment: includes a 125-h. p. steam plant, with 2 hoists, and a 6-drill compressor. Presumably idle.

SUPERIOR BONANZA MINING CO. **SONORA**

Controlled through stock ownership of 60,000 shares by Greene Cananea Copper Co.

Office: Cheyenne, Wyo. **Head office:** Cananea, Sonora, Mexico.

Officers: T. Evans, pres.; John Cuddihy, v. p.; Geo. Young, v. p. and sec.; C. Stites, treas.-asst. sec.; C. T. Knapp, F. J. Strachan, R. E. Howe, and M. W. Mitchell, directors.

Inc. in Wyoming, Aug. 31, 1907. **Cap.**, $1,250,000; shares $10 par; 74,923 issued. Owns the entire capital stock of Bonanza Mining Co., S. A.

THARSIS-YORK CO. **SONORA**

Controlled by the Nacozari Consolidated Copper Co. through ownership of a majority of the stock. See Nacozari Cons. Copper Co.

Inc. April 29, 1909, in Delaware. **Cap.**, $1,000,000; shares $5 par. Boston Safe Deposit & Trust Co., registrar and transfer agent, Boston, Mass. Annual meeting, 2nd Wednesday in April.

Property: 12 claims, 1,015 acres, in 6 groups, the Esquina, the main group, adjoining and lying between the Nacozari Consolidated Copper Co. and the Pilares mine of the Moctezuma Copper Co.

The Esquina carries a dike-like mass 600′ wide of red-stained mineralized porphyry, similar to outcrop of the Pilares orebody and on the same line of fracturing. It has a footwall of white rhyolitic breccia, a hanging wall of andesitic breccia, with altered, sericitized, silicified and mineralized rhyolite between.

Development: by 4,000′ Nacozari Con. tunnel, which will undercut the big fault zone at 600′. The old Tharsis-York workings total 1,500′.

Equipment: includes an 80-h. p. electric plant, with a 25-h. p. hoist and a 3-drill air compressor.

TIGRE MINING CO., S. A. **SONORA**

See Lucky Tiger Combination Gold Mining Co.

TRANSVAAL COPPER MINES CO. OF UTAH **SONORA**

Formerly Transvaal Mining Co. of Utah.

Mine and works office: Cumpas, Sonora, Mexico.

Officers: Louis J. Hauck, 433 Dayton St., Cincinnati, Ohio, pres.; Theo. M. Foucar, 1st v. p.; Percy Andreae, 2nd v. p.; Alfred Vogeler, sec.-treas., with Louis Hehman, W. C. Geis, Leo G. Cloud, Bernhard Freiberg and J. J. Haas, directors.

Inc. Aug. 4, 1917, in Utah, as a reorganization of the Transvaal Mining Co. of Utah, which was a reconstruction of the Transvaal Copper Co. **Cap.**, $4,000,000 shares $5 par. Annual meeting 1st Tuesday after 1st Monday in May.

Property: the La Verde, Cobre Rico, Buckeye, Ultima Chanza, and San Nicolas mines, a total of 3,500 acres of mineral land, including a 50-acre smelter site with 75-acre townsite adjoining; La Piedra Verde ranch of 15,000 acres and an interest in the San Nicolas Tolentino ranch, 26,000 acres, including timber and grazing lands.

Geology: company's holdings cover the heart of a mountainous district showing widespread rock alteration with acid stream waters, bleached and iron-stained areas, and "chimneys" or "pipes" of silicified breccia. The tract shows granite exposures, part of an underlying batholith, cutting recrystalized volcanic breccias, baked by contact action. In the Transvaal mines, both granite and volcanic rock are cut by irregular mineralized fractures along which orthoclase, carrying chalcopyrite, fluorite, chlorite, and calcite have been deposited by pneumalytic action. The "pipe" or "chimneys" of brecciated material cemented by quartz, are mostly barren, but in some cases, as at La Verde and Cobre Rico, contain workable copper ores. It is a peculiar type of deposit and resembles the Calumet-Copper Creek deposits of Arizona, the Kamloops mine in British Columbia and the Washington mine, 4 miles W. of the Cobre Rico property.

The **Verde mine** has two 80-h. p. boilers, a steam hoist and air compressor. The water supply at this mine is bad, owing to its acidity.

Extensive drilling at La Verde, or the Transvaal mine proper, has developed a large tonnage of low-grade primary ore, averaging 1½% copper and estimated by the management at 3,000,000 or more tons, which will doubtless be treated some day by flotation methods. The drills have shown the ore to extend to a depth of 1,100'.

The **Cobre Rico mine** has 2 shafts, No. 1 of 100' and No. 2 about 140' deep, with several tunnels and about 16,400' of workings, (including diamond drilling) developing several orebodies in a mass of brecciated rock, locally called trachite. Ore is estimated to average about 2% copper, 1 to 2 oz. silver and a trace of gold. Management estimates 2,500,000 tons available in this mine.

The **Buckeye mine** has about 10,000' of tunnel work, on a blanket vein of 6" to 4' thickness, showing ore reported to have given average returns of 12% copper and 8 to 10 oz. silver, with a trace of gold. There are about 5,000 tons of high grade ore left in the mine and a considerable amount of low-grade ore of no present commercial value. The mine, however, has been thoroughly explored in the bottom, or lower tunnel level and the ore shoot found to have played out.

The **San Nicolas mine** is a silver property about 8 or 10 miles from the Transvaal. It shows a vein varying from 1 to 4' in width, carrying silver-lead ore said to change to copper in the lower workings. The mine is reported to have yielded 6,000 tons of 60 oz. silver ore and still has between 2,000 and 3,000 tons of 50-oz. silver ore. It is regarded as a promising prospect, especially for lateral development. In May, 1919, it was reported that the San Nicolas Leasing Co. operating as the Mexicana Dessaralladora de Minas, had secured a lease on this mine. A 50 ton flotation plant was erected.

The **Ultima Chanza mine** has a 300' incline shaft and a 100' winze, with about 5,000' of workings, developing a fissure vein of 10" to 42" width. The management estimates 50,000 tons of ore in sight, averaging 10% copper, 5 oz. silver and a trace of gold. This property is a good, but small mine, needing further development. Equipment includes a steam plant and hoist.

The nearest rail station is at Nacozari, 30 miles north, but the Cananea, Rio Yaqui y Pacifico railway has surveyed a line to within 9 miles of the smelter. The company has built about 35 miles of wagon roads and 25 miles of trails at a cost of $50,000, with a maintenance charge of about $5,000 yearly.

The main camp is at La Verde, 25 miles S. W. of Cumpas, where mining operations are centered. There are 20 buildings, including 3 power plants, machine shop, carpenter shop, smithies at the principal mines, 2 laboratories, a boarding house, general store, with a branch store at the smelter, a hospital and several dwellings.

Smelter: at Cumpas, about 25 miles from the mines, was located at that point because of a good site and ample water supply. Equipment includes a 125-ton 42"x120" El Paso Foundry & Machine Works water-jacket blast furnace, with room for 2 additional furnaces of the same size. There is a reverberatory furnace, of 50 tons daily capacity, and a sampling mill, capable of sampling ore to feed 3 furnaces. The smelter power plant includes three 80-h. p. Babcock & Wilcox boilers, an Allis-Chalmers tandem-compound engine and a Connersville blower. This smelter was blown in May 1, 1906, treating ores from the Buckeye and San Nicolas mines and doing a little custom business, producing matte shipped to the Laurel Hill works of the Nichols Copper Co., and from May 1, 1906 to November 3, 1907, a period of 18 months, the smelter, in operation about two-thirds of the time owing to scarcity of freighting outfits, smelted 18,550 tons of ore having an average assay tenor of about 10% copper and 8 oz. silver for copper ore, and 2% copper and 60 oz. silver for silver ore, making 3,089 tons of matte, yielding 2,178,855 lbs. fine copper, 407,607 oz. silver and 240 oz. gold.

The extensive development work done on the property since 1909, shows the existence of small veins of rich ore and large deposits of low-

grade ore. The property will be worked on a large scale when given the rail connections now lacking but absolutely essential to the successful exploitation of the ores.

TRENTON-SONORA MINING CO. **SONORA**

Mine office: Tarachi, Sonora, Mexico.

Property: 4 miles S. of La Calera, includes the San José, Santa Eduviges, El Porvenir and other mines, carrying copper ores, with values mainly in silver. The San José mine is reported to show an 18″ paystreak of highly auriferous chalcopyrite.

Development: by a 200′ shaft sunk on the vein, equipped with a hoist. There is a mill and a smelter. No recent returns. Probably idle owing to Mexican conditions.

UNITED MEXICAN MINES **SONORA**

Idle at last reports. Mine near La Verde via Cumpas, Sonora, Mexico. O. L. Neer, mgr., Douglas, Ariz.

Property: 40 miles S. of Nacozari, includes the Veta Grande and Cerro Gordo groups, near the Transvaal mine.

Mines show rhyolite, granite and porphyry, with several orebodies occurring in fissure veins, and as breccia deposits between trachite and granite. Ores are copper sulphides.

VICTOR MINING AND SMELTING CO. **SONORA**

Office: 315 Schultz Bldg., Columbus, Ohio. **Mine address:** Cananea, Sonora, Mexico.

Officers: S. D. L. Jackson, pres.; M. F. Cole, v. p.; F. P. Jackson, sec.-treas.; preceding, with J. S. MacLean, W. H. Sartain, C. Thornton, Chas. Schindler and C. A. Stillwagen, directors. W. A. Woodlief, fiscal agent.

Inc. May 9, 1905, in Arizona. **Cap.,** $1,500,000, increased 1907, from $1,000,000; shares $10 par; issued, 90,000 shares. Title to property is held through the **Guerrero Mining Co.,** legalized in Mexico. Annual meeting, 2nd Monday in January.

Property: 47 pertenencias, in 2 groups in the Magdalena district, about 12 miles S. W. of Cananea, shows fissure veins in granite-porphyry intruding sedimentary rocks.

Development: by 5 short tunnels, about 1,500′ of workings, showing high-grade copper ore with small gold and silver values, in 2 veins of about 4′ and 70′ width, latter without ore.

Mine was ordered sold at receiver's sale, September 11, 1916, at Nogales, Ariz.

WASHINGTON MINES DEVELOPMENT CO. **SONORA**

Office: Douglas, Ariz. **Mine office:** Washington Mine, via Huepac, Sonora, Mex.

Officers: F. O. Bostwick, pres.; Geo. Cass, v. p.; Albert Sames, sec.-treas.

Inc. 1911, in Arizona. **Cap.,** $1,500,000; shares $10 par; issued 130,000 shares.

Property: 27 hectares in the Arizpe district, 60 miles from Nacozari, the nearest rail point. Claims show several big "pipe" deposits composed of brecciated rhyolite in dacite. Ore is reported to average 3.2% copper, 0.35% tungstic acid, 1.5 oz. silver and some gold.

Development: by a total of about 6,000′ of workings said to show 600,000 tons of ore blocked out for stoping.

It was reported in 1918 that L. D. Ricketts and J. S. Douglas had acquired the Washington mine. The price was said to be $400,000, of which $25,000 was paid down.

YAQUI CANYON COPPER CO. **SONORA**

Probably dead. Described Vol. XIII. Formerly at Suaqui de Batuc, Ures, Sonora, Mexico.

YAQUI COPPER CO. **SONORA**

A dead fraud. See Vol. XIII.

YAQUI MINING CO., S. A. **SONORA**

Fundicion, Sonora, Mexico. Geo. M. Ryall, pres., care Jonathan Club, Los Angeles, Cal. **Inc.** in Mexico.

Owned by **Mexican Exploration & Mining Co.**, controlled by Pacific Smelting Co. Property is described under latter title.

YAQUI SMELTING & REFINING CO., S. A. **SONORA**

Dead. Formerly at San Antonio de la Huerta, Sonora, Mexico. Fully described Vol. VIII of the Copper Handbook.

ZAMBONA DEVELOPMENT CO. **SONORA**

Probably dead. Formerly at Minas Nuevas, Alamos, Sonora, Mexico. See Vol. XIII.

STATE OF TEPIC

CUCHARA MINING CO. **TEPIC**

Mine address: Acaponita, via Nayarit, Tepic, Mexico.

Owned by Lacy Manufacturing Co., Washington Bldg., Los Angeles, Calif.

Is a large and well developed mine credited with a production of over $1,000,000 and having as much more in sight in present reserves. Under option to Cuban syndicate represented by F. D. Pagliuchi.

LA JARA GOLD MINES CO. **TEPIC**

Idle. **Office:** J. W. Dunham, 501 Fifth Ave., New York.

Office: W. P. Dunham, pres.; E. G. Thomas, v. p.; J. W. Dunham, sec.-treas.

Inc. in Maine. **Cap.**, $3,000,000; shares $1 par; 2,500,000 issued. Organization and titles are certified by H. L. McNair, attorney, 120 Broadway, New York.

Property: the old Natividad group of claims, 298 acres, at La Jara, Tepic, said to show large quartz veins in andesite carrying gold-silver ore. Mine was under development by tunnels until July, 1916, when conditions in Tepic became dangerous to Americans.

In 1917, company acquired an option on the Jim Crow-Imperial group of patented claims, about 123 acres, in the Steeple Rock district, New Mexico, about 7 miles E. of Duncan, Ariz. Said to have made ore shipments in the past running from $22 to $500 a ton in gold and silver.

STATE OF ZACATECAS

EL EDEN; COMPANIA MINERA y BENEFICIADORA

Idle. Mine at El Eden, Zacatecas, Mex.

Officers: Francisco Llamosa, pres. and gen. mgr.; Enrique Gutierrez, sec.; Luis Colina, supt.

Inc. 1905, and reorganized 1907, in Mexico. **Cap.**, 600,000 pesos; shares 100 pesos par.

Property: a silver-gold mines, 102 hectares.

Development: by 210′ shaft and tunnels aggregating 1,120′, developing copper and lead zinc ores.

Equipment: includes 40-stamp mill with 2 Krupp tube mills, 6 Wilfley tables and 6 Johnson tables; company planned installing a cyanide plant, to treat a large amount of tailings accumulated, the dump being estimated to average 400 to 500 grams silver and 3 to 5 grams gold per metric ton.

ESMERALDA; NEGOCIACION MINERA **ZACATECAS**

Idle. **Property:** at Chalchihuites, Sombrerete, Zacatecas, Mexico, includes the Anaconda, Esmeralda and La Luz mines, developed by shafts and tunnels, opening up argentiferous lead and copper ores.

FRESNILLO MINING CO. **ZACATECAS**

Property bonded on a 60-40% profit basis, to The Mexican Corporation, Limited, which see.

LA FE MINING CO., LTD. **ZACATECAS**

Officers: H. Rogers, Pinner's Hall, Austin Friars, London, E. C. 2, England; and Guadalupe, Zacatecas, Mexico.

Directors: H. Strakosch, chairman; J. P. Farrar, J. Kitchin, and C. T. Pott. E. A. Strout, mgr.

Inc. Dec. 12, 1911, in Great Britain. **Cap.**, £600,000; shares £1 par; 525,000 issued. Company is controlled by the Union Corporation, Ltd. of South Africa. Statement for 1917 showed that expenses in Mexico had been £32,507 to date, and £44,994 in London. Creditors and loans amounted to £214,463.

Property: 95 hectares, at Guadalupe, covering 3,500' along strike of La Cantera vein, which carries silver, lead, and gold.

Development: by 2 vertical and 1 inclined shaft blocking out 192,410 tons of ore averaging 14 oz. silver, 1.86% lead, and 60 cents gold per ton.

Equipment: complete with 30 heavy stamps, 6 tube-mills, and cyanide plant.

Mine has been closed down since 1914, but kept unwatered.

MAGISTRAL, S. A.; NEGOCIACION MINERA DEL. **ZACATECAS**

Office and mine: Aptdo. 22, Zacatecas, Zacatecas, Mexico.

Officers: Dudley H. Norris, pres.; Chas. O. Gilbert, mgr. Company, a close corporation, is said to have paid for improvements from net earnings. Owns the Refugio de Magistral and San Roberto mines. See Vol. XIII.

No recent returns secured. Property idle owing to Mexican conditions.

MAZAPIL COPPER CO., LTD. **ZACATECAS**

Office: E. Lodder, 47 Peter St., Manchester, England. **Mine address:** Apartado 64, Saltillo, Coahuila, Mexico.

Directors: Alfred Crewdson, chairman; R. R. Crewdson, Col. Arthur Dugdale, W. A. R. Heaven, Jacob Higson, Chas. Hopkinson, J. Ramsden, and J. W. Purcell, R. H. Jeffrey, mgr.; J. F. Allen, cons. engr.

Inc. February, 1891, and re-incorporated April 21, 1896, in Great Britain. **Cap.**, increased 1903 to £300,000; shares £10 par, and again increased 1912 to £500,000; shares £1 par; 422,490 issued. Debentures: £120,000 at 7%; £114,500 issued.

In 1917 the profit was £92,626, less £55,189 debit balance. Dividends amounted to £21,124; £16,313 was carried forward. Reserves total £80,000.

Dividends: 20% in 1910; 20% and a 5% bonus in 1914; 30% cash and 50% bonus in 1912; nothing 1913 to 1916; 5% in 1917; 7½% in 1918.

Company owns and operates the Coahuila and Zacatecas railway, running from Saltillo to Concepción del Oro, 2 smelters and various mines, employing over 4,000 men normally. Operations were suspended June, 1913, by the Mexican revolution, but were partly resumed in March, 1917.

Property: about 850 hectares of mineral land in State of Zacatecas. The Aranzazú and Cabrestante mines, carrying copper ores, are the most important; the San Elijio, Naranjera, Cajón, San Francisco and Protero mines, carrying silver-lead ores, and the Promontorio group, producing mainly fluxing ores. Copper ores occur in irregular masses, in limestone, near granite-porphyry contacts, and are opened by over 25 miles of workings.

Equipment: includes a 150-ton concentrating plant. The smelters are at Concepción del Oro and Saltillo. The first named, of about 800 tons daily capacity, has 4 copper furnaces. The Saltillo smelter, built 1906, has a lead plant of 300 tons daily capacity, and does a general custom business, as well as treating ores of the company. There are 3 blast-furnaces and 1 reverberatory furnace. Transportation is by 4 aerial trams.

Production: in 1918 was 5,320 metric tons copper, 4,250 metric tons lead, 1,005,000 oz. silver and 11,580 oz. gold. No 1917 figures given as the plant was only working intermittently.

NATIONAL SMELTING CO. **ZACATECAS**

Address: L. H. Taylor, Jr., 2030 Land Title Bldg., Philadelphia, Pa.

Properties said to be lost to company through the revolution in Mexico and a claim for indemnity has been filed with Department of State. Practically dead. See Vol. XI for description.

NAZARENO y ALICANTE, S. A.; COMPANIA MINERA ZAC.

Address: P. O. Box 183, Saltillo, Coahuila, Mexico.

Officers: Leo M. Cardenas, pres.; F. M. Cardenas, v. p.-mgr.; Lic. L. Davila, sec.; J. C. Siller, treas., with R. J. Rodriguez, directors. F. C. Mortimer, supt.

Inc. 1912, in Coahuila, Mexico. **Cap.,** 1,000,000 pesos; 100 pesos par.

Property: 57 claims, 142 acres, in Mazapil district, Zacatecas, Mexico, containing contact and chamber deposits of gold and silver bearing lead and copper ores, in part oxidized. The sulphide ore assays 19 oz. silver, 16% lead, 22% zinc and 14% iron, while the oxide ore averages 9 oz. silver and 14% lead.

Development: is to a depth of 600′ with about 1,000′ of underground workings, blocking out 100,000 tons of ore.

Equipment: includes electric hoist, pump and a 40-ton concentrator. Mine is connected with railroad by a 5-mile cable line and an 8-mile tramway, the cable handling 100 tons in 8 hours.

Company is apparently connected with the Compania Minera del Saltillo, which see.

PROTECTORA y ANEXAS; COMPANIA MINERA LA. ZACATECAS

San Salvador, Mazapil, Zacatecas, Mexico. Percy A. Babb, pres. and gen. mgr.; J. L. Miranda, sec.

Inc. 1907, in Mexico. **Cap.,** 100,000 pesos; fully paid.

Property: 68 hectares, including La Protectora y Anexas and San Francisco mines carrying copper, lead and zinc ore occurring as replacements in limestone. Low-grade ores average 2.5 to 5% and high-grade ores 12 to 19% copper. Mine has a depth of 100 meters with about 1,500 meters of workings.

Equipment: includes a 15-h. p. gasoline hoist. Was working with about 200 men, early 1913, and shipping around 250 tons of high-grade ore monthly. No recent reports received and mine presumably closed down.

SAN ROBERTO MINING CO. ZACATECAS

Zacatecas, Zacatecas, Mexico. C. A. Bently, gen. mgr.

The mine, opened to depth of 300′, shows copper, lead, and zinc ores, occasionally assaying up to 30% copper with good value in gold and silver. The mine has given a limited production of excellent ore.

No recent information received.

SANTA ROSA MINING CO., LTD. ZACATECAS

Subsidiary of the Exploration Co., Ltd.

Office: T. D. Pillans, 24 Lombard St., London, E. C., England.

Directors: R. T. Bayliss, chairman; S. A. Cloman, J. E. D. Ryder, J. H. M. Shaw and the Earl of Hardwicke.

Inc. Nov. 24, 1910, in England. **Cap.,** £150,000; shares £1 par; 100,007 issued. **Debentures:** £35,500.

Property: in the Mazapil district, Zacatecas, Mexico. Since 1913 the mill has not operated, owing to the revolution.

TRES SENORES MINING CO. ZACATECAS

Mine: at San Pedro Ocampo, Zacatecas, Mexico.

Property: includes La Providencia and La Poderosa mines, near San Pedro Ocampo yielding ores that have given smelter returns of 10% copper, 3,234 grams silver and 120 grams gold per metric ton. No recent reports received. Property closed down.

CENTRAL AMERICA

COSTA RICA

ABANGAREZ GOLD FIELDS OF COSTA RICA — COSTA RICA

Office: 17 Battery Place, New York City. **Mine office:** Abangarez, Costa Rica.

Officers: Minor C. Keith, pres.; A. W. Preston, v. p.; E. W. Ong, sec.; with B. W. Palmer, directors. H. H. Hanson, auditor; H. M. Keith, treas.

Inc. Sept. 8, 1899, in Delaware. **Cap.,** $4,000,000 com and $1,000,000 6% cumulative pfd.; outstanding, $3,880,000 com. and $1,000,000 pfd.; par $25. Transfer agent: Old Colony Trust Co., Boston; registrar, American Trust Co., Boston. No dividends on pfd. since May, 1911, when semi-annual of 3% was paid. Annual meeting, third Monday in December. Listed on Boston Stock Exchange.

Notes—These may be shown as under:

Term	Interest, %	Amount	Dated	Due	Amount at end of 1918
Demand		$.....	.....	.....	$517,755
1-year	6	374,000	May 1, 1915	May 1, 1916	281,888
2-year	6	476,000	May 1, 1914	May 1, 1916	357,000
3-year	6	.....	.....	May 1, 1914	1,975
3-year	6	.....	.....	May 1, 1915	3,750
Total payable					$1,162,368

Financial Statement, years ending December 31:

Assets.

Year	Property	Equipment	Current	Supplies	Cap. stock held	Income account	Total
1918	$3,458,897	$1,214,048	$246,663	$203,223	$80,150	$1,057,853	$6,260,835
1917	3,488,018	1,346,719	179,937	170,873	80,150	945,059	6,235,757
1916	3,519,834	1,506,309	282,519	165,879	150	977,474	6,452,165

Liabilities.

	Capital	Notes payable	Current	Sundry	Total
1918	$4,880,000	$1,162,367	$211,936	$6,532	$6,260,835
1917	4,880,000	1,143,248	205,978	6,532	6,235,757
1916	4,880,000	1,333,426	158,063	80,675	6,452,165

Profit and Loss.

	Bullion Sales	Operating cost	Profit	Interest	Previous deficit	Depreciat'n & amortization	Total deficit
1918	$582,425	$458,121	$124,304	$70,127	$945,059	$166,971	$1,057,853
1917	686,298	457,565	178,733	68,153	977,474	78,165	945,059
1916	670,574	425,623	244,951	79,562	1,006,369	136,494	977,474
1915	197,619	206,863	9,243*	78,546	809,063	109,517	1,006,369

* Loss.

Property: company acquired the properties of the Guanacaste Syn. and the Guacimal Expl. Co. After obtaining possession of three-fifths of the capital stock of the Costa Rica Esperanza Mng. Co. in exchange for land, the Abangarez Co., December 31, 1909, acquired the balance of the stock, by giving one share of Abangarez and $1.87 in cash for each share of Costa Rica Esperanza. Owns mining properties in full operation covering 118 sq. miles in the province of Guanacaste, Costa Rica, C. A. The ore developed at Majica creek on the

Tres Hermanos lode is transported by aerial tram to the Abangarez mill. Also owns a power plant on the Guacimal river, 12 miles from the mill.

Development: reports give no details of operations, but several distinct orebodies are being mined, and judging by past experience, company says that a diminution of available ore at one point is likely to be made up by increased tonnages at other workings.

Production:

	Ore	Cost Per Ton						Int.
Year	Milled, Tons	Mng.	Mlg.	Cyanide	Total*	Prod.**	Earn.**	Chgs.**
1918.....	66,204	$3.10	$0.55	$1.32	$6.92	$8.80	$1.88	$1.06
1917.....	62,934	3.50	0.58	1.23	7.26	10.12	2.86	1.08
1916.....	50,221	4.08	0.71	1.36	8.48	13.35	4.87	1.58
1915.....	25,262	4.33	0.84	1.60	8.18	7.82	0.36†	3.11
1914.....	37,742	4.47	0.58	1.39	7.89	5.27	2.62†	2.00
1913.....	69,346	4.92	0.64	1.70	8.68	8.36	0.32†	1.00
1912.....	50,011	9.11	1.07	2.28	14.71	12.14	2.57†	0.94
1911.....	42,514	10.06	1.61	2.38	16.98	21.84	4.86†	0.42

* Includes cost of production, administration and marketing.
** Per ton. † Deficit.

In view of the company's finances and conditions in general, an arrangement was made with J. N. Popham, who has been successful in the management of a neighboring mining property, to undertake the operation of the company's property. He is to furnish all necessary capital for carrying on operations. As compensation he will receive 10% of the net profits over and above operating and development expenses. Company reserves the right to withdraw from agreement upon due notice. Since Mr. Popham assumed charge there has been a gradual but fairly constant improvement in the output of the mine.

In 1919 there was a scarcity of labor and the yield was about $400,000.

AGUACATE MINES, INC. COSTA RICA

Office: Room 2503, 55 Liberty St., New York City. **Mine office:** San Mateo, Costa Rica. H. H. Juchern, gen. supt.

Officers: W. F. White, pres.; E. Gibbon Spilsbury, v. p.; Edgar H. Woodward, treas.; W. F. White, asst. treas.

Inc. 1907, in Maine. **Cap.**, $4,000,000; $3,754,630 outstanding and $245,370 in hands of trustees for benefit of company.

Property: the Quebrada Honda mine, carries gold ore in fissure veins that average $8 per ton value recovered.

Development: by tunnel and a shaft below the 700′ level. On the Black vein, the deepest workings are on the 1,000′ level, opened 1918, for 840′ in length and stoping started, ore being hoisted to 700′, the main tunnel level. The 700′ tunnel is the working or haulage level, the mill being near its portal. Company's report of July 17, 1915, is said to state that original estimates of tonnage and values, must be reduced as development has shown that the vein has pinched in places, reducing the size of the ore reserves.

Cyanide mill treats 2,000 tons per month, but no figures are available.

AMERICAN MANGANESE MFG. CO. COSTA RICA

See same title under Minnesota.

Office: 352 Bullitt Bldg., Philadelphia, Pa.; and Duluth, Minn.

Property: 4 developed mines acquired in 1917 from the Costa Rica Manganese & Mining Co., on the Nicoya peninsula, province of Guanacaste, Costa Rica, in a region difficult of access and with bad climate. Described in the Eng. & Mng. Journal of October 27, 1917.

Geology: outcrops are of basic volcanic rock and of highly metamorphosed sedimentaries. The former is porphyritic in structure. Weathering and erosion has left considerable high-grade manganese float in water-courses. Ore is found near the contact of the volcanic and sedimentaries. There are 3 grades: (1) 53 to 58% Mn.; (2) 50% Mn. and 6% SiO_2 and (3) high silica ore which can be mined with pure ore to make it marketable.

Development: a large area shows the deposit to be from 1 to 30' thick. To produce a ton of 50% ore, costs are placed at $2.

Equipment: steam tramway, loading pier on the coast, 5,000-ton ore-bins, docks, lighters, and 5 ore steamers aggregating 5,130 tons, delivering at Baltimore or Philadelphia.

No information available as to production and costs.

COSTA RICA MANGANESE & MINING CO. **COSTA RICA**

Property sold in 1917 to American Manganese Mfg. Co., which see.

GUATEMALA

MATAQUESCUINTLA MINING CO. **GUATEMALA**

Property: El Rosario, Los Ocotes, Magdalena, and San Francisco silver mines in Mataquescuintla county, under development in August, 1918, but said to be for sale. A recent sampling of El Rosario returned from 0.01 oz. gold and 7.4 oz. silver per ton to 0.01 oz. gold and 54.20 oz. silver. The San Francisco was recently reopened. A native company worked it in 1888, and erected a 20-stamp mill. Some chloride of silver yielded 300 oz. per ton. Reserves were reported to be 600,000 tons worth $34 per ton, with silver at $1 per ounce.

SILVER LEAD MINING CO. **GUATEMALA**

Address: Sansare, Guatemala.

Property: near Sansare, 9 miles from rail. Reported in August, 1918, that a wide deposit of pyrrhotite, containing nickel and cobalt had been opened.

HONDURAS

NEW YORK & HONDURAS ROSARIO MINING CO. **HONDURAS**

Office: 17 Battery Place, New York. **Mine office:** San Juancito, Honduras, C. A.

Officers: Wm. A. Prendergast, pres.; Lewis L. Clarke, v. p.; A. R. Gordon, v. p. and gen. mgr.; W. C. Langley, treas.; J. Perlman, sec.

Executive committee: Lewis L. Clarke, H. A. Guess, W. C. Langley, W. L. Saunders, and A. G. Todd.

Inc. Nov., 1880, in New York. **Cap.,** $2,000,000; shares $10 par; all issued. Stock is listed on the New York Curb.

Dividends: to Jan 1, 1919, total $4,990,000. Payments in 1918 amounted to 10% for dividends and 10% for amortization, a total of $400,000. American Exchange Nat'l Bank, New York, registrar. U. S. Mortgage & Trust Co., New York, transfer agents.

Financial Statement, years ending December 31:

Assets.

Year	Property	Equipment	Current	Investments Etc.	Sundry	Total
1918...	$3,000,000	$1,135,859	$1,630,866	$151,372	$39,504	$5,958,602
1917...	2,800,812	1,257,869	1,505,209	.....	.....	5,563,890
1916...	1,516,515	781,952	1,095,341	103,521	17,355	3,514,674

Liabilities.

Year	Capital	Current	Reserves	Surplus, Including Deplet., Valuation	Total
1918.....	$2,000,000	$688,789	$845,747	$2,434,066	$5,958,602
1917.....	2,000,000	567,784	458,937	2,537,168	5,563,890
1916.....	2,000,000	257,499	206,555	1,050,674	3,514,674

Profit and Loss.

Year	Income	Expenses, Etc.	Net Income	Reserve Fund	Net Surplus	Dividends Paid
1918....	$1,744,413	$1,286,298	$457,104	$80,113	$376,992	$200,000
1917....	1,676,846	1,075,966	600,879	94,005	506,874	300,000
1916....	1,566,173	970,080	596,093	135,983	460,110	400,000
1915....	1,200,743	847,276	353,466	117,324	236,142	240,000

Property: owns 25 sq. miles of mineral bearing land, including the Rosario mine and Sabana Grande mine nearby, at San Juancito, Honduras, C. A.

Development: results may be shown as follows:

Year	Footage	Ore Mined, Tons	Reserves, Tons	Value per Ton	Cost per ft.	Cost per Ton
1918.....	11,266	74,816	282,559	$15.15	.....	.....
1917.....	9,381	83,052	303,296	9.21	$12.21	$0.87
1916.....	12,637	81,513	312,143	9.51	9.91	0.97
1915.....	13,000	90,162	343,716	9.76	10.18	1.09

The Rosario contains about 20 mineral bearing veins, which have been or are now being worked. The south San Miguel was the main producer in 1918.

Geological investigations of the entire zone, as well as surrounding country, were concluded in 1916. Electric haulage on the Peña Blanca and lower 650' levels was very satisfactory.

Two crosscuts have been driven—the Peña Blanca—Esperanza, beginning at the S. E. end of the Esperanza No. 3 and running in a S. W. direction to develop the southern territory, and the Peña Blanca S. W. crosscut, starting at the junction of the Southwest and Jucuara veins in Block 84, and planned to reach Jucuara gulch. With this connection made, additional water power and cheap timber are obtainable from the western side of the mountain. The cost of lumber was reduced from $22.50 to $12.50 per 1,000 board feet since the tunnel was completed. Rock passed through was not favorable for ore deposition. The Esperanza crosscut opened some ore, which is being developed.

Exploration of other properties is part of the regular work of this company. Results have been as follows:

Company spent 37,871 pesos for prospecting and development on the Chile Mountain concession without promising results. Three gold-silver veins of low value did not persist at depth and work was stopped.

An option on the Guasucaran area was dropped, also on Santa Rosa de Potosi. Some work is under way at the Aurora-Santa Elena group, adjacent to the Rosario.

The most promising property is the Sabana Grande, 40 miles west of the Rosario, which has been under development since 1915, and on January 1, 1919, contained 18,190 tons of ore averaging $57.40 per ton in silver and gold. A mill, described later, has been erected, and contains a flotation plant, the first of its kind in Central America.

Equipment: at Rosario, 1,200-h. p. hydro-electric plant, hoists, 5, 6, and 7-ton electric locomotives in the mine, 2 air compressors, machine-drills, sawmill, 350-ton cyanide mill using aluminum dust precipitation, machine shops, assay office, hotel, store, schools, hospital, and garrison consisting of a commandant, 58 officers and men.

At Sabana Grande—three 50-h. p. oil-driven air compressors, and 35-ton mill containing 100-h. p. Fairbanks-Morse oil engine, jaw-crusher, 4x6' ball-mill, Dorr machinery, K. & K. flotation machines, and Oliver filter, laboratory, shops and dwellings.

Production:

Year	Ore Treated, Tons	Extraction Silver, %	Extraction Gold, %	Extracted Silver, Oz.	Extracted Gold, Oz.	Total Cost per Ton
1918.....	143,050	86.75	88.31	1,587,468	9,748	$9.41
1917.....	141,218	93.79	94.00	1,670,612	13,790	7.49
1916.....	128,030	89.04	94.24	1,810,886	14,989	6.30
1915.....	117,790	87.45	92.32	1,748,803	15,211	5.74

New York & Honduras Rosario is an extensive property making good profits. Its resources are extensive, and exploration continues to open up new mines. Reports contain a wealth of interesting mining and metallurgical information.

WEST END OPOTECA MINES CO. **HONDURAS**

Subsidiary of West End Consolidated Mining Co. of Nevada, Inc. 1920. **Cap.**, $3,000,000; $1 par.

Property: 1,500 acres, including the Opoteca gold-silver mine, upon which nearly $100,000 has been spent. The mine is fully equipped, and extensive development work has revealed ore in 20 places.

NICARAGUA

BABILONIA GOLD MINES, LTD. NICARAGUA

Office: 1 London Wall Bldgs., London, E. C. 2.

Officers: J. H. Cordiner James, chairman, with J. A. Agnew and A. Pomeroy, directors. G. G. Hay, sec.; J. V. Lake, mgr.; James Brothers, cons. engs.

Inc. in England, June 9, 1911, as Sierra Guaranty Syndicate, changed Dec., 1911, to present title. **Cap.**, £200,000; shares £1 par; 170,007 issued, fully paid; 150,007 shares held by Lake View & Oroya Exploration, Ltd.

A profit of £1,290 ($6,200) was made in 1917.

Property: 3 gold claims—Crimea, Babilonia, and Santa Maria—at La Libertad, Chontales district, Nicaragua.

Development: ore reserves at end of 1917 were estimated as 37,095 tons, averaging 37s. 6d. ($9) per ton. Mining has been much hampered by water.

Equipment: includes 75-ton pneumatic (Holman) stamp-mill and cyanide plant.

Production:

Year	Tons	Value	Year	Tons	Value
1917.....	22,328	£42,941	1915.....	9,586	37,152
1916.....	19,344	40,526	1914.....	7,675	21,155

COCO RIVER MINING CO. NICARAGUA

Office: was at 50 Broadway, New York.

Officers: J. G. Turrif, pres.; H. A. Currie, v. p.; Gordon D. Bruce, 120 Broadway, New York City, sec.-treas.; A. A. Holland, managing director; J. A. Calder, J. T. Brown and J. H. Lamont, directors, at last accounts.

Inc. in Delaware. **Cap.**, $1,000,000; $1 par; 500,000 issued. U. S. Corporation Co., 28 Cedar St., New York City, registrar and transfer agent.

Property: 175 acres in Cabo Gracias district, Nic., C. A., 60 miles inland and 3 miles from navigable river, via Cabo Gracias.

Ore: free milling gold quartz said to average $5 per ton, including all developed oxidized ore.

Equipment: costing $125,000, includes 200-ton mill "of ironwood and mahogany," electric motors, etc. A report by A. A. Holland, mining engineer, is said to give 2,000,000 tons blocked out and 4,000,000 partly blocked out.

Company planned installation of 300-h. p. hydro-electric plant on Coco river and to enlarge mill to 500 tons daily capacity, addition of cyanide mill and disintegrator.

Management expected to make a 95% extraction less $1 a ton for all costs, leaving a profit of $1,875 daily when treating 500 tons. Costs seem to be figured too low. Nothing new available early in 1920. Probably dead.

CONSTANCIA-SIEMPRE VIVA MINES NICARAGUA

Property: in the Pis Pis district, now producing from $20,000 to $30,000 gold per month. The mill extracts 95% of the metal.

EDEN MINING CO. NICARAGUA

Controlled through ownership of 55% of capital stock, by Tonopah Mining Co. of Nevada.

Office: 572 Bullitt Bldg., Philadelphia, Pa., and Bluefields, Nicaragua, C. A.

Officers: J. H. Whiteman, pres.; C. R. Miller, v. p.; C. A. Higbee, Barton Hoopes, H. D. Moore, Samuel Bell, Jr., G. S. Munson, and W. I. Forbes, directors. P. S. Bickmore, sec.; W. H. Blackburn, con. eng.; M. B. Huston, gen. supt. The engineers responsible for bringing the property to the productive

stage were Louis Garbrecht, J. L. Phillips, and Robert Hawxhurst, Jr., successively.

Inc. Nov. 24, 1914, in Delaware. **Cap.**, $1,000,000, all outstanding; shares $1 par, non-assessable. Company office, transfer office, Fourth St. National Bank, Philadelphia, registrar. Annual meeting, first Wednesday in May.

Property: 9 square miles in the Pis Pis mining district, which is 100 miles in direct line from the town of Prinzapolca on the east coast of Nicaragua. Transportation of supplies from the United States involves 1,200 miles by ocean steamer, 90 miles by coast schooner, by barges up to Tunky, transfer into "pit-pans" to Miranda on the Tunky river, and finally 7 miles by narrow-gauge railway to the mine. The full distance from Prinzapolca is 187 miles. It costs from $90.78 to $131.28 per ton to carry freight from New Orleans to the mine. The rainy season lasts for 8 months, when wheel vehicles cannot be used. The Tunky Transportation & Power Co. which operates the railway and power-plant, is controlled by the Eden company.

The financial statement for the year 1918 shows that receipts totaled $428,327, of which $355,000 was loans from the Tonopah Mining Co. Expenditures were $433,320. Cash on hand decreased from $13,172 to $8,178 at end of 1918. Current assets amount to $453,305, and liabilities $56,528. Loans from the Tonopah Mining Co. total $1,994,000. The Eden company lent the Tunkey Transportation & Power Co., a subsidiary $408,309.

Development: as the property is mountainous, the veins are all opened by tunneling, there being 6 main adits at an elevation of 652 to 1,307 ft. above sea-level. The main tunnel has an electric haulage system, the locomotive handling 20 tons a trip. The two veins so far developed—the Culebra and Eden, strike E. and W. and N. and S., respectively and dip steeply, so that shrinkage stoping is used. The oxide ore near the surface breaks easily; but the deeper ore is diffcult to blast. The Culebra vein is rather more uniform in value than the Eden, in which the values are bunchy. The main tunnel will be driven 1,669 ft. to get under a known ore-shoot in the Hidden Treasure vein. Ore reserves are estimated as 107,879 tons, worth $11.92 per ton, equal to 2½ years supply for the mill.

Equipment: includes fully equipped machine-shops, sawmill, ice plant, wireless station for distant communication, hydro-electric plant of 700-h. p. turbine and 500 kva. generator, since increased to 1,400-h. p., sub-station, electric locomotive, two 600-cu. ft. air-compressors, drills, and 150-ton cyanide mill including ball and tube-mills.

Production: the mill started in November, 1918, and produced $45,947 to the end of the year. The extraction in December was 95.1%.

In 1919 the mill treated 36,159 tons of $12.94 ore, yielding $445,350. Costs averaged $10.65 per ton.

According to W. H. Blackburn, there should be a satisfactory profit for each month's operation in the future.

LA LUZ & LOS ANGELES MINING CO. NICARAGUA

Offices: 511 Fifth Ave., New York; and Frick Bldg., Pittsburgh, Pa.

Officers: J. Gilmore Fletcher, pres.; Jesse C. Scobey, mgr., at Pittsburgh; H. A. Watson, gen. mgr., Prinzapolca, Nicaragua; H. G. Smith, mill supt.; Dr. Benjamin Cuadra, attorney at Prinzapolca.

Property: near the Eden mine, but on a different branch of the Prinzapolca river, in the Pis Pis district, Nicaragua.

Ore is a soft altered shale, a considerable portion locally known as 'manto', being no more than a stiff clay. Mine is generally regarded as a large, low-grade gold property, whose reserves of oxidized ore are nearing the end. The future of the mine depends upon a successful treatment of the underlying low-grade base ores.

Equipment: includes a milling plant employing six 3½′ Huntington mills fitted with 20-mesh screens, and amalgamating inside and outside. Recovery by amalgamation averaged from 60 to 75% for a 7 year period, and quicksilver consumption was but 0.144% of that fed to the mills. The bullion is 840 fine in gold and 150 fine in silver.

Company has been working for 15 years, but informs us in effect that it considers it inadvisable to give out any information. It is said that production and profits have been regular for many years, and that property has been efficiently managed.

NICARAGUA MINING CO. **NICARAGUA**

Office: 1218 Locust St., Philadelphia, Pa.

Officers: B. C. Warnick, pres.; C. J. Fox, v. p.; W. H. Steigerwalt, sec.-treas.; with C. A. Daniel, W. H. Bilyeu, W. S. Duling, Barry Searle (cons. eng.) and J. M. Steele, directors. W. B. Daniel, gen. supt.

Cap., $2,000,000; $1 par; non-assessable; 1,000,000 being issued early in 1920.

Property: in the Pis Pis district, 100 miles from the Atlantic Coast, 160 miles from Prinzapolca, which is 90 miles north of Bluefields. Supplies are handled by the Tunky Transportation & Power Co., a subsidiary of the Tonopah Mining Co.

Andesite is the prevailing rock of the district, and is cut by diabase dikes and by numerous quartz veins. The main vein system runs N. E. and S. W. and dips 25 to 75° N. W. The vein zone contains many branch, cross and parallel veins, and is cut by faults. The vein quartz contains gold and silver, together with a complex mixture of copper, lead and zinc sulphides.

The company owns the following mines:

(1) the Concordia group discovered in 1894, from which gold worth $1,200,000 was extracted by simple amalgamation, which only saved 46%. The claims cover an area of 300 by 10,000', and include water-power sites that will generate from 300 to 1,000 h. p.

(2) the Lone Star claims of 113 acres, also 1,070 acres of farm land and a 7-acre water power site, completely equipped with 30-stamp mill, 500-h. p. hydro-electric plant, shops, etc., costing $270,000. This mine has yielded $1,200,000; though only 50% of the assay value was recovered.

Development work has proven a block of ore averaging 8⅓' thick, 925' long, and with an average back of 456', which contains 262,383 tons of ore averaging $10.82 per ton. Gross value of ore developed, $2,839,931. With an 80% recovery, net gross value is $2,271,953. With a working expenditure of $4 per ton or $1,052,531, the net profit is $1,222,415. A 150-ton mill is expected to treat this tonnage in 5 years.

(3) the Bonanza Mars mines of 335 acres, plus 1,600 acres of farm land, together with general equipment, consisting of hydro-electric plant, 100-ton stamp-mill and cyanide plant, houses, etc., which cost $400,000. Reserves are estimated at 2,000,000 tons with over 90,000 tons that will average $12 per ton, available. This mine has yielded over $1,200,000.

The consolidation of these producing properties and their operation by modern methods, are expected to yield large returns.

TONOPAH NICARAGUA CO. **NICARAGUA**

Controlled by the Tonopah Mining Co. of Nevada.

Property: the Santa Rita mines, 30 miles from the Eden Mining Co.'s mine. Diamond-drilling was completed in July, 1918. Work to date has developed 984,232 tons of carbonate ore, assaying 63 cents gold and 4.832% copper; 163,556 tons of sulphide ore, averaging $3.41 gold and 10.287% copper, and 308,800 tons of sulphide ore, containing 27 cents gold and 3.365% copper. There is also 35,500 tons of tailing, assaying $2.73 gold and 1.97% copper. The aggregate is 1,492,088 tons, carrying 91 cents gold and 5.059% copper. Work has been suspended until it is practicable to erect a mill, for which tests have been made.

SALVADOR

BUTTERS DIVISADERO CO. **SALVADOR**

Property taken over August 5, 1919, by El Salvador Silver Mines Co., which see.

BUTTERS POTOSI CONSOLIDATED MINES, INC. **SALVADOR**

Property acquired August 5, 1919, by El Salvador Silver Mines Co., which see.

BUTTERS SALVADOR MINES, LTD. **SALVADOR**

Address: Gustave Scogland, supt., via La Union, Department of La Union, Salvador, Central America.

Property: 30 miles N. of La Union, San Salvador.

Geology: fully described by C. Erb Wuensch in Mining and Scientific Press of September 8, 1917. Deposit consists of contact fissure veins carrying gold-bearing pyrite. Veins occur at contact between a quartz monzonite porphyry dike and the surrounding eruptives, which are basalt capped by trachyte. No ore has been developed below 700′ depth, where the ore is erratic in rich pockets. At 800′ there is general improvement. Deposit is unusual and although there are practically no reserves, exhaustion cannot be predicted.

Development: by 800′ shaft, with 1,800′ drainage tunnel 30′ below, and 30 miles of workings. Work proceeds at 100 points, and 2,000′ of work is done monthly.

Production: 3,500 tons milled each month. Total output is approximately $15,000,000.

No recent information is available.

COMACARAN GOLD MINING CO. **SALVADOR**

Main office: San Salvador, and mine office, Mineral Hormiguero, Rep. del Salvador, C. A.

Officers and directors: Benjamin Gonzales, pres.; Gustavo Vides, v. p.; Lucio Quinones, sec.-treas.; and Emilio Gonzales, res. director. G. A. Swanquist, local manager.

Inc. 1909, in Salvador. **Cap.**, $500,000; shares $100 par. Semi-annual meetings in January and June.

Gross earnings in 1915 were $377,142; in 1916, $245,920; in 1917, $473,420; and in 1918, $382,342. Two dividends have been paid to date.

Property: 3 mines—Gallardo, Hormiguero, and Guadalupe—and a number of partly developed and undeveloped prospects, about 550 acres of mineral land and 12,000 to 14,000 acres of timber and agricultural land. Ore occurs in fissure veins, averaging $7 to $9 in gold and silver. The vein-filling is quartz, sometimes very hard and sometimes soft and friable, and carries silver, sulphur, calcite, iron and manganese. The ore from all three mines is conveyed to the mill by aerial trams.

Development: the Gallardo mine has been opened for a distance of 2,200′ and to a depth of 410′, the Hormiguero mine for 1,200′, and to a depth of 464′; and the Guadalupe for a distance of 1,700′ and a depth of 200′. A new main working shaft is now being sunk on the Guadalupe vein. Other veins are also being developed.

Equipment: includes a 25-stamp mill and cyanide plant with a capacity of 5,000 tons per month. Average extraction is about 90%. Power is steam, using wood as fuel.

Production: 1914, 30,483 tons; 1915, 49,430; 1916, 40,976; 1917, 61,891; and 1918, 55,799 tons.

EL SALVADOR SILVER MINES CO., INC. **SALVADOR**

Offices: 25 Broad St., New York; and Divisadero, Department of Morazan, El Salvador, C. A.

Officers: J. H. Warner, pres.; E. D. Dowling, v. p.; G. W. Griffin, sec.; with G. E. Farish (managing), and Charles Butters, directors. H. M. Case, treas. John Seward, mgr.

Inc. Feb., 1918, in Delaware. **Cap.**, $3,000,000; shares $1 par; non-assessable, 1,150,000 issued. Empire Trust Co., transfer agent; and Franklin Trust Co., registrar, both in New York. Listed on New York Curb.

Company was organized to acquire, consolidate and operate a group of producing mines in Salvador, including the Monte Mayor group, those of Butters Divisadero Co., Butters Potosi Consolidated Mines Co., and the Gigante mine.

Property.

Monte Mayor group: an estate of 3,000 acres, 4½ miles from San Sebastian, Department of La Union, comprising the Monte Mayor, Santa

Gertrudis, Banadero, El Carao, and Los Tunos mines; the first named being the most important. Also owns rights on estates nearby covering 2,500 acres.

The Monte Mayor mine has an oreshoot 500 feet long opened to a vertical depth of 120′; the Santa Gertrudis orebody is 200′ long and opened to depth of 150′; the Carao oreshoot is 200′ long and developed to a depth of 70′, the veins persisting at depth in all mines. Surface work on Banadero and Los Tunos show a strong vein, and indications of good oreshoots. The Temisque and Jimerito claims cover a well-defined vein, parallel with the Monte Mayor. In the former, the shoot is 220′ long and opened to depth of 80′.

Butters Potosi: the Potosi mine, 25 miles west of the Divisadero. Extensive development has proven considerable ore, with every indication of a continuation of the ore shoots downward.

Butters Divisadero: 7,000 acres, 14 miles west of Monte Mayor, and 24 miles north of San Miguel, the nearest rail point connecting with La Union on the Pacific Coast, Department of Morazan. The important mines of this group are the Divisadero, La Matilde, San Francisco, Carolina, Portectora, and Gigante; also leases on the Encuentros and Loma Larga mines. The Divisadero is the most extensively developed mine, including the Matilde and Carolina which belong to it.

Workings extend to depth of 700′ on the incline and for a length of over 2,000′.

Gigante: this mine, situated about six miles east of Divisadero, is opened to depth of 100′, with promising indications, and estimated to contain a total of 26,960 tons valued at $301,716, of which $138,336 would be profit.

Ore reserves in the three groups may be summarized as under, excluding Gigante:

	Tons	Gross Value*	Per Ton	Costs	Per Ton	Net Value	Per Ton
Monte Mayor.....	44,774	$647,230	$14.45	$278,644	$6.25	$368,586	$8.20
Butters Divisadero.	129,992	1,408,869	10.83	855,612	6.58	553,257	4.25
Butters Potosi.. .	18,167	224,544†	12.36	100,468	5.54	124,076	6.82
Total	192,933	$2,280,643	$11.82	$1,234,724	$6.40	$1,045,919	$5.42

* Silver at 80c. per ounce. † All gold.

Equipment: Monte Mayor—present plant cost $161,983; and includes hydro-electric and steam power-plants, mine machinery, 10-stamp mill, cyanide plant, store and quarters.

Divisadero—oil-storage tanks, 14-mile oil pipe-line, steam and Diesel oil engine plant generating 1,100-h. p., transmission-line, hoists, pumps, compressors, aerial tram, 400-ton cyanide mill, foundry, machine-shops, store, dwellings, etc., valued at $560,696, and supplies worth $112,453.

Potosi—power-plant, hoists, machine shop, etc.

Production:

Mine	Years	Ore, Tons	Gross Value
Monte Mayor.....	3	23,382	$233,818
Divisadero	13	.....	5,194,967

The Divisadero yield represents 93,971 oz. of gold and 5,657,128 oz. of silver.

This consolidation of both proven and developing mines gives stability and long life to the company and should result in economical operation and earnings warranting early and long continued dividends.

MONTE MAYOR MINES, INC. SALVADOR

Controlled by El Salvador Silver Mines Co., which see.

WEST INDIES

Including Cuba, Hayti, San Domingo, and Porto Rico.

CUBA

METAL MINES OF THE REPUBLIC

The following mines, active at last accounts, are grouped by States:

Pinar del Rio

Asiento Viejo (copper).
El Brujo (copper).
Buena Vista Mining Co. (copper).
Cia. Minera de Cobre de Pinar del Rio y San Juan (copper).
Constancia (copper).
Francisco Mining Co. (copper).
Matahambre (copper).
Mercedita (copper).
San Gumersindo (copper).
Cia. Minera Occidental de Cuba (copper).

Mantanzas

Jack (chrome-iron).

Santa Clara

Carlota (copper and sulphur).
Mercedes (iron and copper).

Oriente

Cauto Mining Co. (manganese).
Cia. Mercantil de Creditor (manganese and copper).
Cuban Mining Co. (manganese).
Juragua Iron Co. (iron ore).
Ponupo Manganese Co. (manganese).
Spanish American Iron Co. (iron ore).

Mining in Cuba was extraordinarily active in 1917-18, but very dull during 1919, when one of the largest mining properties was closed indefinitely. The chrome and manganese deposits were examined for the U. S. Government in 1918 (described in Bull. 380 of the U. S. Geological Survey and in Bull. 153, September, 1919, of the A. I. M. & M. E.)

CUBA COPPER CO. **CUBA**

Office: 60 Wall St., New York.

Operations discontinued January, 1919, on account of low grade of the ore and abnormal conditions. Equipment being sold. See Vol. XIII for history and description of operations since 1907.

LOS CERROS COPPER CO. **CUBA**

Office: Blackstone Bldg., Cleveland, Ohio.

Officers: W. I. Boardman, pres.; W. C. Watkins, v. p.; Sherman C. Dalbey, sec.; W. L. Rees, treas.; Col. D. H. Pond, gen. mgr.

Inc. Aug. 12, 1905, in Arizona. **Cap.**, $500,000; shares $100 par.

Property: 2 claims, 100 acres, also 1,500 acres of non-mineral land, near Fomento, Prov. de Sta. Clara, Cuba, opened by 3 shallow shafts and 5 tunnels, longest 250', showing ore assaying 10% copper, 20 to 25% zinc, 20% sulphur and 30% silica, with gold and silver values. Zinc apparently decreases at depth.

The vein has a 12′ to 15′ gossan outcrop along its strike. Property is an antigua last operated in 1750. The ore though mostly low-grade and zinciferous can be concentrated and property is considered worthy of further development under competent direction.

MATAHAMBRE MINES **CUBA**

Address: A. H. Diaz, Consulado 57, Havana, Cuba. D. F. McCormick, Matahambre, Pinar del Rio.

Property: 12 patented claims, leased by estate of M. L. Diaz, about 1,000 hectares, in province of Pinar del Rio, 110 miles west of Habana.

Geology: ore occurs in lenses in a series of fault veins cutting the sedimentary rocks; the ore is a clean sulphide which carries copper (17%), gold and silver.

Development: by 600′ vertical shaft and tunnels.

Equipment: includes double-drum Lidgerwood hoist, Ingersoll compressor, De La Vergne oil engines, tramway, and 200-ton concentrator. A powerplant is to be built.

Production: 6,000,000 lb. in 1914; 40,000 tons of 12% ore in 1915; 80,000 tons in 1916; and 25,000,000 lb. in 1918.

PINAR COPPER CO. **CUBA**

Address: C. H. Hyde, 120 Broadway, New York.

Officers: C. H. Hyde, pres.; Caldwell Hardy, v. p.; with W. H. Hinkle, I. J. R. Muurling, G. H. Rohrdanz, and C. S. Sweetland, directors.

Cap., $5,000,000; shares $1 par; $3,546,000 outstanding. Listed on New York Curb. Registrar & Transfer Co., New York, agents.

Property: El Mono claims adjoining the Matahambre copper mines, near city of that name in Pinar del Rio, Cuba.

PONUPO MANGANESE CO. **CUBA**

Out of business. Formerly controlled by Chas. F. Rand, 61 Broadway, New York City. See Vol. XIII for description.

WEST INDIES MINES DEVELOPMENT CO. **CUBA**

Address: 25 Broad St., New York.

Property: the Constancia and other copper mines near Viñales, Western Cuba, and north of the Matahambre mine. M. Paetzold, former Austrian consul at Habaña, controls mines.

HAYTI AND SANTO DOMINGO

BLANTON COPPER MINING SYNDICATE **SAN DOMINGO**

Inactive. **Address:** The Bourse Bldg., Philadelphia, Pa. **Mine office:** Bucaro, San Cristobal, Santo Domingo.

Officers: E. J. Hedden, pres.; H. A. Smith, sec.; J. B. Thom, treas.; with M. W. O'Boyer, A. D. Blackinton, J. F. Wilt, directors. F. T. Eddingfield, mgr., Santo Domingo; Otto Peterson, supt.

Inc. Feb. 16, 1910, in Delaware. **Cap.,** $500,000; shares $25 par; nonassessable; $360,000 outstanding. Authorized bond issue, $400,000; $180,000 outstanding. Annual meeting, first Monday in January. Total receipts from ore sales from October, 1915, to July 15, 1916, amounted to $45,193, or net cash, $32,440, for 857 tons selected ore, the ore averaging 12.4% copper and $1.60 in gold and silver. Shipments from January-July, 1917, totaled 231 tons of 12.78% copper ore. This ore is hand sorted about 10 into 1. Property examined and reported on by F. Lynwood Garrison, Thos. F. Donnelly, Henry D. Adams, and F. T. Eddyfield.

Property: 1,700 acres, held under government concession, including the Bucaro mine, on the Rio Nigua, 27 miles west of San Domingo, bought of San Christobal Mining Co. Property shows orebodies in limestone, near a porphyry contact, one orebody in the Bucaro mine carrying chalcopyrite, bornite and chalcocite, all auriferous and argentiferous.

Development: by tunnels, the work aggregating 3,500′ in 1917. Company reports 35,000 tons ore blocked out and that property is near the profitable

stage. The Ferdinand vein opened for 200′ on No. 1 level is said to average 16′ of 4% ore for 150′, and has 25,000 tons nearly probable ore. The Santiago vein appears to be 40′ to 80′ wide and assays ½ to 1½% copper for levels 130′ apart along 200′ drift.

Company out of funds and properties idle.

HAYTI MINES CO. **HAYTI**

Address: 25 Broad St., New York City.

Inc. 1910, in New York. **Cap.,** $1,000,000; shares $5 par; non-assessable.

Is a New York corporation. Property is held by the Minière de Terre Neuve, a Haitian corporation, whose title is direct from Haitian government, to whom company must pay 5% royalty on all copper or other ores mined, from a concession covering 250 square miles N. W. of Gonaives, Hayti.

The property contains at Memé a contact metamorphic deposit of bornite ore in garnetized Tertiary limestone, invaded and altered by andesite and by quartz diorite. Also veins of copper ore in the eruptive rock at and near the village of Terre Neuve. Considerable surface stripping and numerous shallow shafts and short tunnels have been driven on the property, and shipments of sorted ore made to New York smelters. Reports on property made to Vogelstein & Co. by Duncan Rogers and Bela Low. Examination also made by J. H. France and W. H. Weed.

PORTO RICO

Several copper deposits are known in this island, some of which were prospected 75 years ago, but since American ownership no mines have been worked or even prospected. The Department of Agriculture and Labor was to issue a bulletin on mining opportunities in this Territory.

ABUNDANCIA; MINA LA

Mine near Rio Blanca, Porto Rico, opened in 1869. Produced a small quantity of rich oxidized ore from a paystreak of 8 to 15″, carrying bornite and chalcopyrite averaging 10 to 12% copper, in a 6 to 10′ vein of cupriferous pyrrhotite. Idle for several years.

SOUTH AMERICA

ARGENTINA

FAMATINA CO., LTD. **ARGENTINA**

The company's property is operated by a receiver and manager, appointed June 27, 1913, on behalf of the prior lien and other debenture holders.

Office: 638 Salisbury House, London, E. C., England. **Directors:** Wm. Parker, D. H. Bayldon, and G. E. Stephenson. F. F. Fuller, sec.

Company is a reconstruction of the Famatina Development Corporation, Ltd. **Inc.** June, 1912. **Cap.,** £800,000 shares 10s. par; 1,523,489 issued and fully paid, of which 1,126,165 are credited 7s. paid. Bonds authorized, £200,000 6%, of which £151,500 are issued.

Property: 850 acres, in 4 groups, in the Mexicana district of the Sierra Famatina range, province of Rioja, Argentine Republic, including the 6 principal mines of the district, the Upulungos group, Mellizas group, Compania group and San Pedro group. These lands lie at an elevation of 15,000′ and are very difficult of access and transport.

The company has inherited a troublesome problem and a variety of financial as well as mining troubles. Fresh capital was put into the company in 1912, with the understanding that the property would be profitable as soon as smelting was resumed. The then manager, Mr. Parker, stated, May, 1913, that the assay-value of the ore had been overestimated, and that the ore extracted is lower grade than previously reported. The smelter is not yet complete nor running smoothly, and the finances of the company are in a bad way, the £20,000 guaranteed by the big stockholders having been spent and the directors seeking further funds. Mines regarded as good, but company overcapitalized.

No recent information is available, save that the property was examined in 1919 by Bancroft Gore, of New York. Operations are to be resumed 1920, the new machinery ordered including a 7,000 cu. ft. blower.

NATIONAL LEAD CO. OF ARGENTINA **ARGENTINA**

Subsidiary of National Lead Co. of 111 Broadway, New York, organized to manufacture mixed metals in the republic.

BOLIVIA

ARACA; COMPANIA MINERA DE **BOLIVIA**

Office: Oruro or Santiago, Bolivia. Mine at Araca, Bolivia.

ARAMAYO FRANCKE MINES, LTD. **BOLIVIA**

Office: H. F. Ings, sec., 148½ Fenchurch St., London, E. C. 3, England. **Mine office:** Quechisla, Bolivia.

Directors in England: F. A. Aramayo, chairman; Bernard Dale, L. A. Kensington, Robt. G. Ribon, and F. J. Torromé.

Directors in Bolivia: F. A. Aramayo, chairman and managing; C. V. Aramayo, C. Navarro, and M. Roberts (gen. mgr.).

Inc. Oct. 17, 1906, as Aramayo Francke & Co., Ltd. **Cap.,** £600,000; shares £1 par; £597,090 outstanding. Name of company changed to present title, January, 1911.

Profits have been as follows: £135,764 in 1914; £3,504 in 1915; £167,559 in 1916; £198,314 in 1917.

Dividends: 6d in 1909; 1s 6d in 1910; 2s in 1911; 3s in 1911-'12; 3s 6d in

1912-'13; 2s. in 1913-'14; 1s. 6d. in 1914-'15; 3s. in 1915-'16; 3s. in 1916-'17; 6s. in 1917-'18; and 3 s in 1918-'19 to February, 1919.

Property: consists of the consolidated mining rights over the mountain group of Chorolque, 817 hectares, containing tin, bismuth and wolfram; the concentration works of Santa Barbara, Santa Elena and Sala-Sala; the establishments of Cotani, with its mines; the Quechisla smelter; the mines at Tasna, covering 1,460 hectares, with concentrator and smelter at Buen-Retiro; the mines at Churquini, Chocaya, 81½ hectares, the estates of Quechisla and Atocha and the concentrating plant at Asllani, besides other mining rights of lesser importance.

At Chorolque the company operates 2 groups of mines, the Chorolque at 18,000', with veins averaging 3' wide cutting andesite near limestone contact. Company operations at Chocaya yield silver-tin ores from narrow (1'-3') veins in dacite intrusive in slate. At Tasna, bismuth ores are mined.

Production—the products are varied, as shown below:

Year	Black Tin, Tons	Copper Matte, Tons	Silver, Oz.	Wolfram, Tons
1916-'17.....	2,059	118	523,284	227
1915-'16.....	2,095	19	110,000	148
1914-'15.....	2,060	111	.....	...
1913-'14.....	3,442	342	.....	...

Company is one of the largest operators in Bolivia.

BERENGUELA TIN MINES, LTD. **BOLIVIA**

Office: G. E. Elgee, sec., Leadenhall Bldg., London, E. C. 3, England.

Directors: J. Macandrew, chairman; J. L. Barber, J. D. Campbell, H. M. Read, and J. W. Read. C. L. Price, mgr.

Inc. April 20, 1905, in Great Britain. **Cap.,** £20,000; £1 par; all issued.

Profit in 1917 was £9,083, of which £4,000 was distributed; £9,038 was carried forward.

Dividends: 20% in 1916 and 1917.

Property: 123 acres of tin claims at Berenguela in Bolivia, equipped with a concentrating mill.

Production: 202 tons of tin concentrate (71% metal) in 1914; 193 tons in 1915; 324 tons in 1916; and 348 tons in 1917.

CASA BELIN HERMANOS **BOLIVIA**

Office and mine at Potosi, Bolivia.

COROCORO DE BOLIVIA, COMPANIA **BOLIVIA**

Mine office: Coro Coro, La Paz, Bolivia. G. B. Lott, mine supt.

Inc. April 23, 1873, in Bolivia. **Cap.,** 1,025,000 bolivianos.

Property: 500 hectares; is the largest copper mine in Bolivia, employing, at last accounts, about 1,000 men. Mine 530 meters deep, is opened on steeply inclined sandstone and conglomerate strata carrying native copper, and rarely native silver, with occasional cuprite and chalcocite.

Development: by six vertical shafts timbered with 8x10" Oregon pine and equipped with electric hoists ranging from 50 to 180 h. p. The ore when mined is soft, and even when dry disintegrates in the hand. The copper is between the grains of sand so that grinding in the usual sense is not necessary. Two 12x18" jaw crushers will disintegrate 1,000 tons in 10 hours. Jigs obtain 95% of the total mill recovery. Capacity of mill is 200 to 250 tons of ore per day with heads assaying 2 to 3% copper.

Equipment: includes a narrow-gauge line between shafts and mill operated by gasoline locomotive, 1,500-h. p. Diesel engines and a mill. The product is exported as "copper mineral," production ranging from 800 to 1,200 quintals of 46 kilos, monthly, of "barillas de cobre" of about 85% average copper tenor. Copper sulphide, as chalcocite, is exported as crude ore at the rate of 1,500 metric tons monthly of 18% copper.

COROCORO UNITED COPPER MINES, LTD. **BOLIVIA**

Registered office: 5 Lothbury, London E. C., England. **Main office**

7 Rue des Italiens, Paris, France. **Mine office:** Corocoro, La Paz. Bolivia.

Officers: Baron René de Batz, chairman; J. L. Barber, P. Bebin, A. Berthin, N. Berthin, G. Charbonnel, F. Harrington, L. Monnier, Baron C. Portalis, and Baron F. Portalis, directors; G. Bryans Wolfe, sec. in London; Roger Leo, sec. in Paris; F. J. Dorrian, gen. mgr.

Inc. Aug. 6, 1909, in Great Britain. **Cap.**, F700,000; shares F1 par; 673,607 issued, fully paid. Company took over the properties of J. K. Child & Co., Ltd.; Sucesión Noël Berthin; Compania Sud Americana de Cobre de Corocoro, and Carreras Hermanos.

Profit for year ended June 30, 1918, was £168,128, of which £155,448 was paid in dividends. Balance earned to 1919, was £41,547. Reserves total £170,000.

Dividends: 120 francs in 1912-'13; 60 centimes in 1913-'14; 1 franc in 1914-'15; 3 francs in 1915-'16; 6 francs in 1916-'17; and 6 francs in 1917-'18.

Property: 515 hectares at 12,000′ elevation, in the Corocoro district of central Bolivia. The principal mines are the Vizcachani, Santa Rosa and Guallatiri. The first was formerly owned by J. K. Child & Co; the second, by Carreras Bros., and the third by the Noël Berthin estate.

Geology: the copper is found native in several beds of sandstone inter-stratified with reddish and brownish shale. The ore-bearing beds occur in 2 series, separated by a strong fault. Beds to the east of this fault are known as "ramos" and dip east, the copper-bearing strata being succeeded by a considerable thickness of red slates capped by green slates and limestone, overlain in turn by red clay and brown sandstone. Beds west of the fault are known as "vetas," or veins, and are much harder than the copper-bearing ramos. The mineralization is not uniform and the native copper occurs in particles scarcely visible to the naked eye, as well as in grains, plates, threads and, sometimes flat masses weighing several hundred pounds. The main fault, known as Dorado vein, is also mineralized, and was once the main producer of the company, yielding sulphides and arsenides of copper. It is supposed that this fault was the feeding fissure whose solutions spread into the sandstone and were precipitated by organic matter; but there are also other geological theories.

The mine workings have not yet crosscut very far into the series, but show at least 4 ramos and 6 vetas, the four former are divided into 7 cuerpos, or beds, and the 6 veins into 10 to 14 beds. Some of these beds have 7 to 8 meters of homogeneous ore, the white ramos being 30 metres wide on the 10th level of the Vizcachani shaft, of which 8 meters are mined as ores. The beds average 10 meters workable thickness with an average content of 3½%.

The district is extremely arid, without timber, and almost without shrubs, and extensive use is made of a local fuel, called taquia, which is currently used for firing boilers and also for drying ores, and in the past was even used for smelting.

Work was recently started on the croppings of several beds where the mineralization appears in the shape of sulphides. These sulphides, after hand-sorting, are bagged and shipped. Company has erected a flotation plant for the concentration of the ores; the starting capacity being 125 tons daily.

Development: the mine openings in the conglomerate strata stand fairly well, though with some crushing, and levels average 25 metres apart. Winzes are inclined, with steps cut. Little timbering is used, except for shafts, owing to its great cost, timber being imported mainly from North America, and the workings are secured principally by the poteo or dry-walling system. Steel is used for arching lateral workings.

The property is divided into 4 operating units, the principal and active sections being the Corocoro and the Guallatiri. The former has a vertical shaft 420 meters deep, equipped with a steam plant, and ore-sorting and crushing plant. The Guallatiri has shafts of 180 and 350 meters.

Equipment: ore is treated in 3 mills of 10 to 100 tons daily capacity, making a product known as "barilla," or crude copper mineral, of 80 to 88% copper tenor, which is shipped to Europe for refining. An electric power plant of 500-k. w., in which alternators are driven by semi-Diesel engines, has been erected, and a further increase of 300-k. w. is contemplated.

Production: in 1912 was 4,100,000 lb. fine copper; in 1913, 3,784,000 lb.; in 1914, 4,150,000; in 1915, 7,166,000; in 1916, 11,300,000 lb. During 1917-'18, there was mined 169,561 tons of ore, averaging 3.83% copper. This was sorted to 118,209 tons containing 5.49%; while mill products, etc., amounted to 22,633 tons, averaging 2.87%. Total copper output was 14,311,360 lb.

Owing to the remote and almost inaccessible location of these mines, past production has been small, compared with possibilities, but the company is making progress and output is steadily increasing since rail communication has been established. The property is considered decidedly promising.

EMPRESA AVICAYA — **BOLIVIA**

Mine address: Aricaya, via Pazña, Bolivia.

EMPRESA NUEVA PENNY & DUNCAN — **BOLIVIA**

Office: Oruro, Bolivia. Mine at Morococola, Bolivia.

EMPRESA SOUX HERNANDEZ — **BOLIVIA**

Office and mine at Potosi, Bolivia.

HUANCHACA DE BOLIVIA, COMPANIA — **BOLIVIA**

Offices: C. Fresno, Calle Pratt 141, Valparaiso, Chile; and J. del Rio, 22 Rue de la Pepinière, Paris, France.

Directors: A. Alessandri, pres.; R. Couzinier, v. p.; C. E. Devincourt, M. Edwards, and R. Wedeles; J. C. Tonkin and T. E. Allen, min. engrs.

Inc. 1873, in Bolivia. **Cap.,** 40,000,000 francs; shares f. 125 par; all issued. Listed on Paris Bourse.

The year 1917 resulted in a loss of £27,989 with debit balance of £58,607, and £64,583 in reserve fund.

Dividends: £2,112,000 from 1899 to 1908, inclusive; nothing since.

Property: 3,300 acres, including silver mines at Pulacayo (or Huanchuca), Potosi, Bolivia. **Equipment:** includes 25-mile railway, and 2 smelting works.

Production: 1,168,000 oz. of silver in 1917.

HUAYUA-POTOSI y MILLUNI, COMPANIA — **BOLIVIA**

Office: Huet Hnos, La Paz, Bolivia. Mines at Milluni, Bolivia.

INTERNATIONAL MINING CO. — **BOLIVIA**

Offices: W. R. Grace & Co., 7 Hanover Square, New York; and La Paz, Bolivia.

Officers: D. S. Inglehart, J. Louis Schafer, J. E. Zallas, and J. M. Connal, manager, directors.

Inc. July 1, 1918. Owns tin and wolfram mines in Bolivia.

LLALLAGUA TIN CO. — **CHILE AND BOLIVIA**

Address: Oruro, Bolivia, and Arica, Chile.

Cap., £425,000. Financial statement for 1917 showed a profit of £1,407,048, of which £637,500 was distributed in dividends. Reserve fund totaled £1,316,000, including £850.000 for dividends and interest; £153,000 for new works; and £93,000 for exploitation.

Development: by a main haulage tunnel called Siglo XX, which is 8,420 meters long, and cost 1,394,365 bolivianos. At the beginning of 1918, the ore reserves were 261,902 tons, averaging 14.33% tin, equal to 37,544 tons of metal.

Production: 7,460 tons of "barilla" (tin concentrate) in 1916, compared with 11,250 tons in 1917. Costs averaged $172.80 in 1916, and $156.80 per ton of concentrate in 1917.

At Arica, Chile, company operates a smelter of 1,500 tons monthly capacity of concentrate. Is one of the greatest tin producers in the world.

OLLA DE ORO (BOLIVIA) GOLD MINE, LTD. — **BOLIVIA**

Office: 33 St. Swithin's Lane, London, E. C., Eng. **Directors:** A. F. Martin, chairman; R. R. Harris and W. E. Hall. E. T. Roe, sec. I. G. Preumont, mgr., La Paz, Bolivia.

Inc. Aug. 18, 1909, in England. **Cap.,** £40,000; shares £1 par; all issued.

Dividends: 5% in 1913; 6¼% in 1914.

Property: 5 groups, 302 pertenencias, 720 acres, on the Umabamba river,

La Paz, Bolivia, carrying gold ore in quartz veins in slate and quartzite. Vein is 2-6′ wide and ore averages about ½ oz. gold per ton with a little silver.

Development: by several tunnels, longest 800′.

Ore reserves: estimated at 35,000 tons in sight with 9,600 tons broken ore in stopes.

Equipment: includes mining plant and a mill with 140-h. p. turbine, 2 Hardinge ball and 2 pebble mills, compressor, electric power and tram lines. Plant capable of treating over 100 tons daily. Over 85% of the values are saved by amalgamation.

Production: owing to loss of mill was but 9,920 tons in 1914; 21,426 tons in 1915; yielding 4,949 oz. gold. In 1916 various lawsuits involving title to company's claims were decided in its favor.

Company has had severe hardships to combat, cloudbursts wrecking the mill in December, 1912, and again in March, 1914, so that both mining and milling operations were transferred to a new site. Ore value had decreased to 0.3 of an ounce gold for 5′ width, at last reports.

OPLOCA DE BOLIVIA; CIA MINERA y AGRICOLA **BOLIVIA**

Office: Santiago, Chile. Mines at Chocaya, Bolivia.

ORURO; COMPANIA MINERA DE **BOLIVIA**

Main office: Huerfanos 1326, Santiago, Chile. Mine at Oruro, Bolivia.

Officers: Don Leonidas Vial, pres.; Don C. A. Solar, L. B. Borgono, Carlos Besa, A. G. Errazuriz, J. A. Orrego, directors. H. F. Grondijs, cons. engr.; P. F. Bliek, mgr.; M. G. Sohnlein, mill supt.

Cap., Bolivianos, 4,000,000. outstanding 300,000 shares. Financial statement for 1918 shows net profit of Bs, 664,910, bringing reserve fund up to Bs. 3,532,497. **Dividends:** has paid 15 dividends of Bs 2. per share.

Property: at Oruro, includes the Mina Socovan, Itos, La Colorado, Atocho, and Escuelas, in which are several veins, the principal ones being the Dolores and the Purisima.

Development: at Mina Itos by 420 m. shaft on a vein 0.40 m. wide, which, in 1918, produced 7,246 tons of ore that averaged 16.5 kilos silver and 3.80% tin per ton. The Mina Socovan has 270 meter shaft from which 10,360 tons of ore was mined in 1918 that averaged 7.17 kilos silver and 1.69% tin.

Reserves: at Mina Socovan, about 23,900 tons that average 5.5 kilos silver per metric ton, and 1.15% tin. Mina Itos reserves total 3,700 tons, and average 28 kilos silver and 3.0% tin.

Equipment: includes hoists, 100-h. p. compressor. Diesel engine, electric power, buildings, etc. Mill at Machamarca includes McDougall and Merton roasters, Hardinge mill, tables, jigs, etc.

Production: in 1918 was 1,110 tons of barilla (concentrate) carrying 59.41% tin.

Company has a good property, ably managed.

For geology of district, see Miller-Singewald Min. Deposits of So. America, p. 110.

PATINO; SIMON I. **BOLIVIA**

The largest tin operator in Bolivia, owning the Huanuni mines.

PORCO TIN MINES LTD. **BOLIVIA**

Office: H. F. Ings, 148½ Fenchurch St., London, E. C. 3, England.

Directors: E. Hooper, chairman; L. A. Kensington, R. G. Ribon, and J. Macandrew. A. B. Reece, gen. mgr.; M. Roberts, cons. engr. Avelino Aramayo & Co., general agents in England.

Inc. Sept. 27, 1912, in England. **Cap.,** £140,000; shares £1 par; 120,075 issued. Debentures: £19,900, 6%.

The year 1917 ended with a loss of £272. Current assets were £11,381, and liabilities, £58,003. Profit in 1918 was £777, and indebtedness to Avelino Aramayo amounted to £57,202.

Property: 400 acres, 25 miles from Potosi, Bolivia. Mines were worked in the 16th century for silver, but are now worked for tin. The district is mountainous, up to 17,000′ at one point. (See Eng. & Mng. Journal, February 24, 1917).

Geology: the Porco company is working tin deposits in igneous agglo-

merate, tuff and quartz porphyry. The San Jose vein is a shattered zone with orebodies of massive pyrite, low in tin, but with 8 oz. silver per ton. One shoot is 500′ long and 6½′ wide. Another is 170′ long and 8′ wide, assaying 3% tin.

Development: by tunnels, open cuts and drifts. Reserves in 1918 were 315,000 tons of 1.67% tin content.

Equipment: includes 2½-mile aerial tram and a 100-ton mill, 2 ball mills, screens, jigs, Wilfley tables, Huntington mill, classifiers, Humboldt tables, buddles, etc. The tailing is cyanided for the silver. Mill at Agua Castillo recovers only about 60%.

Production: in 1915, 168,000 lb. tin; in 1916, 443,500 lb.; in 1917, 20,404 tons of ore yielding 307 tons of tin oxide; in 1918, 274 tons of tin. Mill ore averages 2½% tin and 12 oz. silver per ton; 20,404 tons of ore yielding 307 tons of tin oxide, compared with 17,320 tons of ore and 274 tons of tin in 1918.

ROYAL SILVER MINES, LTD. **BOLIVIA**

Operates silver-tin mines at Potosi, mining through the Socovan Real. This company, together with Bebin Hermanos and Louis Soux, control operations at this famous camp.

SAN JOSÉ; CIA. MINERA DE **BOLIVIA**

Is a Chilian company operating tin mines at Oruro. See Cia. Min. de Oruro.

TOTORAL; SOCIEDAD ESTANIFERA **BOLIVIA**

Office: Santiago, Chile. Mine at Totoral, 7 miles from Pazna, Bolivia.

UNCIA; COMPANIA MINERA DE **BOLIVIA**

Office: Oruro, Bolivia. Company owns mines at Uncia, and the Huanuni mine.

BRAZIL

The mineral deposits of Brazil include two important gold mines and the remarkable diamond bearing conglomerates and gravels near Diamantina, in Minas Geraes, about 300 miles due north of Rio de Janeiro. It is also the world's largest producer of monazite sand. Manganese is at present the most important mineral product of Brazil, though the great deposits of iron ore are without doubt the most extensive undeveloped deposits of any country in the world.

BRACUHY FALLS CO. **BRAZIL**

Address: Joaquin de Almeida Lustoza, Ouro Preto, Brazil.

Property: the Serra do Mascate, Mendonca, and Inhotin iron deposits containing over 29,000,000 tons of iron ore.

BRAZIL; CIA. de MIN. y MET. do **BRAZIL**

(Brazilian Mining and Metallurgical Co.)

Address: Rio de Janeiro, Brazil.

Property: iron mines acquired from Antonio da Costa Lage of Rio.

BRAZILEVIA, COMPANHIA METALLURGICA **BRAZIL**

Address: Rio de Janeiro, Brazil.

Property: 8 manganese mines in State of Minas Geraes, estimated to contain 100,000,000 tons of ore.

BRAZILIAN IRON STEEL CO. **BRAZIL**

Address: M. Harder, Rio de Janeiro, Brazil.

Property: the Cana and Santa Anna iron ore deposits containing 132,000,000 tons, and the Algeria and Cota deposits of 10,000,000 tons. A concession is held for construction of a railway.

ITABIRA IRON ORE CO., LTD. **BRAZIL**

Office: R. S. Long, 81 Gracechurch St., London, E. C. 3, England.

Directors: G. W. B. Pease, chairman; Sir A. J. Dorman, F. W. Lund, J. Whishaw, I. H. Benn, P. M. Gotto, and F. A. E. Samuelson. G. H. Robinson, engr., Itabira, Brazil.

Inc. March 31, 1911, in England. **Cap.,** £2,000,000, in 500,000 pfd., 359,438 issued; and 1,500,000 ord. £1 shares, all issued.

Notes: £345,000, holders having the right to form a new company to take over the property in 1921.

Property. 18,271 acres in the Province of Minas Geraes, Brazil. Ore reserves are estimated at 140,000,000 tons of hematite, assaying 69% iron; also 20,000,000 tons of second grade, and 330,000,000 tons of soft ore. A royalty of 6d. (12c.) per ton is payable to the B. H. Syndicate, Ltd., the previous owners.

OURO PRETO GOLD MINES OF BRAZIL, LTD. **BRAZIL**

Office: G. H. Wells, 6 Queen St. Place, London, E. C. 4, England.

Directors: J. Taylor, chairman; E. Beer, M. Paisant, R. Taylor and E. F. H. de Wael. A. J. Bensusan, mgr.; John Taylor & Sons, mgrs.

Inc. July 10, 1914 (originally Jan. 31, 1884), in England. **Cap.**, £100,000 in 60,000 10% non-cumulative pfd. and 40,000 ordinary £1 shares, of which 12,212 and 39,422 are issued respectively. Recent profits have been £7,402 in 1914; £9,545 in 1915; £7,243 in 1916; and £4,834 in 1917. Working capital at end of 1917 was £35,692.

Property: a concession of 3½ sq. miles in the province of Minas Geraes, Brazil, including the Passagem mine, which had reserves estimated at 74,700 tons at the end of 1915, and 61,230 tons at end of 1917. It is second only to the Morro Velho in importance and worked since 1817.

Equipment: includes 80-stamp mill and cyanide plant, extracting 92% of the gold. The Santa Anna section of property contains workable manganese, which is being shipped. Ore is somewhat refractory, containing arsenic.

Production:	Tons	Gold, Oz.	Value
1918	63,400	22,532	£90,130
1917	82,500	28,840	115,432
1916	87,600	30,244	121,233
1915	85,400	30,203	120,591

In Nov., 1919, the mine yielded 7,200 tons, from which £13,280 was recovered. The geology of the district and mine are described by Miller & Singewald, in Mineral Deposits of South America, 1919.

ST. JOHN DEL REY MINING CO., LTD. **BRAZIL**

Office: S. E. Berry, Finsbury House, Bloomfield St., London, E. C. 2, England. **Mine office:** G. Chalmers, supt.; A. G. W. Chalmers, asst. supt., Morro Velho, Minas Geraes, Brazil.

Officers: Sir H. P. Harris, chairman; J. R. Remnant, E A. Goulding, H. LeRoy Lewis and C. F. W. Kup, managing directors.

Inc. 1830, in England. **Cap.**, authorized, £800,000, in 600,000 ordinary, 100,000 preference, and 100,000 second preference shares of £1. Issued, £646,265, in 546,265 ordinary and 100,000 preference shares, fully paid. In 1891 capital was increased from £252,000 to £432,000; in 1893 to £462,000; in 1895 to £500,000; in 1895 to £600,000, in 1904 to £700,000, and in 1910 to £800,000. Preference shares are entitled to a non-cumulative dividend of 10% (paid free of income tax in December and June), and to priority for capital, without further participation. Second preference shares will be entitled to a non-cumulative dividend of 10%, and to priority for capital over ordinary shares, without further participation. Net profit for year ended February 28, 1917, was £132,637; £157,736 in 1918; and £119,000 in 1919. Reserve fund is £100,000.

Dividends: from 1842 to 1867, £896,500 on ordinary shares; since then these shares received a total of 320% to 1910, after which 10% per annum to 1917, and 3¾% in 1918.

Property: the Morro Velho and Cuba gold mines and iron deposits in State of Minas Geraes, Brazil. Considered the oldest and deepest modern mine in the world, as work has been continued since 1830, and workings are 6,126′ deep vertical. The iron deposits contain 300,000,000 tons of ore, carrying 60% metal. There is also a manganese deposit assaying 47 to 51% Mn. and 8 to 11% Fe.

Development: amounts to about 4,000′ yearly. Below No. 20 level, 5,900′ deep, there has been opened 844′ of lode. Temperature on the 6,100′ level is 99° for the air and 108° for the rock. Reserves are estimated at 1,209,104 tons.

Equipment: complete mine, mill, and power plants. Treatment is by 130 stamps, 7 tube-mills, concentrators, roasting furnaces, cyanidation and filters. Aerial trams are used to advantage. Company operates a store, hotel, medical

department, electric railway, farm, and eucalyptus plantation. Power is generated by water at cost of 2.62c. per h. p. day.

Production:

Year	Ore, Tons	Gold, Oz.
1918-'19	167,854	99,874
1917-'18	180,300	109,912
1916-'17	187,400	$12.06 per ton

Returns in 1919 varied between £30,000 and £40,000 monthly.

This is the most interesting mine in South America and in some respects one of the most remarkable in the world. It has been regularly operated since 1834 and although the deepest mine in the world, the orebody has maintained its size and value to the bottom level, 6,126′ below the surface.

SIDERURGIC MINEIRA, COMPANHIA **BRAZIL**

Address: Bello Horizonte, Minas Geraes, Brazil. Also Amara Lanazi, Sao Paulo.

Property: extensive iron and manganese deposits near Sabara, in State of Minas Geraes, together with others in Ouro Preto and other departments.

Equipment: includes a 35-ton blast-furnace, and a plant containing 600 h. p. gas engines, air-compressor, 200 k. w. generator, etc., erected in 1918-19.

WIGG MANGANESE MINES, THE **BRAZIL**

Address: Carlos Wigg, sole owner, Box 1007, Rio de Janeiro, Brazil. Gailey, Davis & Co., agents, Philadelphia, Pa.

Inc. 1870, in Brazil. **Cap.**, $1,000,000.

Property: near Burnier Station, Central Railway of Brazil, State of Minas Geraes. Ore is a contact deposit in itabirite, and carries 50% manganese, under 5% silica, and 0.05% phosphorous. Workings are down to depth of 200′. Reserves are estimated at 400,000 tons.

Equipment: steam-driven generator, hoist, pump, compressor, and tramways.

Production: is 200 to 300 tons of ore daily. Some ore of 80 to 84% manganese dioxide is also mined.

CHILE

This country has been famous for its mineral wealth since the Spanish Conquest. Its numerous and varied deposits have in many cases lost the bonanza ores of the oxidized zone by shallow mining operations, but it is only recently that intensive development of the larger deposits, requiring the investment of vast sums for equipment and development, has been taken up by American capital.

ANDES COPPER CO. **CHILE**

Subsidiary of Anaconda Copper Mining Co.

Office: 42 Broadway, New York.

Officers: L. D. Ricketts, pres.; Wm. Braden and C. F. Kelley, v. p.; A. H. Melin, treas., with John D. Ryan, B. B. Thayer, W. D. Thornton, Messmore Kendall and T. Wolfson, directors. D. B. Hennessy, sec.

Inc. Jan. 20, 1916, in Delaware. **Cap.**, $50,000,000; shares $25 par.

Is a holding corporation, owning all of the issued stock of both the Andes Copper Mining Co. and Potrerillos Railway Co., which see.

Andes Copper Mining Co.

Inc. Jan. 20, 1916, in Delaware. **Cap.**, $50,000,000; shares $100 par.

Property: the Potrerillos mine at Chanaral, Chile, 1,003 acres; mill-site claims, 1,200 acres; mill-site potash claims, 2,954 acres; and inter-connecting mining claims, 144 acres, a total of 5,301 acres. The mine is 90 miles from the coast, in the main range of the Andes. The orebody is about 1,800′ long, 900′ wide and 850′ deep, and occurs in quartz porphyry intruded in limestone.

Development: churn drilling and underground openings proved up 100,000,000 tons of available 1.4% ore up to 1917. During 1917, sixteen drill-holes were finished, aggregating 12,000′ and proving an additional 5,434,081 tons of an average grade of 1.5411% copper. A shaft 90 metres deep was sunk, and 3,750′ of tunnels were driven in the main orebody to check prior sampling.

During 1918, 2,990′ of drift work, raises, etc., was done underground and 11,800′ of drilling added 5,000,000 tons to reserves.

Equipment: includes a mine railway for transportation of ore and supplies from the mines to the reduction works. A 15,000-ton concentrator is now under construction.

The Quebrada pipe-line, consisting of a 3″ steel line 17 miles long, with terminal reservoirs, was brought into Potrerillos in 1917 for the purpose of supplying the camp. The Asientos pipe-line aggregating a total of 96 miles, bringing in the water supply to Barquito for the purpose of supplying the railroad, was completed. Construction progressed on La Ola pipe-line, about 35 miles long, which is to bring water to the mill-site for the purpose of operating the concentrator when completed. Fifteen miles of wagon-road were constructed for this project in 1918. A supply of water for domestic use is being developed at Cajoncito. A model town is being built for housing 5,000 people, with churches, schools—both American and Chilean—office buildings, etc., at the millsite.

A 22,000-k. w. steam turbine electric plant is to be built at Port Chañaral. Power will be transmitted to the mines and works at 100,000 volts.

The Andes is an important addition to the list of big South American copper producers, ranking with Braden, Cerro de Pasco, and Chile Copper.

Potrerillos Railway Co.

Subsidiary of Anaconda Copper Mining Co., through the Andes Copper Co. **Office:** 42 Broadway, New York.

Inc. January, 1916, in Delaware. **Cap.**, $5,000,000; shares $100 par.

Company owns concessions granted by the Government of Chile to William Braden, for construction and operation of a railway in the Republic. A line was laid from the Port of Chanaral to a point on the Government railway, and from the station of Pueblo Hundido, on said line to the Potrerillos properties, a distance of 60 miles. These properties are owned by the Andes Copper Mining Co., which will spend $25,000,000 on construction work commenced in 1916.

BETHLEHEM CHILE IRON MINES CO. CHILE

Subsidiary of Bethlehem Steel Corporation, 111 Broadway, New York.

Property: lands at Tofo, Coquimbo, Chile, estimated to contain 100,000,000 tons of ore averaging 67½% iron, which is to be mined and transported via Panama Canal to the United States at the rate of 1,000,000 tons per annum. Development and construction underway.

BRADEN COPPER MINES CO. CHILE

Controlled by Kennecott Copper Corporation, and is the holding company of Braden Copper Co.

Office: 120 Broadway, New York.

General officers: W. C. Potter, pres.; Stephen Birch, E. A. Guggenheim, and W. P. Hamilton, v. p.'s.; C. K. Lipman, sec.; Leopold Frederick, treas.; W. E. Bennett, asst. sec.; M. M. Van Keuren, comptroller; O. L. Myers, gen. aud.

Directors: Stephen Birch, Thomas Cochran, E. A. and H. F. Guggenheim, W. P. Hamilton, H. O. Havemeyer, C. K. Lipman, W. C. Potter, Seward Prosser, J. N. Steel, and C. T. Ulrich.

Executive committee: W. C. Potter, E. A. and H. F. Guggenheim, Stephen Birch, and W. P. Hamilton.

Inc. May 26, 1909, in Delaware. **Cap.**, $10,000,000; shares $5 par; increased 1911 to $14,000,000, non-assessable; issued $12,953,530 to December 31, 1918.

Bonds: authorized $20,000,000 issue of 15-year 6% sinking fund gold bonds, non-convertible, due February 1, 1931. Issued $17,894,000. For the purchase of this last issue a minimum of $1,000,000 per annum will be applied, payments being made semi-annually, starting February 1, 1917.

Owns entire capital stock and bond issue of the Braden Copper Co. Farmers Loan & Trust Co., New York, registrar. D. A. Crockett, 149 Broadway, New York, transfer agent. Annual meeting, fourth Monday in June.

In December, 1915, offer was made by the Kennecott Copper Corp. to purchase the stock of the company, payment to be made in Kennecott Copper Corp. stock. As an alternative stockholders had the privilege of receiving $15 in cash for each share of the Braden Copper Mines Co. As a result of this offer the Kennecott now owns 99% of the stock of the company, which, based on the market value of stock at the time the offer was made, cost $42,281,300.

Combined Income and Surplus Accounts, years ended December 31:

	1919*	1918	1917	1916
Operating revenue	$977,848	$19,247,230	$13,041,925	$12,648,111
Operating charges	1,222,789	11,689,308	6,699,726	5,057,656
Operating profit	$244,941†	$7,557,921	$6,342,199	$7,590,455
Other income	1,124,687‡	226,241	876,937	385,095
Total income	$879,746	$7,784,162	$7,219,136	$7,975,550
Taxes, interest, etc	1,418,329	1,547,141	1,110,749	1,029,786
Balance to surplus	$538,583§	$6,237,021	$6,108,387	$6,945,764
Charges against surplus	.....	2,540,141	3,245,276	1,865,689
Net surplus	.....	$3,696,800	$2,863,111	$5,080,075
Net balance from previous year	$5,036,540	2,881,198	2,193,628	1,658,629
Total balance	.....	$6,578,079	$5,056,739	$6,738,704
Less unamortized bond discount	.....	1,541,438	1,170,000	1,260,000
Net earned surplus	$4,497,957	$5,036,540	$3,886,739	$5,478,704

*6 months. †Loss. ‡Includes interest, $822,234. §Deficit.

Current Assets and Liabilities, Braden Copper Co., years ended December 31:

Assets.	1918	1917	1916
Invest. in steamers	$426,665	$426,665	$811,280
Supplies and stores	8,921,180	6,135,896	3,619,140
Items in transit	1,379,396	1,706,505	1,208,360
Deferred accounts	191,731	105,869	319,679
Accounts, etc., receivable	1,796,379	337,552	73,460
Ore and copper in process	207,334	195,005	87,687
Copper on hand, etc	4,083,962	3,274,694	4,538,947
Cash	1,618,645	2,292,669	660,625
Total current	$18,625,292	$14,476,855	$11,329,178

Liabilities.	1918	1917	1916
Accounts payable	$962,551	$2,058,185	$2,519,579
Unpaid on copper	188,856	.....	417,777
Drafts payable	4,100,407	3,384,002	1,895,278
Accrued interest	322,892	375,429	297,500
Credits in suspense	125,433	178,202	431,834
Reserve for taxes	526,353	170,828	
Reserve for employees' bonus	197,259	.....	200,000
Reserve for employer's liability	252,697	.....	
Welfare reserve	58,153	38,768	
Surplus from property	3,667,970	3,667,970	3,667,970
Total current	$10,402,571	$9,875,384	$9,429,448
First mortgage bonds	$4,000,000	$4,000,000	$4,000,000
Notes and loans (Braden Copper Mines Co.)	21,069,000	14,175,000	9,995,000

Braden Copper Co.

Office: 120 Broadway, New York. **Mine office:** Sewell, Chile.

General officers: same as Braden Copper Mines Co. G. G. Thomson, purch. agent; Fred Hellman, cons. min. eng.; E. A. Cappelen Smith, cons. met. eng.; H. A. Guess, cons. mill eng.; T. H. Thomas, cons. elect. eng.; S. B. Williamson, constr. eng.; B. T. Colley, mgr. welfare dept.

Operating officials in Chile: S. S. Sorenson, gen. mgr.; L. E. Grant, asst. gen. mgr.; F. D. Helmerich, gen. mine supt.; R. E. Douglass, gen. mill supt.; W. L. Stevens, smelter supt.; J. Chambers, railroad supt.; H. W. Jones, plant comptroller.

Inc. June 18, 1904, in Maine, and name changed to present title, Aug. 9, 1904. **Cap.**, $2,332,030 shares; $10 par; non-assessable; fully issued. Company is protocolized in Chile. Is controlled, through ownership of entire stock issue, by Braden Copper Mines Co. Has a $4,000,000 issue of 6% first-mortgage convertible bonds. Annual meeting, fourth Tuesday in July.

In June, 1919, the floating debt was $21,626,569, compared with $22,031,550 on December 31, 1918. Practically all of this amount has been advanced by the Kennecott Copper Corporation.

Property: the Teniente mines, 606 claims, 7,580 acres, including 16 acres at Rancagua. Mines are reached from Valparaiso by the Chilean State railroad, 158 miles to Rancagua, and from that point by company's narrow-gauge railway, 43 miles to the smelter and mill at Sewell, and 1½ miles farther to the mines. The elevation is 7,700 to 9,000′, the mine being in a very rugged region on a part of the main range of the Andes.

Company has purchased 10,000 acres of mountain land, for a tailings site, which will hold 200 million tons of tailings. It is 8 miles from the mill and together with the dam, will cost $1,200,000.

Another purchase of 40,000 acres surrounding the mine put all the company's works, including the new smelter under construction at Caletones, on the company's own land and carries smoke easements on adjacent tracts.

A third purchase included sundry lots of land and water rights needed for the new power plant on the Pangal river and a right of way for the power line. Large additions were made to the mining property during 1917 and 1918.

Geology: all the rocks are igneous and the rock at the mine is an andesite surrounding a plug of tuff, which fills the throat and crater of a volcano. This light gray tuff is no longer loose and friable, but cemented into a hard concrete-like mass. The ore deposit is unique, being a series of irregular lenses of ore formed about the border of the old plug, slightly tilted to one side. (Graham.) On one edge erosion has removed the mineral deposit. The volcanic vent is of nearly circular section 4,000′ across, and filled by tuff and an agglomerate of rounded boulders of all sizes. The crater rim is surrounded by highly fractured and brecciated andesite, the fractures being mineralized around the circumference. The ore zone has been further fractured by porphyry dikes, which occasionally cut into the tuff.

The orebodies occur around, but outside the rim of the crater, in the andesite near its contact with the tuff. The ore consists of shattered andesite, often finely brecciated near the tuff contact, copper minerals filling the cracks and openings. The ore bodies are limited on one side by the tuff, but in the andesite the grade becomes lower, passing from breccia to fractured rock and fading out in the more blocky country rock. The fractures in the rock range from a mere film of sulphide up to seams 3 to 4″ thick of mixed bornite and chalcopyrite, mainly the latter. The orebodies dip at 70° toward the center of the crater.

Five distinct orebodies have been proven, and four, the Fortuna, Teniente, Centinela and Bornite, are worked. All are marked by strong outcrops stained with copper minerals. The zone of oxidation is shallow, ranging from a few feet to 150′ in depth, and as the deposit consists of disseminated ore, it is believed that values will persist to great depth.

The **Fortuna** orebody is typical of all the deposits. It is lens-shaped in horizontal section, is developed for 3,000′ in length and has a maximum width of 260′. Below the 4th level, 1,425′ beneath the outcrop, little increase in size can

be expected, as the rock is denser and ore is lower grade. The copper occurs as bornite and chalcopyrite, associated with ankerite and quartz. The Fortuna orebody is developed and ready for ore extraction. The shrinkage stoping system, similar to that employed at the Ray Cons., is used. Stopes are carried up 7 metres wide, with 5-metre pillars. The topography of the country is such that shafts are practically unnecessary; all ore can be taken out through tunnels, and, even though parts of the mine are very wet, pumps are not required.

The mine was gophered by former owners for high-grade ore, which was followed and extracted wherever found. Average grade of Fortuna ore is lower than in El Teniente mine, but workings show copper sulphides and occasional metallic copper throughout the brecciated material for depth of 2,000′.

The **Teniente** orebody, which is supposed to be in the crater of the old volcano, is the largest and most important orebody of the property, having a length, on No. 1 level, of 4,800′, an average width of 300′, and depth of 840′. It is in this orebody that the greatest increase of tonnage is to be expected. It is much the largest of the various orebodies and, with the exception of the small Bornite orebody, the richest.

No. 1 Teniente level and No. 2 Fortuna level have been extended along the tuff contact entirely around the crater, 2½ miles. The Teniente is the oldest mine of the district, having been worked by the Spaniards for the high-grade ore in the small veins.

The **Centinela** orebody is being mined above Teniente No. 3 level and will probably extend below it. The Bornite orebody worked out above the 4th level, is rich, but small, and no great extension in depth is looked for. Regimiento No. 2 orebody lies beyond the Fortuna, is lower grade and its size has not yet been determined.

New work from 1916 to 1918 inclusive aggregates 276,728′.

In 1918-19, development was mainly on the Teniente side, where large quantities of good ore was disclosed. The new ore-pass gathering system has been completed and ore caved down on the Teniente side will be sent to C level through passes, where it will be handled by motors to other passes, thence by the main electric railroad haulage-level, to the crushing plant at the mill. This new railway, completed April, 1918, is entirely underground; its grade being but 0.5%, trains of fourteen 22-ton cars are used. The two-unit (5,000 cu. ft. each) compressor station is underground. Mining methods were described by Frank Cameron in the "Min. & Sci. Press" of September 20, 1919.

The main 3-compartment 9′x20′ shaft, between C level and Fortuna 5, known as shaft A, is to be 1,650′ deep.

Ore reserves: calculated by Fred Hellmann, are as follows:

Year	Positive	Copper, %	Probable	Copper, %
1918.....	173,506,356	2.45	90,000,000	1.88
1917.....	149,192,000	2.42	90,000,000	1.88
1916.....	131,680,000	2.40	88,000,000	1.89

Electric power is used throughout. It is generated at the Coya hydro-electric plant on the Cachapoal river by four 2,000 k. w. Pelton wheels and generators, and a 4,000 k. w. vertical Francis turbine with generator, a total capacity of 15,000 k. w. Power is delivered to mine and mill at Sewell over a 16-mile 33,000-volt transmission line.

To handle 10,000 tons of ore per day, an additional hydro-electric power plant on the Pangal river, 6 miles from the Cachapoal power plant, will develop a total of 15,000 k. w. by three Pelton impulse wheels and generators. A new transmission line has been erected between these two power stations; a new and second transmission line having already been installed between Cachapoal and Sewell, carrying current at 66,000 volts for the new smelter at Caletones and mill and mine at Sewell. The new power plant was expected to be ready early in 1920.

The motor-driven aerial tram, 2,630 meters long, with 550 meters drop and 1,000 tons daily capacity connecting the mine and mill, at Sewell, is used as a store delivery system. The main line, of 2,000 meters length, runs from the mill

to the central transfer station, where connection is made with a 1,000-meter line to El Teniente mine and a 500-meter line to La Fortuna mine. The 5-mile aerial tram from the mill at Sewell to the new smelter at Caletones will be ready at latter part of 1920.

Ore treatment: at the Sewell smelter there will be a 12,500-ton coarse-ore bin and a 10,000-ton crushing plant finished in 1921. The treatment plant is being enlarged from 7,400 to 10,000 tons daily capacity. The flow-sheet includes coarse-ore bin, gyratory crusher, rolls, Symons disc crushers, fine-ore bin, 16 Marcy mills, impact screens, trommels, Wilfley tables, 30 Hardinge mills, classifiers, two 60′ Dorr thickeners, 11 gear-driven Minerals Separation flotations units of 20 cells each, Callow flotation units and Rateau-Battu-Smoot turbo-blowers of 20,000 cu. ft. of air per minute at 7 lb. pressure for the Callow plant; also a concentrate mixing and loading plant.

An experimental leaching plant was in operation during 1915, testing the process for extraction of copper from concentrate; it is believed that process can be successfully carried out on a commercial scale, but cost of plant would be large and inadvisable at the present time.

A sulphuric acid plant provides the acid required in the flotation cell. Wilfley table concentrates are roasted in two Wedge 7-hearth furnaces. The feed carries from 6 to 7% moisture, 16% copper, 13.6% silica, 28.6% iron, and 33.3% sulphur. Hearth temperatures, from 1 to 7, respectively, are 380, 460, 600, 750, 790, 680, 630°C. The furnace shaft makes one revolution in 3 min. 20 sec. and 12 h. p. is required to operate the furnace when treating 35 tons of concentrates per 24 hours. The calcine contains 2% sulphur.

The lead chambers are four in number (being added to), each with a volume of 46,750 cu. ft. and constructed of timber framing and ⅛-inch lead sheets.

Since the smelter at Sewell was completed, several improvements have been made, the most important being the addition of nodulizing kilns. These are similar to the kilns used in the manufacture of Portland cement. In 1918, 76% of the concentrate was reduced to nodule form. The 4th and 5th nodulizers are largest ones ever built, being 8′ in diameter and 100′ long. Heat is applied by an oil burner at discharge end. By feeding nodules instead of raw concentrates, the blast furnace capacity has been almost doubled, and coke consumption was practically cut in two.

On account of an irregular oil supply, a coal pulverizing plant was added to the nodulizers.

The smelter equipment consists of 14 storage bins for concentrates, lime, coke, etc.; 4 sinter grates, with a daily capacity of 50 tons concentrates, roasted to 40 tons; 5 nodulizing kilns; 2 blast furnaces, whose daily capacity is 300 tons raw concentrates, or 600 tons nodulized concentrates; 3 Pierce-Smith basic-lined converters, two having 33 tuyères, and the other 17 tuyères; 1 copper casting apparatus.

The new smelter at Caletones, 5 miles from Sewell, will be completed and in operation in 1921.

The complete works, including the concentrators and smelter, are planned to eventually treat 10,000 tons of 2% ore daily, at an estimated cost of 7½c. per lb. laid down in New York. Work was stopped during the war, but resumed late in 1919, and is now being carried on in accordance with the original plans prepared under direction of H. E. Skougor.

Production:

Year	Milled, tons	Copper, %	Concentrate, tons	Copper, %	Mill recovery, %	Blister output, lb.	Price received, cts.	Cost per lb., cts.
1919.....	.....	.....	.....	.....	.....	47,000,000	.....	.....
1918.....	1,962,955	2.477	192,274	21.20	83.76	77,152,000	26.88	16.52
1917.....	1,799,694	2.319	158,546	21.44	81.61	63,774,000	31.80	16.33
1916.....	1,362,629	2.127	117,984	.....	79.00	42,153,270	26.35	8.03
1915.....	1,106,420	2.090	.....	.....	74.92	32,733,576	.....	8.78
1914.....	900,299	2.120	.....	.....	.....	28,304,092	.....	.....
1913.....	.....	.....	.....	.....	.....	18,098,000	.....	.....
1912.....	.....	.....	.....	.....	.....	9,500,000	.....	.....

Although operations at the Braden property have not yet fulfilled the expectations of its sponsors, it is believed that the treatment problems are solved, and with the completion of plant extensions and of the new smelter at Caletones, that profits will be large, though no prediction is ventured as to the date of dividends. Known ore reserves will last 35 years on a 10,000-ton a day basis, and extent of the orebodies is as yet only partly known.

CALAMA: COMPANIA DE MINAS y FUNDICION De CHILE

Reorganized 1913 as Compania Miñera de Calama. In August, 1916, property was sold to the Chile Copper Co., which see.

CARRIZAL; SOC. DE MINAS y FUNDICIONES DE CHILE

Owned by the American Smelting & Refining Co. Company operates two smelting plants running throughout the year.

Caldera: this smelting plant contains 3 copper blast-furnaces and converters, reducing 5,000 to 7,000 tons of charge monthly, mainly copper ore purchased from local mines. The plant ships from 400 to 600 tons a month of converter copper, which goes to Tacoma, Wash., for refining.

Carrizal: this copper smelter, at Chanarcitos, contains but one blast-furnace, handling from 1,300 to 1,800 tons of charge monthly, the ore coming largely from the Astillas mine, which the company owns. The 300 tons a month of copper matte which the furnace produces is shipped to Tacoma.

At Carrizal Bajo a new concentrating mill started in 1919, treats about 3,000 tons daily of dump ore from the Carrizal Alto district.

The copper mining industry of both the Caldera and Carrizal districts was practically suspended in the early part of 1919 on account of the low price of copper, but operations were resumed late in the year.

CATÉMOU: SOCIETE DES MINES DE CUIVRE DE CHILE

Main office: 50 Boulevard, Emil Jacquemin, Brussels, Belgium. **Office:** 5 Rue du Helder, Paris, France. **Operating and works office:** Estacion Chagres, Aconcagua, Chile. A. W. Lehman, gen. mgr.

Officers: Eugene Renevey, chairman: Max Lyon, managing director; Georges Renevey, Jean Renevey, Robert de la Bouglise and Robert Franklin, directors; Joseph Wouters, sec; in Brussels; Henry Saloman, in Paris.

Inc. June 2, 1899, in Belgium. **Cap.**, f. 5,000,000: shares f. 500 par; divided into 10,000 preference shares at 8%, and 35,000 ordinary shares; non-assessable. Debentures f. 1,500,000 5% bonds. Annual meeting, last Friday in June.

Dividends: 4% in 1910, 5% in 1911, 6% in 1912, 6% in 1914, 8% in 1915, 12% in 1916; 8% in 1917.

Lands: 155 claims, with sundry miscellaneous tracts held in fee and under government concessions, including the Finca de Nilhue, total holdings of 30,000 acres, in the districts of Putaendo, Los Andes, Melipilla, La Ligua, Quillota and El Nilhue. Property includes numerous mines in Catémou, Melon, San Felippe de Caracoles and elsewhere, with quarries of fluxing material. The company's cattle ranch, Finca de Nilhue, maintains a herd of 1,200 cattle, for transport and food, and is a valuable factor in reducing costs.

The local management reports that ores average 4% copper, and 2 oz. silver per ton. Veins carry the usual oxidized ores in a comparatively shallow surface zone, changing downward into chalcocite, bornite and chalcopyrite.

Los Mantos, or **Mantos Rojos,** mine opened in 1820, shows sandstone and limestone, cut by eruptive dikes, there being 2 blanket veins, of 5 to 7′ thickness, composed of calcareous matter impregnated mainly with bornite, with accessory chalcopyrite and occasional gray copper, ore ranging 3 to 4.5% copper, 1% lead, 2% zinc and 30 grams silver per metric ton. The oxidation zone has been eroded, leaving only sulphide ores. These blanket veins have been worked since 1835, and the ore, while low in grade, is particularly desirable for fluxing purposes.

Mining is done entirely by tunnels, at vertical intervals of about 50 meters and averaging about 1,200 meters in length with ore reserves developed ahead for 3 to 4 years extraction. Work is by contract, miners being paid 5 to 7 pesos per metric ton for ore won. Only about 8% of the ore broken is discarded as

waste, and ore is concentrated by flotation or smelted direct. Ore is taken to smelters by a 1,580-meter aerial tram, with drop of 750 meters, having 500-kg. buckets. Cables last 2 years and guide cables last 5 years.

In 1918, Los Mantos mine employed 600 men, producing 5,000 tons of ore of 4% copper tenor monthly.

El Soldado mine, one of the Nogales group, and farthest from the smelter, being in the Commune of Melon, on the Calera é Cabildo railway, was opened 1841. This property has 15 known veins, of 5′ to 7′ average width, carrying copper sulphides, with quartz gangue. The veins have a N. S. strike, with dip of 45° east, and lie on a fault contact between trachyte and feldspar-porphyry. The veins are faulted with throws of 1 to 2 meters. A second but parallel series of dikes and veins, but with reverse dip, intersect the other veins. Dikes of decomposed porphyry running with and alongside these cross veins, show occasional oxidized ores and aluminous silicates. The veins show many antigua openings and ore averages 5 to 6% copper.

Development: by tunnels, greatest vertical depth obtained being 80 meters; old workings are about 150 meters in length. The mine shows some immense chambers, one being called the Cathedral, in recognition of its vast size. In 1916 production was about 600 metric tons of high-grade ore monthly. Transportation by wagon cost 3 to 4 pesos per ton. An aerial tram is planned.

La Union group includes the Restauradora, San José and Vieja mines, producing about 40 metric tons daily of 3 to 4% copper ore, mainly used for fluxing and secured with an average force of 150 men.

Miscellaneous mines include El Nilhue mine, in the department of Putaendo, opened 1886; Las Maquinas de Catému mine. in the department of Putaendo, opened in 1870; La Esmeralda mine, opened 1860; La Constancia and La Democracia mines, 10 kilometers from the smelter, carrying blanket veins, and La Marquesa, Malva, Tabourina, Caracoles (with 6% ore), Almendro y Pleito and other properties, in various stages of development, some of considerable promise.

The mines and works have telegraph and telephone communication. Forces, 1916, averaged 1,200 men, with the high average wages of 5 pesos for underground workmen, and 4 pesos for surface labor.

Reduction works: include 2 smelters, each with converter plant, with aggregate capacity of 650 to 750 metric tons of ore daily, and 2 concentrating plants employing flotation, one situated at La Poza, 12 kilometers from the second, near Chagres Station on the Andes railroad, and at Chagres smelter.

La Poza smelter, of 300-tons daily capacity, has 2 blast furnaces turning out 50% matte. The converter department has five 57x77″ shells, with 12 tuyères each, of the Copper Queen type, turning out cakes carrying 99.7% copper and 40 oz. silver per ton. There is a 40-ton briquetting plant and the converter department has a quartz mill. Power is furnished by a 165-h. p. Pelton water wheel and a 175-h. p. engine. Furnace blast is supplied by No. 6 Connersville blowers and converter blast is furnished by a Riedler air-compressor, with capacity to reduce 20,000 cu. ft. of free air per minute to 15 lbs. pressure. Fuel is coke, one ton of coke smelting 6 tons of ore, ores treated being highly silicious, with slags averaging 0.4 to 0.5% copper. In 1918 La Poza and Chagres smelters treated 80,000 metric tons of ore, of 6% average tenor, yielding 4,000 metric tons fine copper. Employs 100 men at average wages of 4 pesos daily.

The converting plant at Chagres smelter contains a large horizontal Pierce-Smith machine.

Chagres smelter has 36x84″ and 36x120″ Allis-Chalmers cylindrical water-jacket blast-furnaces. Ores smelted at this plant carry excess of silica and alumina and are deficient in sulphur, necessitating the free use of low grade cupriferous pyrite and limestone, for fluxing. Reverberatory furnaces are 17x55′ and 17x85′. A 2,000-h. p. hydro-electric plant has been erected.

Production: was 3,379,947 lb. fine copper in 1907; 4,060,873 lb. in 1908; 4,073,761 lb. in 1909; 4,920,500 lb. in 1910; 4,660,000 lb. in 1911; 6,960,000 lb. in 1912; 5,843,250 lb. in 1913; 7,878,465 lb. in 1914; 7,210,350 lb. in 1915; 11,082,330 lb. in 1916; 9,200,000 lb. in 1917, and 9,100,000 lb. in 1918.

Property is estimated by company to have, with further improvement, a productive capacity of 20,000,000 lb. fine copper yearly.

CENTRAL CHILI COPPER CO., LTD, CHILE

Address: W. A. Habberfield, sec., 15 Angel Court, London, E. C. 2, England. **Mine and works office:** Panulcillo, Ovalle, Coquimbo, Chile. B. Schiff, gen. mgr. at mines; A. J. Goldschmid, chairman and managing director; H. L. Bromhead, Andre Goldschmid and W. H. Patchell, directors.

Inc. June, 1894, as a reconstruction of the Panulcillo Copper Co., Ltd., and reorganized January 1898. **Cap.,** increased November, 1905, to £400,000 shares £1 par; issued £312,468.

Inc. Jan. 11, 1898, and is second reconstruction of the Panulcillo Copper Co., Ltd., registered Jan. 5, 1864, and first reconstructed as the Central Chile Copper Co., Ltd., in June, 1894. **Cap.,** £400,000; shares £1 par; 312,468 shares issued and fully paid. Increased from £300,000 to present amount in November, 1905, 30,000 new shares being offered to shareholders at par.

Financial statement showed a profit of £37,086 in 1915, and a loss of £43,906 in 1917. At end of latter year current assets were £94,122, and liabilities £34,727. Profits up to 1915 were small.

Dividends: 6 pence per share in 1900, 6 pence in 1901, and 1 shilling in 1907; none since.

Property: 72 acres, including mines at Panulcillo, 25 kilometers N. E. of Ovalle, and mines in the vicinity of Nisñile. The Panulcillo group includes the Panulcillo Alto and San Gregorio mines.

Development: principally by the 1,000-meter San Gregorio tunnel. Ore is mainly chalcopyrite, associated with pyrite, in limestone gangue, with some commercial production of malachite, azurite and chalcocite. During the year 477.5 meters of development work and 266 meters of diamond drilling were done.

The Cocinera and Inagotable mines, are at Ferro Negro.

Equipment: the 400-ton smelter, connected with the Panulcillo Alto mine by tram, is 76 kilometers from Coquimbo. It is equipped with 3 calciners, 2 reverberatory furnaces, and one 46x180″ and three 42x84″ blast-furnaces. The smelter treats silicious custom ores, company's sulphides furnishing flux. Matte is crushed and exported to New York for smelting.

Production: fine copper, 1913, 2,274 tons; 1914, 2,491 tons; 1915, 2,737 tons; 1916, 2,721 tons; 1917, 2,817 tons of copper, smelted from 56,869 tons of ore; 1918, 1,821 tons, from 32,063 tons of company and 27,826 tons of purchased ore.

CHANARAL: SOCIÉTÉ des MINES et USINES de CUIVRE de

Office: 94 Rue de la Victoire, Paris, France. **Mine and works office:** Chañaral, Atacama, Chile.

Officers: Eugène Renevey, chairman; preceding officer, D. Bethmont, A. DuBois, A. Delattre, Georges Renevey and R. de La Bouglise, directors.

Inc. July 17, 1906, in France. **Cap.,** 6,000,000 frs.; increased 1910, to 7,000,000 frs.; shares, 500 frs. par.

Property: 925 hectares, including 244 mining claims, the more important being Los Pozos, Las Animas, Cerro Negro at distances of 25 to 55 kilometers from the smelter at Chañaral, with which the mines are connected by rail. Property includes that bought, 1906, of Besa y Ca., and of Las Animas Copper Mining & Smelting Co., Ltd., 1909. Lands are a desert and water is scarce.

Las Animas deposit consists of a lode of 3 veins with parallel strike and dip of 70°, in wall rock of syenite, traceable 2 kilometers. Average width of the 3 veins is about 5′, with ore occurring mainly in vertical shoots sometimes 100′ in depth. Oxidized ores, to depth of 150 meters, are succeeded by sulphides, mainly with chalcopyrite, and some cupriferous pyrite. Gangue is silicious, or calcareous, or both. Ore shipped to smelter averages 4 to 5% copper.

The mine is opened by 4 shafts, three of which are used for hoisting. The fourth shaft is used at present for pumping. Depths of shafts vary up to 550 meters. The shafts are equipped with two steam hoists and a Diesel engine hoist. Compressed air is used for drilling, pumping and sub-hoisting.

The **Los Pozos** deposit has 2 parallel orebodies in porphyry and syenite, one having a silicious and the other a ferruginous gangue. Width of orebodies has not been determined; cross-cuts, 70 meters long, still show mineralized headings and indicate large deposits of the porphyry type. The mine has been opened by a tunnel 300 meters long and 90 meters below the outcrop, by a 600-meter drift and by numerous cross-cuts. The mine is being developed by a system of raises, winzes and sub-levels, leaving the pillars to be mined later if filling can be done.

The mine is equipped with a compressed air plant, using a Diesel engine.

El Manto Verde mine at Los Pozos, 25 kilometers from Las Animas, has 2 parallel orebodies in porphyry and syenite, one carrying oxidized ores of about 6% average copper tenor, there being no sulphides, though chalcopyrite is found in the Laura mine, nearby. There are shafts of 80 meters and 195 meters depth. The mine has extensive and erratic old workings and shows large bodies of low-grade ore, somewhat refractory.

In addition to the foregoing mines, which are the principal properties, there is **La Descubridora** mine, formerly an important producer, abandoned at depth of 650 meters; the Andacollo mine, with ore averaging about 12.6%; the San Augustin, with 3.5% ore, and the Manto Atacama, with 3% ore. With further development the properties of this company can furnish a sufficient variety of ores to permit proper furnace mixtures.

The **Cerro-Negro** deposit has one orebody with ferruginous gangue, but in other respects it is similar to that of the Los Posos. Rich ores only, 10% or better, are mined because of heavy cost of transportation due to the distance of 50 kilometers from mine to smelter.

The company owns numerous other claims in the districts of Sierra-Aspera, El Salado and Pueblo Hundido, some of which are valuable.

The smelter is located at the harbor of Chañaral. It has four water-jacket furnaces, one of 100, one of 80 and two of 50 tons. There are two converter stands. Converter shells are 1.68 meters in diameter and 2 meters in length. The basic process is used with excellent results in spite of small size of converters. Air at 10 lbs., is delivered to the converters by a two-cylinder direct connected double expansion, Walker compressor.

The product of the smelter is bar copper averaging 99 to 99½% copper and containing about 60 grams gold and 150 grams silver per metric ton.

The company owns a shipping pier and lighters. Property is considered valuable and management good. No recent data obtainable.

CHILE COPPER CO. **CHILE**

Office: 120 Broadway, New York.

Officers: Daniel Guggenheim, pres., Albert C. Burrage, v. p.; Murry Guggenheim, v. p.; H. F. Guggenheim, v. p.; W. C. Potter, v. p.; W. E. Bennett, sec., with Isaac Guggenheim, S. R. Guggenheim, William Loeb, Jr., John N. Steele, Albert C. Burrage, Jr., Russell Burrage, Chas. D. Burrage, E. A. Guggenheim, H. R. Wagner, and E. A. Cappelen Smith, directors. L. Fredrick, treas.; D. A. Crockett, transfer agent, 149 Broadway, New York; Judd Stewart, gen. auditor and comptroller.

Inc. April 16, 1913, in Delaware. **Cap.**, $135,000,000; shares $25 par; issued, 3,800,000; 600,000 shares held in treasury for conversion of $15,000,000 7%, 10-year and $35,000,000, 6%, 15-year gold bonds. Shares are listed on the New York and Boston Stock Exchange. Company owns entire issued capital stock of the Chile Exploration Co. of New York.

Funded debt:

(1) Collateral trust convertible 7%, 10-year gold bonds, due May 1, 1923, $15,000,000 outstanding; convertible into stock at $25 per share; bonds are a direct obligation of the company and are secured by deposit of the entire capital stock of the Chile Exploration Co., the operating subsidiary of the Chile Copper Co. This is a closed mortgage.

(2) Collateral trust convertible 6%, 15-year gold bonds, series A, due April 1, 1932. This issue of $35,000,000 is convertible into Chile Copper Co. stock at

$35 per share and secured, subject to the convertible 7s, by the capital stock of the Chile Exploration Co..

Financial Statement, years ending December 31:

Assets.

Year	Investment in Chile Ex. Co.	Notes & loans, Chile Ex. Co.	Liberty bonds	Call loans	Cash, etc.	Total
1918.....	$111,878,446	$18,523,239	$1,008,050	$5,000,000	$1,282,741	$137,692,476
1917.....	111,853,956	15,522,003	.....	.....	22,338	127,934,220
1916.....	109,984,065	11,405,733	.....	.....	16,956	121,406,754

Liabilities.

	Capital	Bonds	Accounts and notes payable	Interest accrued, etc.	Total
1918.....	$95,000,000	$42,353,250	$5,474	$333,752	$137,692,476
1917.....	95,000,000	32,665,000	.....	269,220	127,934,220
1916.....	95,000,000	15,000,000	11,220,000	186,754	121,406,754

Chile Exploration Co.

Controlled by Chile Copper Co. Same officers. G. G. Thomson, purchasing agent.

Officials in Chile: H. C. Bellinger, gen. mgr.; Burr Wheeler, asst. gen. mgr.; B. Middlemiss, mine supt.; B. T. Colley, mgr. welfare dept.; Alfred Houston, gen. rep. at Santiago; W. F. Baseden, port agent, Antofagasta; Harvey Diamond, res. eng. at Tocopilla.

Consulting engineers: Fred Hellman, mining; E. A. C. Smith, metallurgical; H. A. Guess, milling; S. B. Williamson, mill mgr.; M. R. Hull, designing, and P. H. Thomas, power and electricity.

Inc. Jan. 11, 1912, in New Jersey. **Cap.,** $1,000,000; shares $100 par; entire issue owned by Chile Copper Co.

Financial Statement, years ending December 31:

Assets.

Year	Property	Construction equipment, etc.	Investment in steamers	Current	Total
1918.....	$4,992,810	$21,916,986	$426,665	$21,230,713	$48,566,175
1917.....	4,983,117	16,435,795	426,665	19,669,952	41,515,529
1916.....	4,944,300	18,183,818	811,280	10,913,012	34,852,400

Liabilities.

	Capital	Capital surplus	Notes payable and loan Chile Copper Co.	Current	Earned surplus	Total
1918.....	$1,000,000	$13,684,000	$18,523,239	$5,684,885	$9,674,051	$48,566,175
1917.....	1,000,000	13,684,000	15,522,003	6,118,311	5,191,215	41,515,529
1916.....	1,000,000	15,000,000	11,405,733	5,656,449	1,790,218	34,852,400

Profit and Loss.

	Copper Sold	Sundry income	Operating charges	Charges against income and surplus	Surplus	Net Deductions Previous surplus	Net Deductions and additions	Net surplus
1918	$20,931,071	$437,263	$12,414,667	$5,513,437	$3,440,229	$602,118	$1,254,466	$2,787,882
1917	18,908,855	649,294	11,751,778	5,207,960	2,598,411	1,790,218	3,786,511	602,118
1916	10,558,724	39,346	6,425,022	2,236,657	1,936,392	.....	.....	1,790,218

The first half of 1919 showed a loss of $1,174,367, after paying bond interest of Chile Copper Co.; while the third period returned a net profit of $45,114.

Property: the copper deposits of Chuquicamata, province of Antofagasta, Chile, the largest known in the world, form the crest of a low ridge some distance from the main range of the Andes, 9,600′ elevation above sea level. Chuquicamata is about 85 miles E. of the Pacific Ocean on a branch of the Antofagasta & Bolivia Railway, 163 miles from Antofagasta. The company owns 687 mining claims, about 6,700 acres, including 2,075 acres mineral land, plant site, waste dump area, and limestone, iron ore, salt, and sulphur deposits.

Geology: the outcrop of the orebody is 8,000′ long, with an average width of 554′. The maximum length of orebody, as proved up to present time,

is about 7,000′ with a maximum width of 1,800′. Since starting operations to end of 1918, 142 holes were drilled, totaling 60,786′. Small veins of rich ore cut through the mass, but the average of the entire deposit is esimated at 2.12% copper. The copper in the oxidized area occurs in the form of brochantite, with a small amount of atacamite and chalcanthite, or natural blue vitriol.

The drill holes show that the oxidized minerals change in depth to sulphides, notably chalcocite, bornite, and chalcopyrite. About two-thirds of the ore developed carries brochantite (a basic copper sulphate containing 56% copper) and the balance copper sulphides. The underlying sulphide ore, practically all ore below 400′ from surface, can be treated in the customary way by water concentration and direct smelting. At present the company is devoting its entire attention to the sulphate part of the orebody, the mining of which is done by steam and electric shovels.

In August, 1916, company acquired the holdings of the Compañia Minera de Calama for $1,508,368. The property included an important adjacent group of mines; an antiquated smelter at Calama, 14 miles from Chuquicamata; considerable amount of land at Calama, some with water rights; a water-power concession near Calama; a group of copper claims near El Abra, 28 miles from Chuquicamata on a branch of the A. & B. railroad. The mines are located on two vein systems known as the Panizo-Rosario del Llamo and the Poderosa-San Felipe systems. These have produced much ore carrying 16% to 18% copper. The veins, up to 45′ wide, are strong and persistent, and the ores in the upper levels are oxides of copper, brochantite principally, mixed with chalcocite. In the lower levels the ore is chalcocite and enargite. The dumps of the property are reported to have sufficient copper content to repay purchase price.

Development: is by open-cut work, like that of the Utah Copper Co., at Bingham, Utah. During 1918, overburden moved from all benches totaled 557,800 cu. yd. averaging 0.37% copper. Bench B was extended to a length of 800′ in ore, averaging 50′ in height; bench C is 3,000′ long and 95′ high. The reduction cut on bench C is 2,300′ long and 32′ high; and bench D has ore 700′ long by 35′ high.

A notable feature of mining practice at Chuquicamata is tunnel-blasting, which supersedes churn-drill blasting, described by Barker in "Min. & Sci. Press" of August 17, 1918. This is so successful and efficient that 70,950′ of tunnels have been driven for this purpose, 23,739′ being blasted to end of 1918.

Ore reserves: estimated as follows (by tons):

	Oxidized	Per ct.	Mixed	Per ct.	Sulphide	Per ct.	Total	Av. %
1918...	336,510,349	1.91	151,000,000	2.98	210,000,000	1.84	697,510,349	2.12
1917...	339,000,000	1.91	151,000,000	2.98	210,000,000	1.84	700,000,000	2.12
1916...	339,000,000	1.91	151,000,000	2.98	210,000,000	1.84	700,000,000	2.12

Equipment: at mine includes 14 No. 103-C Bucyrus electric shovels, and one No. 225-B, which are more economical than steam-shovels; 1 Baldwin, 7 Porter, and 13 Panama locomotives; air-compressors, ore cars, railway, shops, and everything necessary for moving over 10,000 tons daily.

Treatment: the reduction plant 2½ miles from the mine, which started operations May 18, 1915, has a capacity of 10,000 tons a day. The extension of the plant to 15,000 tons per day was finished in 1919, and it is estimated that the plant will be operating on the increased capacity in 1921. Copper is recovered by leaching process, the ore being peculiarly amenable to treatment by this method. Careful study of the problem by E. A. Cappelen Smith showed that the ore gives little or no slime, and is readily soluble in an 8 or 9% solution of cold sulphuric acid, made at the works. As it contains no arsenic, antimony or bismuth, the solution is not fouled by repeated use.

The ore is broken by two 84″x60″ jaw crushers, 3 No. 10 gyratory crushers, six 48″ horizontal and twenty-four 48″ vertical Symons disc crushers, to ⅜″ size. It is then distributed to mastic-lined, concrete vats, of which there are nine, 110′ wide, 150′ long and 17.5′ high, each with a capacity of 10,000 tons of ore. Tanks are built of reinforced concrete, lined with mastic 1½″ thick.

The leaching process requires approximately 6 days for the complete cycle,

1 day for filling the tank, 2 days for leaching, 2 days for washing and draining and 1 day for discharging. The pregnant solution is drawn off into solution tanks and the leached residue taken from the vats by clamshell buckets, operated on a traveling bridge, transferred to cars, and piled on the waste dump. The copper solution, before electrolysis, is dechloridized by agitation with finely-divided copper. The chlorine is precipitated by this method in the form of cuprous chloride, which is removed from the solution in settling tanks. This cuprous chloride is dissolved in brine in revolving bronze drums, where the copper is precipitated in a finely-divided condition, suitable for dechloridizing more solution.

The clear solution overflowing from the Dorr thickeners goes to the electrolytic tank house where it is electrolyzed, using ordinary copper cathode starting sheets and insoluble anodes made of duriron. The electrolytic refinery consists of 832 electrolytic tanks, 19′ long, 3½′ wide and 4′ 10″ deep, made of concrete and lined with mastic. Of the 832 tanks, 62 are used for making cathode starting sheets, and 480 for electrolytic deposition of copper from solution. The solution enters the head tank of the system containing 5% copper and 2½ to 3% free acid, and leaves the last tank containing 1 to 5% copper and 8 to 9% free acid.

In the secondary crushing plant, the use of rolls was discontinued early in 1918. The third section went into service on March 21, and on July 2 a complete installation of 18 fine-reduction Symons disc-crushers was in operation. The feature of the completed disc installation was the gradual cutting down of the oversize on 0.371-in. screen. During the first quarter this oversize was about 50%, whereas for the last quarter it averaged 18.5%.

In the leaching division, the important feature was the increased extraction. An average of 87.9% was reached, against 82.2% for 1917, owing principally to the finer grinding of the ore. The maximum was reached during November, when an average of 91% was obtained.

The new dechloridizing plant went into operation in 1919, with greatly improved equipment. The new feature is the use of a cylindrical copper drum for precipitating cement copper, in place of the trommel.

Power for operating the reduction plant is generated at Tocopilla on the Pacific Coast by four 10,000 k. v. a., 53,300-h. p. total, steam turbines, served by oil-fired steam boilers. A 100,000-volt, 3-phase, 50-cycle, 87-mile steel tower transmission-line connects this plant with Chuquicamata. A large part of the power is utilized for electrolytic purposes, through seven 2,500-k. w. motor generators, which convert 5,000-volt alternating current into 250-volt direct current. During 1918, this plant generated an average of 26,286 k. w. per hour.

Additional machinery increased the power-house capacity to 115,000 k. w. (153,300 h. p.) by adding three 25,000 k. w. turbo-generators. A new 135,000-volt transmission line and sixteen 3,480-k. w. rotary converters added in 1919, provide the necessary 250-volt direct current. Large extensions and improvements in the applications of electric power are planned. Total oil storage capacity is 165,000 barrels.

Estimates of costs made by Pope Yeatman in 1916, on a basis of 10,000 tons per day of 2% ore are as follows per ton:

Mining and transportation to mill	$0.50
Crushing, leaching and electrolytic precipitation	1.086
Transport of copper to port, port charges and insurance	0.115
Freight to Europe and selling commission	0.214
Depreciation and contingencies	0.191
Total	$2.106

Transportation of copper and supplies being difficult, Chile Exploration and Braden Copper, early in 1916, jointly purchased two steamers, the "Sherman," for $790,000, and the "Republic," for $825,000, to trade between Chile and New York. The Chile Steamship Co. and Sherman Steamship Co. were formed to operate these vessels. The revenue from general carrying business soon repaid

the purchase price and the owners were offered $1,250,000 each for them, but refused. J. K. MacGowan is president of both steamship companies.

There are 11,439 peoples at Chuquicamata, dependent on the company, which has erected 1,855 houses, staff quarters, club-house, 2 schools, and controls the townsite.

Production:

Year	Ore Treated, Tons	Copper, Per Cent.	Extraction, Per Cent.	Copper Pounds	Average price per lb., Cents	Net cost per lb., Cents
1919*....	1,988,619	1.64	82.72	53,801,132	17.837	23.986
1918.....	3,745,083	1.64	82.20	102,136,000	24.713	17.885
1917.....	2,904,191	1.76	81.80	88,370,000	26.400	19.920
1916.....	1,742,748	1.74	77.15	41,306,000	25.56	15.46
1915†....	625,394	1.71	66.87	10,944,000	.....	18.55

*9 months. Cost for first quarter was 15.25 cents, and for second quarter, 12.69 cents. †7½ months. Copper output for full year 1919 was 76,717,132 lb.

Chile Copper, like Braden, is still in a preparatory stage, developing its mine and increasing its plant capacity, which still absorbs enormous sums of money. Until this construction period is over no dividends can be expected. During the second half of 1919, preliminary plans were prepared on the ground by H. E. Skougor, covering extension of the plant to capacity of 300,000,000 lb. of copper per year, necessitating crushing between 30,000 and 40,000 tons of ore daily. Detail plans are now (March, 1920), being prepared for this extension.

COPPER MINES OF COPIAPO LIMITED, THE **CHILE**

Office: Bishopsgate House, 80 Bishopsgate, London, E. C. 2, England.

Property: is in the valley of the Copiapo river, province of Atacama. Company is a private concern and does not give out information concerning its holdings or operations.

GATICO; COMPANIA MINERA DE **CHILE**

Fully described in Vol. XI (1912-13).

Offices: Calle San Augustin No. 9, Valparaiso, and Gatico, Province of Antofagasta, Chile.

Property: 125 claims, 453 hectares, including 4 developed mines; also 15-hectare smelter site all in the Gatico district, near the sea. Claims contain 14 workable veins, ore averaging 8% copper, 0.2 oz. silver, and 30 cents gold per ton. Work was started in 1830.

The smelter is at the port of Gatico, 30 miles S. of Tocopilla, and 60 miles N. of Antofagasta. It includes blast-furnaces, converters, and power-plant.

Production: between 3,100,000 and 8,000,000 lb. of copper yearly from 1907 to 1916. Producing regularly.

GUAYACAN, FUNDICION DE **CHILE**

Subsidiary of American Metal Co. through the South American Metal Co. **Offices:** 61 Broadway, New York; and Guayacan, Chile.

Inc. in 1917. **Cap.,** £150,000; shares £1; 120,750 held by controlling companies.

Works represent an investment of $400,000 and include water-fronts on the harbor, barges, small mines, and copper smelter capable of producing from 350 to 500 tons of copper matte per month. Plant has been closed since 1917 on account of abnormal economic conditions.

NALTAGUA; SOCIÉTÉ Des Mines De CUIVRE DE **CHILE**

Main office: 80, Rue Taitbout, Paris, France. **Mine office:** El Monte, Chile.

Officers: Baron Emmanuel Leonino, chairman; with Vicomte A. de Montureux, H. Chapuis, Baron J. De Bethmann, H. Grandet, Baron B. De Senevas, Pierre Piron, Ch. Chalupt, and Jorge Matte, directors. A. Mercier Pageyral, gen. mgr.; Comte B. de Saint-Seine, cons. engr.; Pretor, Fontaine & Co., Valparaiso, agents in Chile.

Inc. Jan. 26, 1907, in France. **Cap.,** 10,000,000 francs, in 100,000 shares;

par value F. 100; increased to F. 14,000,000 in 1918 by subscription of 40,000 8% preference shares of F. 100 each. Debentures authorized F. 3,000,000, with 5% interest. Total assessments to date F. 3,000,000. Fiscal year ends June 30.

Net profits: were F. 36,000 in 1909-10; F. 195,000 in 1910-11; F. 595,000 in 1911-12; F. 603,000 in 1912-13; F. 318,000 in 1913-14; F. 716,000 in 1914-15; F. 2,043,000 in 1915-16; and F. 1,568,000 in 1916-17.

The fiscal year 1917-'18 left a loss of F. 745,000. Interest on bonds was paid and drawn bonds were repaid.

Dividends: f. 300,000 in 1913-'14; f. 500,000 in 1915-'16; none since.

Property: formerly held by the Compañia Minera de Naltagua, comprises 195 pertenencias of mineral lands and the Naltagua farm with a total of nearly 2,000 acres near El Monte, dept. of Melipilla.

Copper deposits include 3 parallel blanket veins, striking north-south, and dipping about 30° east, with a width of 3 to 30'. They are opened for a length of 5 kilometers, and principally worked in the Trinidad, Las Vacas, San Ramon, Suerte, Venus, Brillante, El Gato, and Esperanza mines. These veins carry oxidized ores, changing at 65' depth to chalcopyrite, bornite and chalcopyrite in disseminated form, averaging 4% copper, and nearly self-fluxing. (2) A blanket vein with 2% copper in a calcareous gangue, used as a flux; the vein has the same strike and dip as the others. (3) A porphyritic formation with low grade values.

Equipment: mine is worked by tunnel only, having no hoists. There are several compressors. The company plans a 2,000-h. p. hydro-electric plant on the Rio Maipo. There is abundant wood on the Naltagua ranch.

Transportation equipment includes several aerial trams and a private railway. The aerial tram from El Monte to San Antonio, where the tower station is located, is 5,600 meters in length, with 22 towers, of 22 meters maximum height, on concrete foundations, having greatest span of 386 meters. An incline tram, at San Antonio, connecting with the lower station of the aerial tram, is 300 meters long, at an incline of 30°, having a double line of rails. A 2½-kilometer railway connects the incline tram with the private rail system, which has a total length of 25 kilometers. Equipment includes 6 locomotives, with 2, 3 and 5-ton ore cars.

An experimental concentration plant to treat 100 tons per day has been erected in order to determine the best method to concentrate these ores.

The 300-ton smelter is at Naltagua, in the valley of the Rio Maipo, adjacent to the Rio Mapocho, 70 kilometers by river to the coast, and 225 kilometers to Valparaiso, with a freight rate of 6 pesos per ton to the latter point. The smelter was blown in 1909. Equipment includes two 40"x160" blast-furnaces. Slags, assaying about 0.4% copper, are granulated, and sluiced to the dump by water.

There are two 17'x55' reverberatory furnaces of the Anaconda type, fired by pulverized coal, the plant being in full operation in 1918.

The converter department has 3 stands, with 9 shells of the Copper Queen barrel type, an electric traveling crane with an hydraulic accumulator for rotating the shells and a large Pierce-Smith basic converter.

The smelter power plant includes 770-kw. engines, 4 Connersville blowers and a 200-h. p. air-compressor for converter blast. The boiler plant has five 200-h. p. boilers, three 300-h. p. boilers and a 30-meter steel stack.

Works were described by F. A. Sundt in "Mexican Mining Journal" of October, 1914, and by Mark R. Lamb in "Engineering and Mining Journal" of October 28, 1916.

About 1,500 men are employed at the mines and works, with average wages of 5 pesos at the mines and 6 pesos at the smelter.

Production: has been as follows: 293,209 lb. in 1908-'09; 2,253,090 lb. in 1909-'10; 2,486,772 lb. in 1910-'11; 4,082,892 lb. in 1911-'12; 4,703,005 lb. in 1912-'13; 5,659,356 lb. in 1913-'14; 6,504,004 lb. in 1914-'15; 9,417,692 lb. in 1915-'16; 9,241,030 lb. in 1916-'17; and 8,054,497 lb. in 1917-'18. Above figures are for Chile bars assaying 99.1% copper.

PODEROSA MINING CO., LTD. **CHILE**

Office: F. W. Bishop, sec., 145 Dashwood House, New Broad St., London, E. C., Eng. **Operating office:** Casilla 855, Antofagasta, Chile, **Mine office:** Collahuasi, Tarapacá, Chile.

Directors: Chas. Fearn, chairman; L. W. Harris, V. Echeverria and W. J. Barnett. J. H. Ivey, mgr.

Inc. Nov. 27, 1908, in Great Britain. **Cap.,** £500,000; shares £5 par; fully issued and fully paid.

Financial Statement shows:

Year	Revenue	Total Charges	Profit	Current Assets	Current Liabilities
1918.....	£60,100	.....	£18,662*	.....	.....
1917.....	199,370	103,361	£96,009	£244,507	£52,640
1916.....	119,738	52,039	67,699	114,702	.....

* Debit.

Dividends: 5% in 1909; 10% in 1916; 12½% in 1917.

Property: 37 contiguous claims, 185 hectares, or 457 acres, including the Poderosa, which is the principal producer, and the San Carlos, Rosario, and other mines. The lands lie at an extreme elevation of 15,400′, among the rounded peaks on the western edge of the Bolivian plateau, a region above the timber line, and barren of vegetation, with the exception of yareta, which constitutes the fuel of the district. Copper mines were worked in this district, during the era of Spanish dominion, and previously by the Indians, as evidenced by remains of ancient furnaces, fragments of matte, scoria and tools left in old workings. Development of the mines was begun 1903, and regular ore shipments were started January, 1906.

Geology: the property shows the Poderosa, or main vein, a fissure without visible outcrop, lying alongside a diorite dike intrusive in dacite. The vein lies under the dike, but in places departs from it. It has numerous branches and parallel fissures. A fault with a horizontal shift of 50′ to 100′, lessening downward, separates the vein in 3 portions, worked in the Poderosa and San Carlos mines, respectively. The ore occurs in shoots, and carries 8 to 60% copper and 6 to 8 oz. silver.

Development: the Poderosa mine has several shafts, with a winze to 720′ depth.

Ore reserves are estimated (1918) at 8,000 tons averaging 22%, and 5,000 tons milling ore averaging 5%.

Equipment: includes power plant, ore-sorting plant, concentrator, etc. There are 175 men on the payroll, 95 being underground.

Production: in 1910 the mine yielded 10,902,080 lb.; in 1911, 6,419,372 lb.; in 1912, 5,077,204 lb.; in 1916; 3,948 tons of 28.7% copper and 9.4 oz. silver ore and concentrate was shipped; in 1917, 6,980 tons assaying 31.55% copper and 13.09 oz. silver; in 1918, 3,309 tons averaging 30.7% copper and 12.45 oz. silver.

Costs in 1917 were £8.44 per ton of ore and £28.86 per ton of copper.

SANTIAGO MINING CO. **CHILE**

Subsidiary of Anaconda Copper Mining Co.

Office: 42 Broadway, New York.

Inc. 1917, in Delaware. **Cap.,** $10,000,000; shares $25 par.

Property: Lo Aguirre mine, situated 20 kilometres W. of the City of Santiago, Chile. The mines consist of five groups, 500 acres, partly acquired by purchase from former owners and partly by denouncement. The Africana mines, also owned by the company, are 3 miles E. of Lo Aguirre; Lo Aguirre and Farfana farms of 17,387 and 980 acres, respectively, were secured for (1) their water-rights; (2) control of the intervening space between the two groups of mines; and (3) to avoid liability for damage to farmlands near the proposed reduction works.

Development: in Lo Aguirre mine, the ore occurs as a disseminated deposit. Work begun in 1914, has developed more than 6,000,000 tons of ore

carrying from 1.75 to 3.5% copper. The average of all tunnel samples was 2.44%. The ore is a mixture of sulphide and oxides. It is believed that the orebody contains a much greater tonnage, estimates showing 16,000,000 tons of probable ore, but a little over 6,000,000 is all that was definitely developed at beginning of 1918.

During 1918, eleven holes, aggregating 4,029′, were drilled, in addition to 6,900′ of underground work.

In the **Africana** mine the ore occurs in veins. The mine has a 220′ shaft, with 350′ of workings. Twelve diamond-drill holes, varying in depth from 50′ to 388′ intersect the vein at undeveloped points. The ore is high grade, running from 4½ to 9%, and is particularly desirable on account of its excess sulphur content, which, manufactured into sulphuric acid, can be used for leaching the oxidized ores of Lo Aguirre mines.

During 1918 the main shaft was sunk 259′, while 2,427′ of underground work was accomplished.

Equipment: preliminary plans include a 750-ton mill for Lo Aguirre and one of 500 tons for Africana.

SOUTH AMERICAN METAL CO. (THE) — **CHILE**

Subsidiary of American Metal Co., which owns entire capitalization.

Office: 61 Broadway, New York.

Inc. June, 1917. **Cap.,** $250,000.

Company was organized for purpose of conducting a general trading business in South America, especially in Chile, but it also supervises the mining exploration carried on by the A. M. Co. on that Continent.

The copper smelter at Guayacan, province of Coquimbo, Chile, is controlled by the S. A. M. Co.

VACAS; COMPANIA MINERA LAS — **CHILE**

Address: E. David Pope, care El Nilhue, Chagres, Chile.

Property: the Vacas gold mine with 150 hectares, near the Pupio river, at southern end of the Aconcagua goldfield, between latitude 30° 30′ and 32° 00′ south; and near the Caruto, Magui, Cueca, and Talco mines. Las Vacas is practically the only gold mine now operating in Chile and has been worked for over 100 years.

Geology: the veins are in unaltered and hard granite, and are richest near the contact with andesite dikes that cut and slightly displace them. Pegmatite quartz veins are also common through the granite, sometimes carrying gold which does not persist. The main vein is 3 to 12 meters wide in the upper, and from 5 centimeters to 2 meters in the lower workings. Sulphides exist right from the surface and carry gold in fine-grained friable pyrite, though none is visible to the eye. The ore averages a little less than an ounce per ton.

Development: to a depth of 1,000′ or more by incline shaft and crosscut adit 300 meters long, connecting with shaft at depth of 60 meters. The principal workings are at bottom of the mine.

Equipment: 2 compressors, drills, pumps, geared hoist, and 10-stamp mill with amalgamating plates, classifiers, tube-mill, Dorr thickener, 3 Pachuca agitators, Moore vacuum-filter, and zinc boxes for precipitation of the gold from cyanide solutions. Amalgamation saves 66% of the gold value, but a total recovery of 90% is made.

COLOMBIA

This Republic is best known for its gold and platinum production which comes mainly from alluvial deposits. The emerald mines are quite famous, and deposits of copper, zinc and lead are also known, but practically undeveloped and unworked.

ANGLO-COLOMBIAN DEVELOPMENT CO., LTD. — **COLOMBIA**

Merged with South American Gold & Platinum Co., which see.

BREITUNG MINES CORP. OF DELAWARE — **COLOMBIA**

Office: 11 Pine St., New York City. E. N. Breitung, pres.

Inc. June, 1912, in Delaware, as a holding company to own or control promising or profitable mining properties.

Cap., authorized, $10,000,000; outstanding Dec. 31, 1918, $1,127,790; par, $5. No bonds. Transfer agent, U. S. Corporation Co., New York. Registrar, Bankers' Trust Co., New York. Annual meeting, last Monday in December.

Owns all the capital stock of the Marquette Magdalena Co., a New York corporation protocolized in the Republic of Colombia, S A. Inactive.

BRITISH PLATINUM & GOLD CORPORATION, LTD. **COLOMBIA**

Office: 73 Basinghall St., London, E. C. 2, England; and Mercado & Co., Buenaventura, Colombia.

Directors and officers: T. J. Ive, chairman; E. Cattanach, Walter Conan, and G. H. Short; C. A. Sack, sec.; Inder, Henderson & Dixon, cons. engrs.; Johnson, Matthey & Co., technical advisors.

Inc. May 2, 1918, in Great Britain. **Cap.**, £250,000; shares £1 par; 150,000 issued; changed 1919 to $1,000,000; $1 par; 600,000 issued in February, 1920.

Property: extensive tracts of placer ground in the Choco district of Colombia, acquired from the Consolidated Colombia Platinum & Gold Mines, Ltd., and from Messrs. Pugliese, Frigerio & Mayolo, the latter holdings said to contain 5,000,000 cu. yds. averaging 2s. per yd.

Lands include: **Bolivar and Colonia,** 2,560 acres of gold-bearing ground, 50 miles S. of Buenaventura, said to contain enough pay-gravel to supply several dredges.

Cimarronas, 7,680 acres, of which 100 acres are prospected and contain 2,904,000 cu. yd. of gravel with 4s. (96c) per yd., recoverable, 25% being gold and 75% platinum. The net value of the proved area is £394,040.

Opogodo, 10 sq. miles, of which 2⅛ miles are estimated to contain 4,181,000 cu. yd. of 25.78d. (61.56c.) to 36.76d. (73.52c.) of dredgable ground, and 60,000,000 yd. of hydraulicking ground worth 10.3d. (20.6c) per yd. Proportions of precious metals are 25% gold and 75% platinum. Net value of proved area is £1,703,145.

Equipment: consists of one dredge of 60,000 yd. monthly capacity. Another dredge is under construction.

CHICAGO; LA MINA **COLOMBIA**

Address: via Nechi or Zaragoza, Guamoco district, Colombia.

Property: gold-lead-zinc mine in Guamoco district. Ore is a heavy iron sulphide containing gold, the ore varying from $30 to $40 per ton. Plant includes water power, crusher, Hardinge mill, and counter-current decantation system of cyanidation. No figures of production available.

COLOMBIAN CORPORATION, LIMITED **COLOMBIA**

Office: Henry Richards, sec., 441 Salisbury House, London, E. C. 2, England.

Inc. October, 1919, by the Oroville Dredging Co. to acquire the Constancia mine for $180,000. **Cap.**, £500,000; £1 par. Half of shares are ordinary, and were allotted to Oroville Dredging as the purchase price, the other half are preference shares, entitling holders to half of the profits until a 100% dividend has been paid, and 12½% thereafter.

The mine, worked for 140 years, has 2 parallel quartz lodes of the California type, each about 6′ wide and opened for 2,400′, out of 16,000′ owned. Reserves contain 200,000 tons of $6 ore, with estimated cost of $3.50 per ton. A 100-ton mill is to be erected. The mine is 44 miles S. W. of the Pato mine. Under former ownership production from 1914 to 1918 amounted to 46,000 tons of ore worth $311,000.

COLOMBIAN MINING & EXPLORATION CO., LTD. **COLOMBIA**

Office: 6 Broad Street Place, London, E. C. 2, England; and Marmato mines, Medellin, Colombia.

Directors and officers: S. H. Jenks, chairman; P. E. Butler, J. H. Iles, N. L. Jenks, mgr.; H. Lovegrave, Sir Newton Moore, and John Morgan; G. V. Hatch, sec.

Inc. Feb. 25, 1908, in Great Britain. **Cap.**, £550,000; shares £1 par; 450,000 issued. **Debentures:** £50,000, 6%, 7 years.

Company has a 40-year lease from the Colombia Government on 900 sq. miles in the Supia and Marmato districts of Colombia. Examined by Charles Olden, L. Parker, H. H. Knox, and A. Wilkinson. Some of the area is leased. Reserves at Marmato contain 400,000 tons of 36s. ($8.64) gold-silver ore. Equipment consists of 40 stamps, 3 tube-mills, and cyanide plant. The Mapura property contains large deposits of ore averaging 16s. ($3.84) per ton, which can be mined by open-cut work; a mill of 10,000 tons monthly capacity was ordered in America for this mine early in 1918.

An oil property was being drilled in 1919 and 1920, and work was expected to be finished in July.

CONSOLIDATED COLOMBIA PLATINUM & GOLD MINES, LTD. **COLOMBIA**

Property acquired in May, 1918, by British Platinum & Gold Corporation, which see.

FRONTINA & BOLIVIA (S. A.) GOLD M. CO., LTD. **COLOMBIA**

Office: J. J. Truran, sec., 184 Gresham House, London, E. C. 2, England. **Mine office:** La Salado, Colombia.

Directors: S. W. Stephens, chairman; T. H. Alexander, Sir H. P. Harris, R. W. H. O'Neill, and R. C. Lyall. J. Reed, supt.

Inc. July 18, 1911. **Cap.**, £200,000 in 23,390 pfce. shares, all issued, and 176,610 ord. £1 shares, 140,000 issued. Debentures amount to £45,138, 10%, redeemable in 1921 and 1926.

Profit in 1917-'18 was £17,354, of which £9,339 was distributed and £4,999 carried forward to 1918-'19, after allowing for interest, etc. Profit for 1918-'19 was £18,309, of which £12,839 was paid in dividends.

Dividends: regular on preference shares and 10% on ordinary in 1915; 10% in 1916; 10% in 1917; 5% in 1918; 7½% in 1919.

Company owns mining rights over 12 sq. miles and surface rights over 40 sq. miles in Colombia, S. A.

Property: the Silencio mine is the main producer. Recent development has been on the 14th and 15th levels. Company also owns an interest in the Marmajito Mines, Ltd., owning adjacent properties.

Ore reserves, June, 1916, were estimated at 42,200 tons; in 1918, at 58,500 tons, worth $18 per ton; and in 1919 at 56,100 tons of $17 ore. In 1919 the Marmajito company was preparing to reopen its properties.

Equipment: includes 10-stamp mill and cyanide plant.

Production, years ending June 30:

Year	Ore, tons	Gold, Oz.	Year	Ore, tons	Gold, Oz.
1919	29,020	23,958	1916	25,484	22,358
1918	27,855	23,895	1915	25,971	26,938
1917	23,642	20,653			

LIBERTAD, LA MINA **COLOMBIA**

Address: via Nechi, or Zaragoza, Guamoco district, Colombia.

Property: a gold mine in the Guamoco district, which has been profitably operated for over 8 years on a series of rich pockets occurring in quartz vein 2′ to 12′ wide. Ore is free-milling, and is treated in a 10-stamp mill with concentrator and cyanide plant.

MAMMOTH GOLD, SILVER & PLATINUM MINES **COLOMBIA**

Controlled by Assets Realizing Corporation of California.

Address: J. V. Priest, 812 Merchants' National Bank Bldg., Los Angeles, Cal.

Property: in Department of Bolivar, Colombia, is a concession of about 48,000 acres with extensive placer holdings as well as quartz veins. Extensive sampling shows that the placer properties carry between $2 and $3 per yd. in gold, with some platinum. This property was carefully examined in 1919, and equipment taken in to work the gravel, using hydraulic

elevators. The quartz mine will be worked later. Other valuable assets on the property include rubber trees, vegetable ivory, mahogany, and peruvian bark. There is also a surface seepage of oil on a part of the property. Management considers this a most valuable asset, and development will be pushed rapidly.

NECHI MINES (COLOMBIA), LTD. **COLOMBIA**

Controlled by Oroville Dredging Co. of California and Pato Mines of Colombia.

Office: 441 Salisbury House, London Wall, E. C. 2, England.

Directors and officers: F. W. Baker, chairman; F. D. Behrend, A. S. Elmore, J. A. Agnew, and H. C. Porter. W. A. Pritchard, mgr.

Inc. Feb. 5, 1914, in Great Britain. **Cap.,** £140,000, in 140,000 pfce. and 140,000 ord. 10s. shares, all issued.

Revenue from gold in 1917 was £98,093, of which £52,267 was profit. Preference dividend absorbed £35,000; and £75,862 was carried forward. Current assets were £144,869, and liabilities, £68,238. Revenue in 1918 was £86,000, of which £25,841 was profit. Dividends amounted to £35,000.

Dividends: 25% on pfd. in 1916; 75% in 1917, and 25% in 1918.

Property: 400 acres of gold-bearing placer gravel land on River Nechi, Department of Antioquia, Colombia. Ninety acres of the tract contain 6,855,900 cu. yds., valued at $4,926,600 gross. The gravel is about 50′ thick.

Production: dredging operations since 1915, are summarized below:

Year	Yardage	Yield	Per Yd.,c.	Cost, c.
1918.....	2,142,929	$437,499	20.40	5.80+
1917.....	1,883,659	489,959	26.00	10.73
1916.....	1,617,975	797,125	49.27	15.20

The output in December 1919, was $39.559 from 84,678 yards.

PATO MINES (COLOMBIA), LTD. **COLOMBIA**

Subsidiary of Oroville Dredging, Ltd.

Office: Henry Richards, sec., 441 Salisbury House, London Wall, London, E. C., England. **Mine office:** Apartado 104, Barranquilla, Colombia.

Directors: Fred W. Baker, chairman; F. D. Behrend, H. S. Derby, A. Stanley Elmore, J. A. Agnew, and H. C. Porter. W. A. Prichard, supt.

Inc. Oct. 5, 1909. **Cap.,** £100,000; shares £1 par; all outstanding.

Financial Statement, years ending September 30:

Year	Gold	Net Profit	Balance	Current Assets	Current Liabilities
1918....	£54,715	£12,832	.....	.....	.....
1917....	130,556	46,822	£183,320	£93,682	£85,543
1916....	144,648	74,894	136,498	144,060	202,087

Property: 40,000 acres of gold-bearing ground on the Nechi river, 6 miles from Zaragoza, Department of Antioquia, Colombia. At last estimates, in 1913, 448 acres contained 19,092.650 cu. yd. averaging 29.1c per yd. to depth of 26.4′.

Geology: the properties lie in an oval basin cut through by the Nechi river and surrounded by crystalline rocks; within the basin are flat tables of bedded gravel with red or blue clay strata that contain beds of peat or brown coal. The gravel deposits grow richer in depth.

Equipment: includes hydro-electric power plant, an 8½ cu. ft. dredge, ice plant, and repair shops.

Production:

Year	Yardage	Yield	Per Yd., c.	Cost, c.
1918.....	1,345,215	$266,062	19.78	11.16
1917.....	1,181,945	650,522	55.40	11.20
1916.....	1,684,721	719,493	48.50	12.46
1915.....	1,308,470	618,884	47.30	11.40

The yield in November, 1919, was $25,342 from 81,413 yards.

SOUTH AMERICAN GOLD & PLATINUM CO. **COLOMBIA**

Office: 61 Broadway, New York.

Officers: Adolph Lewisohn, pres.; Frederick and Sam A. Lewisohn, v. p.'s; F. M. Loper, sec.; E. H. Westlake, treas.; with James McDougall, A. F. Keene, J. H. Sussman, and J. Parke Channing, directors.

Inc. Oct. 11, 1916, in Delaware. **Cap.**, $10,000,000; shares $5 par; non-assessable; 1,800,000 issued, of which 1,479,684 are in escrow.

Bonds: $500,000; 7%, 10-year cumulative convertible income notes, due 1926. Listed on New York Curb.

Company is a holding concern for the shares of various corporations owning producing gold and platinum mines in Colombia. Most of the shares are owned or controlled by Lewisohn Brothers, General Development Co., Consolidated Gold Fields of South Africa, Gold Fields American Development Co., and Johnson, Matthey & Co. of London.

Property of Subsidiaries: (1) about 10,000 acres, and (2) 50 miles of river beds and banks in the Intendencia of El Choco, Colombia, accessible from the San Juan river. Exceptional quantities of platinum and gold are said to be available, valued at $70,000,000. The ground carries from 90 cents to $1.60 a yard.

Equipment: includes a dredge with wooden hull capable of digging 40,000 yards per month, and a steel dredge of double that capacity.

Production: in 1917 reported to be worth $700,000.

ECUADOR

Ecuador has only a small gold production, and although deposits of other metals are known, there are no operating mines. The total production of gold varies between $300,000 and $500,000 annually, coming mainly from the veins of the Zaruma district, in the southern part of the country.

SOUTH AMERICAN DEVELOPMENT CO. **ECUADOR**

Address: Paul C. Schraps, constructing engr., and Lee O. Kellogg, mng. eng., Apartado 655, Guayaquil, Ecuador.

Property: gold mine in the Zaruma district, El Oro province, Ecuador. The nearest town is Portovelo. Transportation of supplies is difficult and expensive, being $85 to $95 per ton from New York. A 90′ head-frame costing $10,100 was erected in 1917. This mine contributes nearly all the gold produced in Ecuador. Veins are in fine-grained diorite and are often 15′ wide. Extensive faulting is evident. Ore treated is a mixture of quartz and calcite, with 10% by weight of sulphides.

Equipment: includes water-power, hoist, compressor, stamp mill and counter current decantation cyanide plant. Reconstruction of the power canal was described by Paul C. Schraps in the "Engineering and Mining Journal" of November 10, 1917.

ZARUMA MINING CORPORATION, LTD. **ECUADOR**

Office: J. C. Stamfer, 156 Palace Chambers, London, S. W., England.

Directors: J. Rey, chairman; C. Brault, P. J. E. E. Chambost, A. E. Lund, E. Saladin and J. Vielle.

Inc. Jan. 31, 1913, in England. **Cap.**, £120,000, in 110,000 pfd. £1 and 200,000 dfd. 1s. shares; 90,000 of former and all of latter issued.

Property: 1,838 acres in the Zaruma district, Ecuador. The Caridad lode contains reserves of 90,000 tons of £12 gold-silver-copper-lead ore and the Christina 61,000 tons of £10 ore.

PERU

The mineral wealth of Peru has been famous since the days of the Incas, but the principal mineral products of today, copper, silver and oil, are produced by the aid of outside capital. The precious metal output is

derived chiefly from copper ores, with a smaller amount from lead ores. The vanadium deposits are widespread, but production is mainly from the Minasragra mine, owned by the Vanadium Corporation of America, which yields 80% of the world's supply of vanadium.

AMERICAN VANADIUM CO. **PERU**

Merged 1919 into Vanadium Corp'n of America, which see.

ANGLO-FRENCH TICAPAMPA SILVER MINING CO., LTD. **PERU**

Offices: A. Dangerfield, 56 Cannon St., London, E. C. 4, England; F. J. Ruffner, 27 Rue Laffitte, Paris, France; and Ticapampa, Hwaras (Huuraz), Peru.

Directors: E. Quellennec, pres.; Baron J. de Catelin, managing; W. J. Cousins, M. Hentsch, L. Jumentier, C. Ledoux, P. G. Reumaux and R. de Thezillat. P. Fontenay, eng.

Inc. Dec. 10, 1903, in Great Britain. **Cap.**, £140,000; £1 par; 117,171 issued.

Profit: in 1917 was 1,516,042 francs, of which f 790,904 was distributed. Reserve funds are f 330,618 for ordinary, and f 457,731 for projected railway construction.

Dividends: 169% from 1905 to 1917, inclusive, 27% being paid in 1917.

Property: a silver mine at Ticapampa, province of Hwaras, Peru.

Equipment: mining and milling machinery, and 100 km. railway projected.

Production: 374,400 oz. silver in 1916; 591,100 oz. in 1917.

BACKUS Y JOHNSTON DEL PERU; SOC. MIN. **PERU**

Main office: 134 Plateros de San Pedro, Lima, Peru.

Officers: A. J. Bennett, pres.; B. A. Simpson, v. p.; with D. C. Babbitt, H. S. Hunter, and T. P. Jones, directors. N. B. Roper, gen. mgr.; Wm. Campbell, supt. of Morococha mines; S. Herz, supt. of Casapalca mines.

Inc. May 1, 1917, in Peru. **Cap.**, £300,000; shares £1 par, fully paid. Company purchased practically entire holdings of the Backus & Johnston Co., a New Jersey corporation, fully described Vol. XI.

Property: consists of several large groups of copper-silver mines in the Morococha district, Peru.

Casapalca Mines: the principal mines in this district are the Carlos Francisco, Upper and Lower, the Cuarenta, Corina and Chuquichuccho. The first named is developed by an adit, equipped with electric haulage, about 5,000′ long, which cuts the vein at a depth of about 2,500′ below the outcrop. The vein is being worked along a length of 7,500′ from the adit level, and from adits about 1,200′ and higher above the main adit. Ore from the upper workings is sent to smelter over a 4,500′ aerial tramway.

Morococha Mines: the company relies principally upon the Morococha district for its copper ores, the chief sources of supply being the Huillca, Natividad, Churruca, Isabel, Alicia, Favorita, Alapampa, Ombla, San Luis, Pacchapata, La Vieja, Manuelita, and the mines of the Cia. Santa Clara, Cia. Minera de Pesares and of the Cia. Blanc. All of these mines are operated by the company either on account of ownership, by partnership arrangement or on lease. The completion of the power plant at Bellavista in 1913, the arrangement for the rental of further power, with a consequently more complete installation of compressors and machine drills, and the driving of three drainage tunnels have resulted in much lower mining costs and in a much more extensive exploitation of the properties.

The Natividad, the deepest shaft of the district, is 500′ below the drainage tunnel level—a total of 1,000′. To provide for the deeper development of this and other mines of the district, a large central shaft is being sunk to a depth of 500′ below the level of the drainage tunnels and a pumping plant capable of handling 10,000 gallons per minute will be installed. The ore from the Morococha district is transported to the smelter, 32 kilometers distant, over the Peruvian Central Railway, which has a branch line 14 kilometers long running from Ticlio on the main line to Morococha.

The output of the Morococha is about 4,000 tons a month, averaging 2% copper and 40 oz. silver per ton, including concentrates.

Smelter: the smelter and concentrating plants are situated at Casapalca on the main line of the Peruvian Central Railway, 154 kilometers from the port of Callao, at an altitude of 13,700′. The company is operating at present two of its three furnaces and four 96″x150″ horizontal barrel type basic converters. The sintering plant consists of 20 roasting pots of 10 tons daily capacity each, and of two Dwight-Lloyd sintering machines. Flue dust is briquetted and returned to furnaces. The smelter handles a considerable quantity of custom ore.

Concentrating plant: low-grade ores from the Casapalca mines are concentrated in a 200-ton mill adjoining the smelter, equipped with a No. 5 gyratory crusher, 2 primary ball mills, one regrinding ball mill; 2 Hancock jigs, 4 Overstrom tables and 5 single-deck and 2 double-deck Deister tables. Product is dewatered in a 30′ Dorr thickener and filter-pressed.

The main power plant, situated on the Rio Rimac, 4 miles below the smelter, contains two 800-kw. generators driven by Pelton wheels, transmission being at 10,000 volts. At the smelter there are two 150-kw. and one 125-kw. generators, also driven by Pelton wheels. Air is furnished as follows: for the furnaces, by one 118-cu. ft. and two 200-cu. ft. Connersville blowers, both driven by Pelton wheels, and by one motor-driven turboblower of 24,000 cu. ft. capacity; for the sintering pots, by 3 small rotary blowers of the Connersville type; for the converters, by a 14,000 cu. ft. Nordberg blowing engine, direct-driven by a synchronous motor; for the Casapalca mines, by 3 motor-driven air compressors with a combined capacity of 5,000 cu. ft. free air per minute. A 500-ton sampling mill and 16-oven coking plant were erected in 1919.

Production, for the last five years has been as follows:

Year	Fine Copper, lb.	Silver, Oz.	Gold, Oz.
1914	11,115,176	2,948,338	1,734
1915	11,438,165	2,842,477	1,969
1916	19,395,396	3,262,499	2,587
1917	23,647,771	3,492,724	3,494
1918	23,940,043	3,351,294	3,810

CAYLLOMA; CONSOLIDADA SOC. ESPLOTADORA DE PERU

Office: Casilla 178, Valparaiso, Chile.

Officers: G. C. Kenrick, pres.; H. A. Barker, mgr.; L. J. Rosenshine, mill supt.

Inc. 1906, in Chile. **Cap.,** £125,000; shares 5 shillings par. Gross sales of products in 1917 were £34,142.

Property: 500 acres in Province of Caylloma, Arequipa, Peru. The outcrop of vein now worked is over 13,000′ long. Company took over property originally worked by the Caylloma Silver Mining Co., formed in London in 1889. The first silver mines of the district were worked by Spaniards in 1630, and prior to that time by the Incas.

The mines, which are at 16,500′ elevation, show andesite cut by quartz-rhodonite veins carrying rich silver minerals, together with galena and chalcopyrite. The ores of milling grade average 20 oz. silver per ton, the sorted ore 100 to 300 oz. silver per ton, with some gold.

Development: by 6,000′ drainage tunnel tapping center of ore deposit.

Equipment: includes 80-ton treatment plant with 12 Nissen stamps, Deister tables, and cyanide works. Plant was reconstructed in 1919.

Production: the monthly output averages 110 tons of concentrate assaying 6 to 9 kg. (190 to 280 oz.) silver, with gold and lead. Cost of mining is $8; milling, $5; and total, $20 per ton of ore mined.

CERRO DE PASCO COPPER CORPORATION PERU

Office: 15 Broad St., New York.

Officers: L. T. Haggin, pres.; Edward H. Clark, v. p.; H. Esk Moller, sec.-treas.; S. L. Rawlings, gen. mgr., Lima, Peru.

Inc. Oct. 28, 1915, in New York, succeeding the Cerro de Pasco Copper Investment Co. **Cap.,** 1,000.000 shares, without par value; 898,225 issued. Annual meeting second Wednesday in May. Columbia Trust Co., New York City, transfer agent; Bankers Trust Co., registrar. Shares were $67½ high and $31 low in 1919, range being $52 to $63 in last three months.

Company owns $2,850,000 of the $3,000,000 capital of the Cerro de Pasco Railway Co. In 1917 the Cerro de Pasco Mng. Co. and Morococha Mining Co. were dissolved, and their assets and liabilities were transferred to this corporation. All bonds were redeemed in 1918.

Financial Statement: years ended December 31:

Assets.

Year	Mines and works	Investments	Current	Total
1918	$25,723,581	$6,408,284	$16,818,731	$48,950,596
1917	25,339,400	6,037,011	12,618,272	43,994,683

Liabilities.

	Capital	Bonds	Capital Surplus	Deferred	Current	Property and operating surplus	Total
1918	$5,000,000	.....	$18,545,515	$4,156,338	$3,608,439	$17,640,304	$48,950,596
1917	5,000,000	$4,542,000	14,003,515	2,653,850	1,556,353	16,238,966	43,994,683

Profit and Loss.

	Reserves	Operating charges	Taxes, custom ore, etc.	Reserves	Net profit
1918	$27,422,807	$9,659,536	$9,104,929	$8,158,424	$499,916
1917	30,182,515	7,832,006	9,697,736	7,539,275	5,613,598

Surplus Account.

	Profit	Previous balance	Interest and Sinking fund	Dividends paid	Balance
1918	$499,916	$11,447,916	$263,650	$4,393,353	$7,290,830
1917	5,613,598	13,378,519	3,534,730	4,009,470	11,447,916

Dividends: $1 quarterly has been paid regularly since March 1, 1916, with extras of $1.75 in 1917 and $1 in 1918. Total dividends, $19.75 per share to end of 1919. No. 17, of $1 per share, was paid March 1, 1920.

Property: over 940 claims, and 70,000 acres miscellaneous lands in the Morococha and Yauli districts and about 400 acres of land that includes three-fourths of the rich Cerro de Pasco district, with a smelter site and extensive coal tracts north of Cerro de Pasco.

Cerro de Pasco lies 14,300′ above sea level, rendering physical labor very fatiguing. The population of the town is about 6,000, of whom only a small percentage are white. The region is bleak and all food and supplies must be brought in from considerable distances. The year has but 2 periods, the wet and dry, the former from November to April. Both are said to be bleak and exceedingly disagreeable. Snow and hail fall at any time, summer or winter, but rarely remain on the ground as long as 48 hours, even in winter. The fluctuation between mean summer and winter temperature is about 20° F. only, less than the daily variation.

Silver was discovered at Cerro de Pasco in 1630, and the mines produced, to the close of the nineteenth century, about 450,000,000 oz., from 40,000,000 tons of silver and copper ore, nearly all extracted by hand-work and carried 3 to 6 miles on the backs of llamas, to primitive smelters, whence the silver bullion was transported by llamas 200 miles to Lima, until 1870, when a railroad was completed to Oroya. Formerly only the copper ores of 25 to 40% were shipped.

Geology: the ore deposits occur in rhyolite agglomerates and tuff, forming the western part of a body of rhyolite 1¾ miles across, that is intrusive in, and surrounded by limestone. Over an area a mile wide and nearly 2 miles long, nearly every claim carries ore. The orebodies outcrop prominently, as crestones, or ridges, and carry gold, silver, copper, lead, zinc and cobalt. The oxidized zone carries considerable gold, running as

high as 1 to 2 oz. per ton, occurring in rich but erratic shoots. The high silver values usually extend to about 100′ depth only, occasionally running up to thousands of ounces per ton, followed by rich silver-copper ores, which in turn, at a little greater depth, are succeeded by ore low in silver but richer in copper, the copper ores being estimated to have averaged 15 to 30 oz. per ton in the old workings. Primary ores below the water level contain bornite and chalcopyrite, associated with pyrite, tetrahedrite, arsenopyrite and sphalerite, containing little silver and only traces of gold. There are occasional veins of high-grade silver-lead ores, with others carrying up to 8% zinc; practically all the copper ores are bismuthiferous, hence refractory in reduction. The ores carry about 35% silica and 14 to 30% iron, the excess of silica requiring considerable limestone for fluxing.

Development: the Cerro company is working its orebodies through 3 shafts to a depth of 600′. The surface of the property shows scores of tajos, big pits resulting from the caving in of old open cast workings, some of these being 300′ deep. The property lies in a basin, and the mines are very wet, especially below a depth of 400′. The Rumiallana drainage tunnel, begun April, 1877, by Henry Meiggs, was completed 1907, by the Compañia Empresa Socavonera del Cerro de Pasco, with which a financial arrangement was made, through a 5% stock interest given in the Cerro de Pasco Copper Co., obviating the payment of a 20% royalty.

The company disregarded old workings and opened a new mine, by 2 tunnels, of about 2 miles length each, and 5 new shafts. The Diamante, Peña Blanca, Carmen and Noruega 2-compartment shafts have 4 levels opened, and are bottomed at 410′. The Excelsior shaft is 800′ deep with levels 100′ apart and serves the entire mine. Waste is used for filling, timber being very expensive, and used only for lining shafts and timbering important tunnels. The mines are equipped with powerful pumps. Reserves of ore blocked out are said to be kept 4 years ahead of smelter consumption, these including first-grade ore of 8 to 10% copper tenor, with good silver values, and second-grade ore, of uncertain copper tenor, though probably workable in the main.

According to M R. Walker, the Rumiallana drainage tunnel is a working level, 30′ below the 400′ level. Shrinkage, square set, and cut and fill methods are employed. Reserves averaging 5% copper, were estimated in 1918 as sufficient for 20 years. All hoists are electric. Coal and oil-fired boilers are available. A total of 1,600 h. p. is used at the mines. Electric locomotives run on the main haulage levels, pulling six 22-cu. ft. ore cars; new cars are to be 40 cu. ft. The equipment is equal to 420,000 tons per annum. Underground costs are $3 per ton. When the new smelter is built, yearly output will be 70,000,000 lb. of copper.

Present reduction works: at La Fundición, near Tiñahuarea, 9 miles from the mines, are connected therewith by rail. All buildings are of steel frames, covered with corrugated iron. The plant treats a small quantity of custom ores and has a sampling mill with crushers, rolls and chain-bucket elevators. The works are terraced throughout, permitting the handling of material by gravity, and are built on the unit plan.

The furnace building has twelve 2,000-ton flat-bottomed steel ore bins, filled from railroad tracks above, and loading into charging cars run alongside, that are drawn by small locomotives on a narrow-gauge track running on either side of each furnace, 2 cars constituting a charge. There are five 56″x180″ water-jacketed blast-furnaces of about 300 tons actual daily capacity each. Slag is granulated by running water. The smelter building has a steel stack, 220′ high and 20′ in diameter. There are three 60′ reverberatory furnaces, fourteen 18′ six-hearth McDougal calcining furnaces and 6 Dwight-Lloyd sintering machines.

The converter department, in a separate building, has 4 Pierce-Smith basic lined converters. Product of the converter is 99% blister copper, in cakes, shipped to Baltimore for refining.

The present smelter is old, antiquated and built at too high an eleva-

tion, owing to rarity of atmosphere. It will, therefore, be superseded by a new plant, authorized August, 1919, to be erected near Oroya, the junction point of the Cerro de Pasco Railway and the Central Railway of Peru. This site, some 2,000′ lower than the present smelter, is much nearer to both the Morococha mines and to the port of Callao from which bullion is shipped and where supplies and construction material are received. Smelter will embody the most modern and approved ideas.

The **Morococha property:** includes the Gertrudis, San Francisco and San Miguel mines and a one-half interest in the Natividad mine, owned jointly with the Backus & Johnston Co.

The Mina Gertrudis, opened 1897, on the Cerro San Marcello, west of Lake Morococha, shows 3 limestone beds with ore impregnations following the bedding planes; vein has strike of N. 51° E. and nearly vertical dip. It averages about 2 meters in width, with a paystreak of 60 cm. to 1 meter, carrying gray copper and chalcopyrite averaging about 14% copper and 1,000 grams silver per metric ton, balance of vein carrying about 5% copper and 300 grams silver per metric ton. The mine has a 12-meter shaft, but is developed mainly by a tunnel, just above the level of Lake Morococha, mining through winzes sunk from short crosscuts in the hanging. Ore is hand-cobbed at the portal of the tunnel.

The Natividad mine is opened to about 300 meters depth, developing a vein about 4′ wide, carrying ore averaging 14% copper and 14 to 70 oz. silver per ton. A new tunnel, planned to be 750 meters long, is being driven under the old workings.

The Mina San Miguel is developed by the Copaycocha and Vulcano tunnels, latter of about 100 meters length, and ore is mainly enargite, with some tetrahedrite and tennantite, associated with pyrite. Mine was opened 1893, and in 10 years produced 6,476,400 kg. fine copper and 10,794 kg. fine silver from ore averaging about 20% copper and 333 grams silver per metric ton.

The San Francisco is opened by a 4,000′ tunnel, known as the Carlos Reynaldo adit. Production is approximately 20,000,000 lb. per year, smelted at the Cerro de Pasco works.

Cerro de Pasco Railway Co.

Subsidiary of Cerro de Pasco Copper Corporation. Results may be summarized as follows:

Year	Revenue	Charges	Profit	Balance available	Dividends	Current assets	Current liabilities
1918..	$1,069,056	$744,199	$324,857	$1,472,033	$285,000	$404,321	$65,256
1917..	1,043,090	682,570	350,519	1,631,675	484,500	301,206	55,538

The company has a main line of 83 miles, running from Cerro de Pasco to Oroya, where connection is made with the Central Railway of Peru, which runs thence 130 miles to Callao, the latter line being one of the most notable in the world, having cost $43,000,000 and gaining nearly 3 miles vertical elevation, reaching the highest altitude of any railroad on the globe, having an average grade of 2.5%, with no less than 37 tunnels, including the Galera tunnel of one kilometer length which cuts through a ridge of the Andes. The Cerro de Pasco railway has a branch to the coal fields, and, with all spurs, sidings and yards, has about 135 miles of standard-gauge track, laid with 70-lb. rails. Them ain line has an average grade of 1.5%, with a maximum grade of 3%, and cost upward of $2,000,000 Equipment includes 13 locomotives, in addition to 6 light switching engines at the smelter, and 59 steel ore and coal gondolas, with a total of 247 forty-ton cars, rolling stock being of the best American manufacture. The railroad is on a paying basis.

The company employs about 2,200 men at the copper mines, 1,500 men at the smelter, 1,000 at the Goyllarisquisca coal mine, 400 at the Vincuscancha coal mine, and 200 at the Quishuarcancha coal mine.

In January, 1919, striking workmen at the Morococha dynamited the power lines, causing flooding of lower levels, and American employees had to abandon the camp.

Production: 3,389,787 lb. copper in 1906; 20,258,689 lb. in 1907; 23,646,921 lb. in 1908; 30,327,423 lb. in 1909; 31,713,012 lb. in 1910; 48,600,926 lb. in 1911; 45,272,000 lb. in 1912; 43,856,000 lb. in 1913; 40,753,000 lb. in 1914; 61,000,000 lb. in 1915; 71,452,000 lb. in 1916; 72,650,000 lb. in 1917; 71,910,000 lb. in 1918, and 58,100,000 lb. in 1919. The silver content is important, as it amounts to over 3,000,000 oz. per annum. Output for January and February 1920, was 9,334,000 lb. copper.

The Cerro de Pasco is undoubtedly the most expensive copper property ever developed, the total investment to date being $25,000,000. The ores are refractory and the great altitude of the smelter, which is 14,300′ above sea-level, coupled with inefficient native labor, have given rise to an exceedingly complex and tiresome problem in ore reduction. Estimating cost of production at 8c per lb. and annual output at 70,000,000 lb., the earnings per share of the Cerro de Pasco Copper Corporation would be $4.20 on a 14c, $8.40 on a 20c and $12.60 on a 26c copper market.

CERRO DE PASCO EXTENSION, INC. **PERU**

Name changed to Peruvian Copper and Smelting Co., which see.

CERRO VERDE MINE **PERU**

Owned by Carlos J. Lohman, Arequipa, Peru. Mine was under 3-year option from October, 1916, to the Andes Exploration Co. of Maine, a subsidiary of Anaconda Copper Mining Co. J. A. Gibbons, mgr., Arequipa, Peru.

Property: 244 pertenencias, about 20 miles S. E. of Arequipa, 9 miles by automobile road from railway at Taibaya. Elevation of mine is 8,800′.

Geology: copper occurs in a disseminated deposit in rhyolite, near a contact with porphyritic diorite. Two irregular masses of granodiorite divide the rhyolite mass. An oxidized zone about 220′ deep has silicates and carbonates; these pass downward into secondary sulphides changing at 320 to 450′ in depth to primary sulphides.

Development: property is being thoroughly prospected by churn-drilling and by underground work from a 430′ shaft. Work on the 250′ level totals 3,000′. The deposit is said to contain more than 10,000,000 tons that average between 2 and 2½% copper.

FERROBAMBA, LTD. **PERU**

Office: F. F. Fuller, sec., 638 Salisbury House, London, E. C., Eng. **Operating office:** Arequipa, Peru. **Mine office:** Ferrobamba, Catobanbos, Apurimac, Peru.

Directors: A. C. Burrage, chairman; A. C. Adams, T. C. J. Burgess, W. H. W. Bliss, C. D. Burrage, H. W. Brown and A. Solomon.

Inc. Nov. 5, 1909, in Great Britain. **Cap.,** £150,000; 60,000 priority shares, 10s. par; 36,658 issued; 120,000 ordinary shares, £1 par, fully issued. Is registered in Peru.

The Ferrobamba property is in central Peru at an elevation of 13,000′ above the sea and about 45 miles west of Cusco, the terminus of the Southern railway, 500 miles from Mollendo, the seaport. The 207 claims are in 10 groups, covering 2,255 acres, in the Cotobamba district, state of Cuzco, Peru. The deposits show oxidized copper ores at the surface, underlain by sulphides largely bornite, and can be worked by steam shovels.

Property: includes valuable water-right concessions, from which it is planned to develop hydro-electric power, the rivers being fed by the melting snows of the Andes. The concessions include water rights to the Rio Chalhuahuacho and several affuents, and application has been made for similar rights on the Rio Apurimac, about 25 miles in an air line from Ferrobamba No. 1. Including the last named concession, the available water power is rated at 120,000 h. p.

The property has been divided into 5 zones, or groups, known as Ferrobamba No. 1, Ferrobamba No. 2, Katanga, Charcas and Bonanza. Condi-

tions are much the same at these different properties and it is thought that all can be worked opencast.

Ferrobamba No. 1, 900 acres, shows an enormous mass of garnet rock, apparently of contact metamorphic origin, rocks being hornblende-biotite-granite and limestone altered into wollastonite by contact metamorphism for a remarkable distance, in many places up to 3,000′ from any recognized igneous contact. An area of 34 hectares of proven copper ground, 2,300′ long and 1,640′ wide, is estimated to carry ore of payable tenor to a depth of 200′; or approximately 12,000,000 tons of ore.

Churn-drilling with Keystone drills from 1910 to 1912, together with underground work in 15 tunnels and in the shafts, proved 6,000,000 tons of ore averaging 3.7% copper and 1.3% sulphur.

Ferrobamba Nos. 2 and 3, 300 acres, constitute the Sulfobamba mine. Development to January, 1913, has proven 778,000 tons of ore carrying 2.25% copper, with 6.75% sulphur and 532,000 tons too low grade to work.

The Katanga or Reina de Cobre mine, 300 acres, is undeveloped.

The Charcas group, though having an area of only about 35 acres, contains a pyritic orebody 100 meters wide and 800 meters long, carrying chalcopyrite with pyrite, the face of a bluff of ore assaying 5% copper, 3 oz. silver and 9 grams gold per ton.

The Bonanza claims, 420 acres, lying 9 miles south of Ferrobamba No. 1, apparently resemble the other properties, but no mining has been undertaken.

Development: 8,300′ of tunnel or adit work and continuous operation of 2 churn-drills.

Property has been examined and reported on by Frank Klepetko and W. H. Wiley. Property closed down awaiting railway transportation.

MOROCOCHA MINING CO. **PERU**

Absorbed in 1917 by Cerro de Pasco Copper Corporation, and company dissolved.

NEW CHUQUITAMBO GOLD MINES, LTD. **PERU**

Office: 459 Salisbury House, London, E. C. 2, England.

Directors: F. Lowy, chairman; F. E. Macfadyen and F. H. McCardie.

Inc. May 22, 1907, in Great Britain. **Cap.,** £50,000; £1 par; 44,869 issued. Year ending June, 1917, showed a loss of £1,577. **Dividends:** 36% from 1907 to 1916.

Property: 142 acres at La Quinua, near Cerro de Pasco, Junin, Peru, contains 2 replacement deposits of auriferous quartz lying with the bedding of limestone where cut by andesite dikes. The ore is 65′ wide, and carries $4 to $25 per ton gold.

Development: by tunnels and open-cuts. A 40-stamp mill and cyanide plant are at work.

Production: £12,567 from 19,360 tons in 1916; £10,743 from 21,333 tons in 1917.

PERUVIAN COPPER & SMELTING CO. **PERU**

Offices: 115 Broadway, New York; and Pachacayo, Peru, S. A.

Officers: F. W. Mason, pres.; J. A. Vandegrift and B. W. Steele, v. p.'s; with J. F. Anderson, and R. R. Carter, directors. M. W. Braden, sec.-treas.; J. N. Vandegrift, mgr.; C. C. Semple, supt.; G. A. Ryder, and Frank Miculicich, engineers.

Inc. Aug. 10, 1917, in Delaware. **Cap.,** $10,000,000; shares $1 par; non-assessable; 4,600,000 issued. U. S. Corporation Co., registrar; and transfer office, 65 Cedar St., New York. Annual meeting second Tuesday in March. Ten thousand shares were advertised for sale in New York in October, 1919, at 65 cents each. Company said to have ample funds in treasury to carry out the construction and development work planned for 1920.

Property: 830 acres of copper-silver and 40 acres of silver-lead claims at Yauricocha, in the district of Yauyos, on western slope of the Andes, 50 miles S. W. of Pachacayo on the Central Railroad of Peru, and 262 kilometers from Callao on the coast. Also owns 4,082 acres of coal land

at Jautenhausi, 20 miles E. of Yauricocha, and 30 miles from Pachacayo. Examined by John Glidden, C. C. Semple, and J. A. Vandegrift.

Geology: the Yauricocha ores occur in a contact between limestone and diorite. The orebody is vertical, runs N. W.-S. E. and has a length of 2,500′. Ore is carbonate, changing to sulphide at water-level at 400 to 500′ below surface. Ore said to average 12% copper, 3 oz. silver, and $2 gold per ton.

Development: at Yauricocha, by 2 vertical main shafts, 225 and 400′ deep, and 4,000′ of workings. Reserves reported as 70,000 tons, plus 60,000 tons of probable ore and 2,000,000 tons possible ore to a depth of 225′. One shaft caved in at 225′. In January, 1920, a crosscut on the 225′ level was reported to have gone through 110′ of 23% ore and the 375′ level showed 130′ of 26% ore. Vein is said to be proven for 2,500′ in length and to 400′ in depth.

At the Felicidad copper mine, 3 miles W. of Yauricocha, little work has been done. The vein is said to be 300′ wide and 4,000′ long on surface, and it is expected to become a large mine.

The Jupiter and La Porfia silver-lead mines, 14 miles W. of Yauricocha and 6 miles E. of the coal mines, have not been worked by this company, though they yielded ore running 51% lead and 100 oz. silver per ton when worked by former owners.

The Jautenhuasi coal properties contain 4 veins of coal 3 to 4½′ thick, with no partings. The coal cokes well and is good enough for boilers. Tests made at the Casapalca smelter were satisfactory and the coal gave good results in locomotives of the Central Railroad of Peru. Reserves are given as 40,000,000 tons. The Government of Chile is said to have voted $1,500,000 towards construction of a railway to these mines.

At Rangracancha, 6 miles W., company has another coal mine.

Equipment: includes a 300-h p. hydro-electric plant, with foundations for 600-h. p. steam and gasoline hoists, compressor, ½ mile of 3′ gage tramway, complete 100-ton copper smelter, with two 50-ton reverberatory furnaces, machine-shop, warehouse, dwellings, and motor road under construction. In January, 1920, 400 men were employed on the motor road and 200 at the mines.

Production: 1,541 tons of ore from the Yauricocha mine, reduced at the Casapalca smelter, averaged 23.68% copper and 2½ oz. silver per ton, giving a gross return of $153,422. None of this ore was selected, according to official reports.

Company proposes to increase the capacity of the smelter to 200 tons per day, which with cost of power plant, road, coal mine expenses, etc., will cost $300,000. Management estimates that treating 200 tons of 16% copper ore daily at a cost of $12 per ton of ore, or 7¼ cents per pound of copper, sold at 18 cents per pound, will yield a daily net profit of $12,600. Deducting $5,025 for charges on metal delivered at New York, plus $2,100 for amount paid M. Larke and associates, previous owners who still retain an interest, leaves a net profit of $5,475 per day, or $1,642,500 per year of 300 days. This estimate does not, it is said, include from $100,000 to $200,000 from precious metals and coal sold. On the present outstanding capital a return of 20 to 30% is therefore expected.

QUEQUENA; COMPANIA MINERA de **PERU**

Owners: Miguel Gamon y Rubio, Arequipa, Peru, and Manuel Chinchilla, Valparaiso, Chile.

Property: about 18 miles S. E. of Arequipa, at an elevation of 11,000′, contains 8 veins carrying from 18″ to 5′ in width. Ore consists of silicate and carbonate of copper, changing with depth to chalcopyrite and bornite with a quartz gangue and assaying from 4% to 60% copper, and up to 40 oz. silver per ton.

Development: by 2 old shafts, 250′ deep. Has shipped ore containing 20 to 30% copper and 25 to 40 oz. silver per ton. Idle.

TINTAYA MINE **PERU**

Under option to Andes Exploration Co.

Property: 1,320 pertenencias, 10 miles S. E. of Yauri, Cuzco, Peru, and 60 miles by good roads to Chuquibambilla on Juliaua Arzco Ry. Developing by churn-drills and tunnels to prove whether mineralization is limited to contact of sedimentary rocks, or extends into the prophyritic igneous rocks. Silicate and carbonates, as well as cuprite, bornite, chalcopyrite, and native copper are found.

VANADIUM CORPORATION OF AMERICA **PERU**

Formerly American Vanadium Co.

Office: 120 Broadway, New York; Vanadium Bldg., Pittsburgh, Pa.; Bridgeville, Pa., and Minasragra, Peru.

Officers: J. L. Replogle, pres.; M. G. Baker, v. p.; with Charles M. Schwab, A. A. Ryan, T. Coleman du Pont, Ledyard Cogswell, E. R. Tinker, H. P. Whitney, and Joseph De Wyckoff, directors. E. F. Nickerson, sec.; L. K. Diffenderfer, treas.

Inc. 1919, in Delaware. **Cap.**, 300,000 shares, to be increased to 500,000 shares in 1920; no par value; 270,000 issued.

Initial balance sheet of September 16, 1919, gave total assets as $10,177,093, including $5,500,000 for mines; $1,000,000 for patents and processes; $2,000,000 for plant; $177,093 for inventories, and $1,500,000 cash.

Income from January 1, 1919, to January 20, 1920, was $1,907,553 from sales, plus $161,674 from other sources, a total of $2,069,227. After paying $741,823 for general charges, $128,334 in dividends, $120,233 for taxes and $68,347 for organization expenses, the surplus was $593,328.

Dividends: initial quarterly of $1.50 per share on April 15, 1920.

Property: vanadium mines at Minasragra, Peru, and smelters at Bridgeville, Pa., where ferro-vanadium is made.

The ore deposits, which are the richest and most productive vanadium deposits in the world, were originally located for coal but their real nature was discovered by the manager of the Hauranca smelter in 1905, who denounced them jointly with E. E. Fernandini. The latter sold out to J. J. Flannery, in 1910. A 12-mile railway, covering the most difficult part of the road, is being constructed from the mines to Lake Pun Run.

Geology: the mines, which produce 80% of the world's supply of vanadium, are in the Andes at an elevation of 16,800′. The orebody is a lens-shaped mass 300′ long and up to 30′ thick, enclosed in red gypsiferous shales near igneous intrusions of varying composition. The ore is made up of the hydro-carbon mineral quisoqueite, coke and patronite, a greenish-black sulphide of vanadium. (See Hewitt Trans. Am. Inst. Min. Eng., Vol. 4, 1909). The ore averaged 19% metal, but the reserves are lower grade, though estimated to contain 30,000,000 lb. vanadium in blocked out and probable ore and 70,000,000 lb. possible ore. Ore is packed on llamas for 28 miles, to the Peru Central Railway.

Production: annual output of vanadium is about 3,000,000 lb., enough for 1,000,000 tons of steel. Ferro-vanadium sells for $7.00 per lb. Output is to be doubled in 1920.

In December, 1919, the Vanadium Corporation announced that it had absorbed the Primos Chemical Co. of Colorado, which produces vanadium, tungsten, molybdenum and chrome. Vanadium Co. will sell 93,334 shares at $45 a share to pay for Primos.

VENEZUELA

The mineral production of Venezuela has been almost at a standstill for several years, as mining is only done by a few foreign corporations and development is retarded by lack of confidence in the stability of the Government. Gold is the important product, but copper and iron, manganese and lead are mined in small amounts. The total value of the mineral pro-

duction for 1918 was $2,376,540, a decrease of $1,696,400, compared with 1917, the lessened output of copper and asphaltum being responsible for the decline. There are 179 metalliferous properties in operation, 53 subject to assessment work before titles are granted, and 97 merely filings which require the approval of Congress.

The gold-bearing regions have a bad climate, which is a serious hindrance to their development. The chief gold-bearing area is the Guianan highland in the southeastern part of the country, extending from headwaters of the river Yuruari down to the frontier of British Guiana. The gold occurs in shallow but rich alluvial gravel deposits.

Vein mining is practically confined to the Caratal district in the state of Bolivar, 150 miles south of the city of Bolivar. The district is underlain by metamorphic mica schists and hornblende and gneiss with intrusive masses of granite and diorite and later dikes of diabase. The gold quartz veins at Callao are in diorite, near diabase. The veins are small, the main bonanza vein but 2 ft. thick, but the ore is rich, varying between $75 and $90 per ton. It is worked to a depth of 1,100′ and a length of 1,000′ and between 1853 and 1895 yielded 1,438,638 ounces of gold.

Copper mining is practically restricted to the Aroa deposits.

In addition to the companies described in this section the following mining companies operated properties in Venezuela during 1918:

El Dorado Rubber, Balata & Gold Mining Co., owning the Perseverancia, Hechicer and San Carlos, gold quartz mines at Tumeremo, Roscio district, Estado de Bolivar.

Sindicato Aleman Minas Santa Isabel, operating the two Santa Isabel copper properties near Villa de Cura, Zamora district, State of Aragua.

Compañia Nueva Panama, owning a gold quartz mine of this name near El Callao, Roscio district, Bolivar.

Waterman y Compañia, at El Callao, and developing three gold quartz veins on the Esperencia, Las Nieves and Talisman claims, in the Callao section.

Bianchi y Odreman, Poggi Hermanos, Meris y Carlos Palazzi, Antonio Pieve y otros, H. Quensa y Cia, and others are operating placer gold properties, the first named getting out large nuggets, and averaging nearly $10,000 a month, working claims through leasers.

The Compañia La Cumaragua is opening up a promising group of 4 copper mines near Arog, and John C. Prince is developing the Camburito copper mine, and Johann Gathman, The Aroa bis, also near Aroa.

Other copper properties are under development by M. P. Maneiro y E. A. Modiano, at Manicuaro in Sucre; Carlos Stilling at Nirgua; M. Griffin y L. Mercado also at Nirgua.

Garbiel Rafalli developing the Canaima silver-lead property at Santa Rosa y Sta. Teresa in Benitez district of Sucre.

EL AMPARO MINE, LTD. VENEZUELA

Address: Guasipati, Roscio, Venezuela.

Property: the old and famous La Paz gold mine in the Roscio district, State of Bolivar, said to be almost worked out late in 1918. Equipped with 10-stamp mill, pans, tables, and cyanide plant.

GOLD FIELDS OF VENEZUELA, LTD. VENEZUELA

Address: El Peru, Venezuela.

Property: claims showing gold quartz veins, 4 miles west of El Callao in Roscio district, State of Bolivar, southwestern Venezuela. A plant employing 2 Chilean mills treats $15 to $20 gold ore by amalgamation and cyanidation.

INCREIBLE, COMPANIA ANONIMA MINERA LO VENEZUELA

Address: Caracas, Venezuela.

Property: the Increible gold mine at Guasipati, 8 miles N. E. of El Callao, in southwestern Venezuela. Development work is said to have proven a large tonnage of milling ore. **Equipment:** includes 20-stamp mill and cyanide plant.

Production: over 40,000 tons of ore yielding $10 per ton by amalgamation, with $5 in the tails recoverable by cyanidation.

NEW CALLAO GOLD MINING CO. LTD. VENEZUELA

Address: El Callao, Venezuela.

Property: the famous Callao mine and the Callao La Union, Nueva Hanza alluvial mines; also the Culebra and El Porvenir vein mines near El Callao in southeastern Venezuela. The old mine is full of water, but some of the lesser mines are very promising.

The company is French and its financial condition is weak owing to the present status of European affairs.

SOUTH AMERICAN COPPER SYNDICATE, LTD. VENEZUELA

Office: 2 Broad Street Place, London, E. C. 2, England; and Aroa, Port of Tucacas, Venezuela.

Directors and officers: H. Edwards, chairman; H. D. Boret, T. O. Callender, H. Maubourguet, C. H. McEwen, and C. N. Murphy. C. D. Comrie, sec.; G. B. Butterworth, gen. mgr.; C. H. Stewart, cons. eng.

Inc. March 27, 1907, in Great Britain. **Cap.,** £40,000; shares 2 shillings par; 150,000 issued. Notes £37,500 of 7% issued in November, 1918.

Profit for year ended June 30, 1917, was £28,753, plus £3,167 brought forward; dividends absorbed £30,000; current assets were £93,516, and liabilities £55,448.

Dividends: 25% in 1909; 30% in 1910; 145% in 1911; 250% in 1912; 350% in 1913; 75% in 1914; 62½% in 1915; 150% in 1916; 200% in 1917.

Property: the Aroa mine and the San Antonio and Titiara mines, 55 miles from port of Tucacas, Venezuela. The Aroa vein is 50′-75′ wide on the surface, and outcrops for 2,000′. The ore consists of pyrite and chalcopyrite, which as shipped to England, runs 9% copper. The low-grade ore is mixed with oxides and smelted to a matte at the mine. A 200-ton smelter is operated. Extensive drilling is under way in 1920.

The production is not made public, but profits are certainly large, judging by dividends.

YURUARI COMPANY VENEZUELA

Letters returned in March, 1919, from Caracas, Venezuela.

Property: gold-bearing gravel in Cicapra district, 25 miles N. W. of El Callao. The gold is in decomposed schist, and churn-drilling is said to have revealed several million yards of ground worth $1 per yd., which could be worked at cost of 50 cents. At last accounts a 200-yard clam-shell dredge was at work.

EUROPE

FINLAND

FINNISH-AMERICAN MINING CO. **FINLAND**

Company idle and without funds. See Vol. XIII for details.

Office: Calumet State Bank, Calumet, Mich. **Operating office:** Fennia Bldg., Helsingfors, Finland.

GERMANY

MANSFELD COPPERSCHIST MINING CO.

(MANSFELD'SCHE KUPFERSCHIEFERBAUENDE GEW.)

Mine office: Eisleben, Prussian Saxony, Germany.

Officers: at last accounts, Dr. Dittrich, Dr. Lehmann, Dr. Lengnick, E. Kreuser, Br. Windisch and I. J. Tobias, executive committee; Bergrat Dr. Vogelsang, gen. mgr.

Inc. 1852, as a consolidation of numerous independent operators, and reorganized, April 10, 1876, under laws of Prussia. **Cap.**, 69,120 shares, apparently without assigned value.

Dividends: have been 90 marks per share in 1900; 45 in 1901; 15 in 1902; 40 in 1903; 40 in 1904; 80 in 1905; 120 in 1906; 70 in 1907; nothing in 1908 and 1909; 10 in 1910; 15 in 1911; 45 marks in 1912; no information available since.

Treasury shares to the amount of 2,000,000 marks, and a new issue of 5,000,000 marks, were authorized 1908, to provide for the deepening of shafts, rebuilding and enlarging of the electric plants at the Krughütte and Kupferkammer works, construction of new copper and brass works at Hettstedt, and other improvements.

Forces employed are upwards of 22,000 men, and exclusive of the Westfalen coal mines, averaged 19,735 men 1912, of whom about 70% were employed at the mines and 13% at the smelters.

Property: the Mansfeld copper mine, together with several large coal mines in Westphalia, and a potash bed near Wansleben, opened by a shaft, which has been in operation since 1903. Landed holdings also include considerable tracts of forest.

The coal mines at Langendreer, near Hamm, Westfalen, include several adjoining mines, with 4 operating shafts, and in connection is a coke plant of about 225,000 metric tons yearly capacity, production averaging about 2,500 metric tons of coal and coke daily. There are 2 crushing plants, 1 near Walzwerke and the other at Rothenberg.

The Mansfeld mine was opened A. D. 1199, was immensely profitable during the fourtenth and fifteenth centuries, but the industry nearly suffered extinction during the Thirty Years' War. Activity was resumed in 1671, when the right of working the mines was declared free, this resulting in the building up of a great number of small independent operators. The present company was first formed 1852, as a consolidation of the various small mine operators and smelters, and the merging of many small interests has resulted in a nearly seventeenfold increase of production, from 1,179 metric tons fine copper and 6,489 kilograms silver in 1852.

Geology: the ore of the Mansfeld mine is kupferschiefer, a 12″ bed of fine-grained bituminous shale, lying nearly horizontal, having a dip of about 5° only. A thickness of but 8″ is workable, but the bed underlies an area of several hundred square miles. The ore contains slightly argentiferous chalcopyrite, bornite and chalcocite, disseminated in very fine grains through the kupferschiefer. Lying just under the kupferschiefer is an arenaceous shale, also carrying chalcopyrite. There also is a slightly cupriferous limestone bed, known as the Dachberg. The kupferschiefer carries 2.9 to 10% copper, and ores smelted average 2.5 to 3% copper and 0.015 to 0.020% silver.

Owing to the great age and extent of the old workings, the headings usually were 2 to 4 kilometers from the shafts, hence the actual mining was done under considerable disadvantage, the thinness of the bed and the great extent of the workings rendering it necessary for miners to work on their sides, stomachs or backs, as in coal mines, wearing boards upon their trunks and thighs, in order to protect themselves from the rock floors. Recent mining operations are through a row of 6 deep-level hoisting shafts, intersecting the kupferschiefer at depths of 300 to 600 meters. Three other shafts reach the seam at still greater depths, and 2 of these also intersect a bed of excellent carnalite. These shafts are all circular, 6 meters in diameter, with a lining of brick, backed by concrete. Many of the scores of old shafts which average about 400 meters in depth, are used for ventilation, safety and raising water. The principal new shafts are the Hohenthal, at Helbra; the Herman, at Helfta, and the Paul, at Helmsdorf. All new shafts have steel headframes. Underground haulage, formerly done by horses, has been supplanted by electric locomotives, in the newer workings. Ore is hand-sorted on reaching surface, and waste rock, including considerable limestone, is used for underground filling.

Water from the entire mine is drained to the Hohenthal, Ernst and Niewandth shafts, whence it is raised by steam and electric pumps to the main adit, 150 meters below surface.

Equipment: includes the most modern improvements. Many shafts have cross-compound steam hoists, with conical drums for deep winding, but the Hermann and Paul shafts and the newer exploratory shafts have electric hoists employing the Ilgner system of balancing. All hoisting is done by double-deck cages holding 4 cars. Electric power is generated by gas engines at the Krughütte and Kupferkammer reduction plants.

The Krughütte power station has two 1,300-h. p. units, the blast furnaces being connected with 2 parallel gas trunks, taking blast gases to a purifier house, where there are Zschokke and Theisen centrifugal washers, through which the gas passes, and is then dried by passing through a Theisen vapor separator, going thence to a gasometer of 500-cubic metres capacity, from whence it is drawn, as required, to two 1,300-h. p. Ochelhäuser gas engines, direct-connected to a Siemens-Schuckert 3-phase alternator of revolving field type. Current is transmitted to various works at 3,000 to 10,000 volts, and there stepped down for use.

Transportation is by railway lines and a number of Otto aerial trams, the Hermann mine having a 7-kilometer electric aerial tram.

The Mansfeld has numerous reduction plants, including 2 smelters for raw ores, 2 roasting smelters with acid plants, 2 matte smelting works, and a desilvering plant, the various works having a total of 13 reverberatory furnaces.

The method of reduction is by heap roasting, and calcining in shaft furnaces. Roast heaps are built about 1,000 meters long, 6.5 meters broad at the bottom and 3.5 meters broad at the top, and 2 meters high. The only fuel used is a little brushwood, at the edges and bottoms of heaps, and each heap is roasted about 4 weeks. If the ore carries any fines, these are screened, briquetted and added to the roast heaps. Roasting reduces the ore 7 to 10% in weight, but is done more for the elimination of carbon dioxide and bituminous matter than to throw off sulphur, the latter running

only 2 to 3% in the raw ore, while the bituminous matter ranges 10 to 17%, and carbon dioxide 7 to 13%. There are 2 roast stalls near the shafts, and at the furnaces the first-fusion product is a matte carrying 40% copper and 0.25% silver. This matte is broken up and roasted in calcining kilns, and the roasted matte, with the addition of 5 to 10% raw matte, is smelted in reverberatory furnaces to white metal carrying 74 to 75% copper and 0.45 to 0.50% silver. The slags from the white metal carry 4 to 6% copper and are returned to the shaft furnaces. Slag is utilized extensively for the manufacture of slag brick and paving blocks. The white metal is ground in Krupp ball mills and sent to the Saigerhütte refinery.

The Kochhütte, at Helbra, is the principal smelter, treating about three-fifths of the total production. There are 8 furnaces, 1 held in reserve, of circular shaft type, using cold blast. The Krughütte treats the rest of the ore. This plant, at Eisleben, near the mines, has 6 furnaces, one being held as a spare, all of circular shaft type, with forehearths, using cold blast.

The Eckardtthütte, at Leimbach, has 4 copper furnaces of circular shaft type, using cold blast. This plant also has 1 lead stack, producing silver and lead matte, and makes a little nickel speiss from resmelted fine dust. The Eckardtthütte has an acid plant, with 72 kilns and 5 lead acid chambers, employing the chamber process of acid making.

The Kupferkammerhütte, at Hettstedt, has 3 circular shaft furnaces, but employs a hot blast. The acid plant at the Kupferkammerhütte has 82 kilns and 6 lead acid chambers, turning out 50 metric tons of 50° Beaumé sulphuric acid weekly.

The Gottesbelohnunghütte is one of the smaller and less modern smelters, equipment consisting of 13 small reverberatory furnaces, 17 roasting furnaces and 2 small furnaces for refining slags.

The Saigerhütte is mainly a refinery, including a desilvering plant, operating on the Ziervogel process, which roasts the matte and retains the silver as a sulphate which is dissolved in water and the solution run over metallic copper, which precipitates the silver, the cement silver so secured being pressed and resmelted to metal 999 fine. The final furnace product, after the extraction of the silver, is blister copper of 99.7 to 99.8% tenor.

Production: which was only 5,865,898 lb. in 1867, increased to 15,230,287 lb. in 1877, to 29,176,000 lb. in 1887, and 40,230,400 lb. in 1897. Recent production has been as follows: 42,500,278 lb. in 1903; 41,629,349 lb. in 1904; 43,824,141 lb. in 1905; 40,108,000 lb. in 1906; 38,822,000 lb. in 1907; 39,686,800 lb. in 1908; 41,891,400 lb. in 1909; 44,769,800 lb. in 1910; 45,955,600 lb. in 1911; 45,188,600 lb. in 1912. Production in 1912 was secured from 873,305 metric tons of cupriferous material smelted. Estimates place the 1915 yield at 44,100,000 lb., and in 1916, 59,000,000 lb.

The Mansfeld is handled with high technical skill, and its orebodies, by reason of their vast extent, are among the largest known. No detailed information has been available since 1913.

SAXON TIN & WOLFRAM MINING CO., LTD. GERMANY

In March, 1919, realization and distribution of the assets in England was proceeding, in conformity with the Act of 1918. See Vol. XIII for description of company, etc.

GREAT BRITAIN

AFRICAN ORE CONCENTRATION SYNDICATE, LTD. ENGLAND

Secretary and office: J. A. Stocker, 701 Salisbury House, London, E. C., England. A. S. Elmore, Walter McDermott and C. Pakeman, directors.

Inc. June, 1905. **Cap.,** £12,000; shares £1 par; issued and fully paid.

Company owns patents for the treatment and concentration of ores and has erected plants at the Transvaal Consolidated Land & Exploration Co., and Namaqua Copper Co.'s properties in South Africa.

DOLCOATH MINE, LTD. ENGLAND

Office: R. A. Thomas, mgr., Camborne, Cornwall.

Directors: F. Harvey, chairman; Oliver Wethered, J. M. Holman, E. W. Janson, F. A. Robinson and F. W. Thomas.

Inc. July 15, 1895, in England. **Cap.,** £350,000; shares £1 par; all issued. **Debentures:** £75,000 of 6% participating, issued February, 1918.

Operations for the year 1918, resulted in a profit of £22,927, plus £9,548 from previous period. After allowing for depreciation and development, £11,916 was carried forward. Cash assets exceed liabilities by £30,000. The first half of 1919 resulted in a loss of £19,519.

Dividends: since 1896 total 135%; last one, 7½%, paid 1913.

Property: the most famous tin mine of Cornwall, worked from 1700 to 1799 for copper and which from 1799 to 1867 yielded ore carrying copper and tin, together with small amounts of arsenic, silver, and cobalt, to the total value of £3,234,693.

In 1918, Dolcoath, with the East Pool & Agar, Ltd., purchased the mineral rights to 9,000 acres of the Tehidy Estate for £90,000, Dolcoath taking a 66% interest.

Development: by 3,000′ shaft and extensive workings. Prior to 1915, the annual advance was up to 1,500 fathoms, but in 1919 was only 150 fathoms. A comprehensive drilling campaign was completed last year.

Equipment: includes machinery for the 3,000′ shaft, 16 Holman pneumatic stamps, concentrators, and Elmore flotation plant.

Production:

Year	Ore Treated, Tons	Black Tin (tons) (70% Metal)	Costs Per Ton
1919 (half)	28,877	387	$11.22
1918	61,499	827	10.76
1917	69,714	967	8.64
1916	79,347	1076	6.52
1915	82,967	1187	6.36
1914	105,302	1439	5.80

The old mine still continues to produce considerable tin ore but without profit to company's shareholders.

EAST POOL & AGAR, LTD. ENGLAND

Office: J. F. Maynard, sec., Carn Brea, R. S. O., Cornwall, England.

Directors: H. M. Rogers, chairman; J. M. Holman, J. C. Gardner, W. J. Loring, and C. A. Moreing. Bewick, Moreing & Co., gen. mgrs.; M. T. Taylor, supt.; J. W. Partington, chemist.

Inc. Jan. 11, 1913, in England. **Cap.,** £100,000; shares £1 par; changed to 480,000 of 5s. par in August, 1917; all issued. In April, 1919, 120,000 new shares of 5s. each were issued.

The net profit for 1916 was £22,485, of which £9,116 was paid in dividends. In 1917, profit was £59,651, and £24,061 in dividends. In 1918, profit was £103,784, and dividends £60,000.

Dividends: 15% in 1916; 25% in 1917; 50% in 1918.

Property: a 42-year lease on 2 mines at Illogan, Cornwall, that were worked from 1834 to 1912. In 1918 company acquired a 33% interest in the Tehidy Estate for £30,000.

Development: for 1916 amounted to 4,501′; besides 189′ of diamond drilling. The vein on the 1,440′ level shows an orebody 39′ long and 5½′ wide that carried 55 lb. black tin and wolfram per ton, and another 185′ long and 6′ wide that assayed 10.8 lb. Other development at this depth was also satisfactory, so that reserves are practically unimpaired.

In 1918, there was 4,115′ of exploration and 1,078′ of diamond-drilling done with satisfactory results, especially for the drill-holes.

Equipment: includes steam and electric power, Cornish and motor-driven pumps, compressors, hoists, shops, assay office, 10 Holman pneumatic stamps, 6 tube-mills, 32 concentrators, slime plant, and magnetic

separators. Late in 1919 a flotation process was evolved by which the cassiterite could be floated with a 90% recovery.

Production: years ending December 31:

Year	Tonnage	Black Tin, tons	Wolfram, tons	Arsenic, tons	Tin and Scheelite, tons	Copper, tons	Value
1918.....	75,401	1,280	57	420	1.78	...	£290,517
1917.....	77,287	.....	...	...	....	...	176,000
1916.....	81,395	706	100	527	....	118	.....

Costs in 1918 totaled 50/8, or $12.08 per ton, against a yield of 77/, or $18.48 per ton, exchange figured at $4.85.

GEEVOR TIN MINES, LTD. ENGLAND

Office: W. C. Williams, mgr., Pendeen, Cornwall.

Directors: Oliver Wethered, chairman; E. J. Andrews, sec.

Inc. Feb. 22, 1911, in Great Britain. **Cap.,** £90,000; shares 10/ par; 120,000 issued; increased in 1919 to £180,000; **Debentures:** £14,700 of 10% outstanding; £25,000 authorized.

Profit for 15 months ended March 31, 1918, was £8,177, of which £6,000 was distributed. Net profit for year ending March 31, 1919, was £17,854. **Dividends:** 10% in 1917; 20% in 1918; 10% in 1919.

Property: 208 acres at Pendeen, St. Just, Cornwall. Three lodes are worked, and a mill containing 4 Holman pneumatic stamps and tables of 100 tons daily capacity is at work. Reserves are given as 140,000 tons of tin-bearing ore. Development in 1918-'19 was quite satisfactory. The Wheal Carn mine has been unwatered and good ore found. Company is also interested in the South Crofty in Cornwall and Rayfield (Nigeria) Tinfields Co.

Production, in recent years:	Tonnage	Yield
1918	25,919	£76,514
1917-'18 (15 months).....	26,313	56,860
1916-'17 (15 months).....	28,683	43,350

Tin concentrate amounted to 439 tons, or 37.9 lb. per ton. Costs are around 31/, or $7.44 per ton.

GRENVILLE UNITED MINES, LTD. ENGLAND

Office: H. Batens, mgr., Camborne, Cornwall.

Directors: T. Negus, chairman: J. R. Goold, and E. Hallett, J. Tonkin & Son, engrs.; F. M. Taylor, sec.; J. Nile, mgr.

Inc. July 2, 1906, in Great Britain. **Cap.,** £100,000; shares 10s par; 180,000 issued. In 1919 company was refinanced and two 5s shares issued for original 10s. shares, 3s. 6d. paid, the exchange providing £24,000 for future development.

Dividends: £21 13/6 paid by old company to 1911 on £100,000 £1 shares; 90% from 1911 to end of 1913; nothing since.

Property: a tin-bearing tract at Camborne, Cornwall, on which there is a concentrating plant.

Production: in 1917 was 454 tons of black tin concentrate produced from 40,938 tons of ore, and 228 tons of black tin for first half of 1918.

LEVANT TIN MINES, LTD. ENGLAND

Address: Francis F. Oats, St. Just, Cornwall, England.

Inc. February, 1920, in Great Britain. **Cap.,** £160,000; shares 10s par; 240,000 issued. Company succeeds the Levant Mining Co., organized in 1872.

Property: the Levant mine, on a cliff facing the Atlantic Ocean, 6 miles from Land's End in Cornwall, adjacent to the Geevor mine. There are 2 systems of lodes, which intersect. They are in granite and "killas" (clay-slate). The mine, operated since 1820, is practically dry, in spite of being partly under the sea.

Development: by 1 main and 2 blind shafts, reaching depth of 2,100′, and many miles of workings. There are 3 blocks of unworked ground said to be worth developing.

Equipment: includes steam power, 50-h. p. pump, hoists, 64 stamps, and concentrating machines.

Production: to end of 1918 the total was 3,800 tons of crude arsenic sold for £32,657; 136,562 tons of copper ore for £859,303; and 21,959 tons of black tin for £1,531,977. The last three years for which returns are available follow:

Year	Arsenic Tons	Copper Tons	Black Tin Tons	Total Value
1918	52	54	278	£60,137
1917	86	146	372	53,815
1916	202	155	437	49,926

MINERALS SEPARATION, LTD. **ENGLAND**

Office: A. O. Williams, sec., 62 London Wall, E. C., England.

Directors: J. H. Curle, F. L. Gibbs, S. Gregory, H. A. Krohn, W. W. Webster. W Broadbridge, chief eng.; Sulman & Picard, cons. mets.

Inc. in 1903, to carry on metallurgical operations. **Cap.,** £50,000; shares £1 par; all issued and fully paid; increased to $500,000 in November, 1919.

Profit in 1917 was £36.400, and £38,717 was carried over from previous year. Dividends amounted to £50,000, leaving balance of £25,117 carried forward. Cash assets exceeded liabilities by £81,000.

Dividends: 50% in 1917 and 1918.

The chief assets of the company are a number of patents (said to be over 50) for flotation processes and machines for recovery of concentrates from silver and lead, zinc, copper, and other ores. The use of flotation has been as great an advance in the treatment of zinc and copper ores as the cyanide process has been for gold ores. United States, Canadian, and Mexican Minerals Separation patents are owned by Minerals Separation North American Corporation, which see. In August, 1919, the patent rights for Spain were reported licensed to the Peñarroya company (which see) which is to act as agent; also to the Société Minerais et Metaux in France.

NATIONAL MINING CORPORATION **ENGLAND**

Office: Walter McDermott, Moorgate Hall, Finsbury Pavement, London, E. C. 2, England.

Directorate includes Walter McDermott of the Consolidated Mines Selection Co., J. A. Agnew of the Burma Corporation, F. A. Govett of the Lake View & Oroya Exploration Co., F. W. Baker of the Mexican Corporation, E. S. Christopherson of the Consolidated Gold Fields of South Africa, B. Kitzinger of the National Bank of South Africa, H. Strakosch of the Union Corporation, A. S. Elmore of the Chemical & Metallurgical Corporation, and H. Guedalla of the Imperial & Foreign Corporation.

Inc. November, 1919, in Great Britain. **Cap.,** £3,000,000; £1 par. The corporation is organized for exploration, investment and financing of mining properties throughout the world.

The first report, published in March, 1920, shows that 5 shillings per share had been called, realizing £625,000. Net value of investments was £281,458, and cash on hand £345,891.

In February, 1920, company acquired an interest in the South American Copper Syndicate, Venezuela, which see.

ORE CONCENTRATION CO., LTD. **ENGLAND**

Office: 701 Salisbury House, London, Eng. **Directors:** Alex. Stanley Elmore, chairman, and F. E. Elmore; Walter McDermott and B. C. Hinman, directors. J. A. Stocker, sec.

Inc. Nov. 18, 1905, in Great Britain. **Cap.,** 230,000 ord. shares of £1 each, 224,544 issued, and 20.000 pfd. of £1 each, 8,795 issued.

Company owns the Elmore patents for concentration of ore by the use of oil, and has installed plants at several low-grade copper properties.

SOUTH CROFTY, LTD. **ENGLAND**

Office: Josiah Paull, mgr., Carn Brea, Cornwall.

Directors: F. Allen, chairman; H. J. Meyerstein, and H. A. Micklein, T. W. Evans, sec.

Inc. July 18, 1906, in Great Britain. **Cap.,** £50,000; shares 5s par; all issued; increased to £100,000 in June, 1919.

Profit for 1917 was £43,852. Dividends were £35,000. Reserve fund is £25,000. Profit for 1918 was £67,554.

Dividends: 321% from 1909 to Dec. 31, 1918, including 60% for 1918.

Property: the Trevenen Sett, arsenic-copper-tin-tungsten mine at Illogan, and the Castle Dinas tungsten mine at St. Columb, Cornwall. Both mines are equipped with concentrating plants.

Development: in 1918, 3,572′ of work was done and 2,703′ of drilling, with disappointing results.

Production, years ending December 31:

	Ore, tons	Gross Yield
1918	70,055	£139,981
1917	67,688	196,545
1916	71,706	103,087

Costs are around 25/- ($6) per ton.

TEHIDY MINERALS, LIMITED **ENGLAND**

Office: J. F. Maynard, sec., 20 Copthall Ave., London, E. C., England.

Oliver Wethered, chairman of directors; R. A. Thomas, cons. eng.; Bewick, Moreing & Co., gen. mgrs.

Inc. February, 1919, in Great Britain. **Cap.,** £40,000; £1 par; 10/- called up; increased in September to £300,000; 150,000 shares are held by Viscount Clifden.

The Dolcoath and East Pool & Agar companies have large interests in Tehidy.

Property: the mineral rights on more than 26,000 acres in mid and west Cornwall, owned by the Basset (since 11th century) and Clifden estates, including the Tincroft and other operating tin mines; also deposits of silver-lead ore, hematite iron, and china clay, considered to be the most important mineralized area in Cornwall. Besides the famous Rogers tin lode, the ground contains several others. A large production of tin and other products has been made in the past, but there is yet a great area of unexplored ground. The lodes have been worked mainly in the "killas" (clay slate), but as the tin content increases in the granite, extensions will be made in this formation. It is proposed to start extensive lateral development of the principal fissures. Diamond-drilling is also to be done. Geology studied by Malcolm Maclaren; mining methods by W. A. Macleod.

TINCROFT MINES, LTD. **ENGLAND**

Office: Wm. Thomas, mgr., Carn Brea, R. S. O., Cornwall. F. E. Martin, sec.

Directors: Jas. Wickett, chairman; T. R. Bolitho, J. Gilbert, H. Bolitho, H. Rich, and W. D. Coode.

Inc. May 20, 1900, in England. **Cap.,** £62,500, in 50,000 priority and 200,000 ord. 5s. shares, of which all and 96,953, respectively, are issued. **Debentures:** £30,000 authorized, of which £10,000 have been issued.

Financial statements show that profits and losses have been erratic, as below:

Year	Receipts	Working Profit	Net Profit	Loss
1919	£61,979	.....	.....	£15,885
1918	126,385	£19,093	£15,685	.....
1917	103,605	18,004	14,954	.....
1916	77,846	5,046	2,500	.....
1915	68,630	3,739	1,266	.....
1914	62,854	804	.....	£3,865
1913	89,221	.....	.....	15,685
1912	118,626	18,356	14,057	.....

Dividends: priority shares received 10% in 1907, 5% in 1912 and 1913, 10% in 1917, and 110% in 1918.

Property: 142 acres at Carn Brea, Cornwall, has a lode 3 to 15′ wide, dipping 60°, and opened to a depth of 1,248′ in granite. Ore carries arsenic, copper, tin, and wolfram. Reserves are about 80,000 tons. The bottom of the mine is looking well, especially on the 208-fathom level.

Equipment: includes beam hoist, 2 Cornish pumps, motor-driven compressor, and 200-ton dressing plant using ordinary gravity and Nissen stamps, concentrators, and magnetic separators. Employs 598 men.

Production:

Year	Ore Treat., Tons	Arsenic, Tons	Copper, Lb.	Black Tin, Lb.	Wolfram, Tons	Yield P.T. Ore	Cost P.T. Ore
1919	36,744	...	.....	705,000	..	.....	.....
1918	54,356	...	.....	848,960	..	$11.10	$9.66
1917	56,121	...	.....	1,003,520	..	8.70	7.50
1916	57,500	663	197,120	1,155,940	44	6.48	6.06
1915	59,000	538	67,200	1,361,920	39	5.22	5.04
1914	59,000	467	107,520	1,375,360	19	5.08	5.32

WEARDALE LEAD CO., LTD. **ENGLAND**

Office: Harold Chase, sec., Salisbury House, London, E. C. 2, England. E. P. Deas, chairman of board of directors; H. S. Willis, mgr.; Henry Louis, tech. advisor.

Inc. Sept. 18, 1900, in Great Britain. **Cap.**, £100,000; shares £1 par; 97,919 issued.

Profit for year ended September 30, 1918, was £18,143, of which £12,240 was distributed; £7,177 was carried forward. Profit for 1919 was £7,421 net.

Dividends: total 37/10 ($8.98) per share from 1901 to 1918, when 2/6 (60 cents) was paid. The distribution in 1919 was equal to 7½%.

Property: large area of mineral land at Weardale, Durham, containing deposits of galena and fluorspar in limestone. The milling plant was remodeled in 1919.

Property: in 1917, the 5,452 tons of ore smelted yielded 4,348 tons of lead; in 1918, 4,281 tons of ore gave 3,405 tons of lead. Output for 1919 was 1,869 tons of lead, and 11,500 tons of fluorspar.

GREECE

ANGLO-GREEK MAGNESITE CO., LTD. **GREECE**

Office: J. D. Henderson, 24 Finsbury Square, London, E. C. 2, England.

Directors: C. F. Colville, chairman; J. MacLaren, W. G. Waldron and J. Hogg, gen. mgr.

Inc. Aug. 21, 1902, in England. **Cap.**, £125,250 in 50,000 7% cum. pfd., 74,000 £1 ord. and 25,000 1s dfd. shares, of which 37,845; 65,207; and 15,728 are issued, respectively.

In 1915, profit was £49,359; dividends absorbed £21,310; £18,512 was

carried forward; reserve fund was £32,000. In 1917, profit was £16,167; dividends absorbed, £13,216; £9,956 was carried forward; reserve fund was £32,000.

Dividends: 7% each year on pfd. shares; total on ord. shares since 1904 is 181%, including 15% in 1917; and 1325% on dfd. shares since 1911, the 1917 distribution being 100%.

Property: 5,000 acres near Pyli on the island of Eubea, Greece, mostly magnesite bearing.

Equipment: mining machinery suitable for open-cut work, 4-mile aerial tram, ore trams, etc.

Production: is not given, but operations must be highly profitable, judging by profits. Much of the ore comes to the United States in normal times.

ITALY

ENGLISH CROWN SPELTER CO., LTD.

Office: W. Saberton, sec., White's House, Port Tennant, Swansea, Wales, England.

Directors: R. J. E. Francis, chairman; W. H. Edwards, J. L. Richardson, and Sir G. Thomas.

Staff: E. W. Carlyle, supt.; E. Zay, mine mgr.; G. H. T. Tucker, mill manager.

Inc. March 9, 1883, in Great Britain. **Cap.**, £100,000; shares £1 par; 84,000 issued.

Profit in 1917 was £33,254; dividends absorbed £14,175; £15,326 was caried forward.

Dividends: total 400% since 1883; 15% paid in 1918.

Property: zinc deposits at Oneta, province of Bergamo, Italy.

Equipment: hydro-electric plant and concentrating works in Italy, and smelter in Wales.

Production: 10,862 tons of calamine and blende in 1916, and 5,263 tons in 1917.

LIBIOLA COPPER MINING CO. LTD. ITALY

Office: Bishopsgate House, 80 Bishopsgate, London, E. C. 2, England.
Mine office: Sestri Levante, Genoa, Liguria, Italy.

Officers: T. V. Anthony, chairman; H. Hubert James, and Albert Straube, directors; C. J. Whitaker, sec.; Robert H. Craven, mine mgr.

Inc. January, 1867, in Great Britain, and reconstructed 1888. **Cap.**, £252,000; shares, £5 par.

Profit in 1917 was £3,037, plus previous balance of £732. Dividend absorbed £3,150. Profit in 1918 was £1,819.

Dividends: 2s 6d in 1903; 3s 6d in 1904; 3s 6d in 1905; 2s 6d in 1907; 2s in 1908; 1s 6d in 1909; 1s 6d in 1910; 2s in 1911; 3s in 1912; 2s 6d in 1913; 1s 6d in 1914; 1s 6d in 1915; 1s 6d in 1916; 1s 3d in 1917, the total being £5 14/ per share.

Property is worked through a subsidiary company, organized under laws of Italy.

Property: 4 claims, leasehold, 1,000 hectares, also a half-hectare mill-site, including the Libiola mine, in the Carrara district, northern Italy. The mine, worked by the Romans, and reopened 1867, has about 12 miles of workings. The veins, in serpentine and diabase, carry chalcopyrite associated with pyrite, ores estimated by management to average 3.45% copper and 45.03% sulphur. A total of 64,440 tons of ore was blocked out for stoping at the end of 1916; in 1918 reserves were estimated at 990 tons copper ore and 11,000 tons pyrite.

Equipment: includes a 150-h. p. steam plant, 60-h. p. electric plant and a 30-h. p. hydraulic plant, with 90-h. p. used at the mine and 150-h. p. at the mill; one hoist, and two air compressors of 12 drills aggregate capacity.

The mine has a machine-shop, smithy and carpenter shop, all of stone, and saw mill. The mill covering 550 square meters, is built of reinforced concrete and stone, and has a daily capacity of 180 tons.

Production: 17,984 tons of pyrite and 1,687 tons of copper ore in 1916, and 16,930 tons of pyrite and 1,252 tons of copper ore in 1917.

Property is well managed and yields small though satisfactory returns. Operations continued without serious interruption during the war, but mine was closed down in 1919.

NORWAY

AAMDALS KOBBERVERK, A. S.

Address: Telemarken, Norway. N. A. Nielsen, Skippergaten 27, Christiania, chairman; H. H. Dahll, Aamdals Verk, Telemarken, mng. director.

Property: about 300 acres, besides considerable forest land. The ore is low grade, carrying chalcopyrite and bornite, averaging 2% copper, with a gangue of slate and quartz. Reserves are 800,000 tons of ore containing 12,000 tons of copper.

The new concentrating works, built in 1915, consist of coarse-sorting house, crusher, mills, jigs, tables and flotation plant for slime. Concentrates contain 25% copper. An electric smelter was being erected in 1919.

Production: 900 tons concentrates per year, equivalent to 225 tons copper.

ALTENS KOBBERGRUBER NORWAY

Idle since 1908, and resumption of operations very uncertain. See Vol. XIII for description.

Office: care of Sulitelma Aktiebolag, Helsingborg, Sweden.

DUNDERLAND IRON ORE CO., LTD. NORWAY

Office: C. A. Frith, 4 Copthal Ave., London, E. C. 2, England.

Directors: A. O. Cantley, J. H. Gretton and S. C. Magennis, C. Bannatyne, mgr.

Inc. April 22, 1902, in Great Britain. **Cap.**, £700,000; shares £1 par; all issued; originally £2,000,000 **Bonds** £150,000 of prior lien.

Property: iron ore deposits from 3 to 35 miles from Mo, on the coast of Norway, connected by 17 miles of rail with Storforshei, near Mo. About 80,000,000 tons of 39% ore has been proven.

Equipment: the concentrating works at Guldsmedirk, originally consisted of an Edison magnetic process plant as once used in the United States, but it was a failure. Another concentrator of 2.000 tons daily capacity awaits normal conditions before operations start. Product is shipped to England.

FOLDAL COPPER & SULPHUR CO., LTD. NORWAY

Office: 7 St. Michael's Alley, Cornhill, London, E. C. 2, England. **Mine office:** W. H. Lund, mgr., Foldal, Lille-Elvedal, Norway.

Sidney St. J. Steadman, chairman of board of directors. W. A. Carlyle, cons. engr.; D. N. Forbes, sec.

Inc. Jan. 27, 1906, in Great Britain. **Cap.**, originally £350,000; shares £1 par, in £150.000 preferred and £200,000 deferred stock. Company reorganized in 1914 and capitalization reduced to £185,000; shares £1 par; 28,000 shares issued, December 31, 1915.

Balance sheet: for year ending Dec. 31, 1915. November, 1916, includes: Assets—mining properties, £60,000; equipment, £52,479; ore stocks, £17,405; provisions and livestock, £16,006; debtors, £19,669; cash, £17,478. Liabilities—capital stock, £28,000; mortgages and liens, £155,074; creditors and credit balances, £21,911. Net receipts from ore sales amounted to £8,808. Operations for the year showed a loss of £1,610, with a total debit to date, £18,712.

Property: about 3,000 acres, at Foldal, Norway, timbered and includ-

ing 4 old mines, known as the Juliana Marie, Knutshovd, Foldal, Grev, Moltke and Grimsdal, worked for about 150 years. Mine, opened mainly by tunnels, shows a vein of about 12′ average width, carrying massive cupriferous pyrite, with only traces of arsenic, vein giving every indication of persistence. Ore estimated to average about 2% copper and 46% sulphur. Property also has some ore of high copper tenor.

Development: during 1915 amounted to 5,385′, compared with 6,328′ in 1914. The main shaft was sunk to the 6th level, but exploratory work on this and the 5th and 7th levels did not fulfill expectations of the management.

Equipment: includes an excellent mining plant, installed at a cost of £105,000, and company has expended about £22,000 for substantial mine buildings. A large waterfall, on the Einuna river, held under a 25-year lease, subject to renewal, at annual rental of £25, has been improved with a hydro-electric power station. Good wagon roads have been built.

A 22-mile Pohlig aerial tram, which is one of the longest in the world, built at a cost of £38,412, runs from the mines to the Lille-Elvedal railway, and has a capacity of 40 metric tons per hour. Miscellaneous improvements include a telephone line, and a quay at Trondhjem, for ore shipments.

The tonnage of clean ore shipped from the mine to the railway was—

Year	Tons	Copper, %	Sulphur
1910	58,558	1.93	46.31
1911	48,832	1.96	45.84
1912	45,334	1.99	46.38
1913	38,579	1.85	44.79
1914	40,457	1.84	44.87
1915	58,400	1.81	44.33

Property considered promising and management good. No report issued since 1915.

ORKLA GRUBE-AKTIEBOLAG — **NORWAY**

Address: N. E. Lenander, mgr., or V. B. Lange, Lökkens Verk, Norway.

Officers: Marcus Wallenberg, pres.; Th. Fearnley, v. p., at last accounts.

Inc. October, 1904, in Norway. **Cap.**, 16,000,000 kroner ($4,160,000); shares 180 kroner ($46.80) par.

Dividends: of 7% are paid.

Property: at Meldalen, Norway. Deposits are lenses in gabbro. Ore is a cupriferous iron pyrite, carrying 2% copper and 42 to 44% sulphur. The mine is opened by an incline and 2 vertical shafts to 1,300′ depth.

Equipment: five 1,200- h. p. electric hoists, four 1,400-h. p. compressors, two 130-h. p. pumps and a mill of 500,000 tons annual capacity.

Production: in 1915 was 180,000 tons, and in 1916, 100,000 tons. No recent returns.

ROSTVANGEN AKTIESELSKABET — **NORWAY**

Head office: Skippergaten 19, Christiania, Norway. **Mine office:** Rostvangen, via Tonset, Norway.

Directors: Johan Didrichsen, chairman; V. Koren, managing director; B. Bredesen, mgr.

Inc. May 18, 1908, in Norway.

Mine: is connected with the Kristiania-Trondhjem railway by an aerial tram.

Production (annually): 40,000 tons of pyrite containing an average of 2.5% copper and 45% sulphur.

SULITELMA AKTIEBOLAG — **NORWAY**

Office: Helsingborg, Sweden.

Directors: Lord-Lieut. G. Tornerhjelm, pres.; N. P. Mathiasson, v. p.; Claes Andersson, R. M. B. Schjölberg, Prof. Hj. Sjögren, Consul C. In-

gelsson (managing director), Holm Holmsen (gen. mgr.), Dr. C. Sjunnesson, Vice-Consul Lloyd Lundström (vice-managing director), and Captain Loris Person Henning. Andr. Zuale, mgr.

Inc. 1890, in Sweden. **Cap.**, originally 3,000,000 kroner, but increased several times to present amount of 14,042,000 kr.; shares, 500 kr. par. Annual meeting in May.

Dividends: 6% was paid in 1907; and total to end of 1911 was 2,460,000 kr.

Property: 214 claims and total area of 50,000 hectares, more or less mineralized, mainly in the Fauske Herred district of Nordland. Lands include the Sulitjelma, Carlotta, Giken, and Altens groups of mines. The company also owns the Vaddasguisa mine, in the Oksfjorddalen, in Skjervö and Kvaenangen herreds, the Vaddasguisa being the largest and best ore deposit so far known in the Oksfjorddalen.

The Sulitjelma mines are situated within the Arctic Circle on the shore of Lake Langvand, 400′ above sea-level and 12 miles E. of Fineidet, a port on the Saltenfjord. Discovered 25 years ago, they have been developed to an enterprise in which 1,600 workmen are employed, and in which the Knudsen pyrite smelting process was invented and is still in operation.

Geology: ore consists of cupreous iron pyrite and pyrrhotite, disseminated through mica-schist and sometimes found massive. This ore occurs in long and narrow lenses on the contact between schist, amphibolite, and olivine gabbro, the lenses running E.-W. on the N. side of the lake, changing to N.-S. on the S. side of the lake. There are 17 outcropping orebodies, 15 under development, which range from 1 to 30′ in thickness, and from 200 to 2,500′ in length. The ore is sorted by hand and 4 grades produced; the first, called sulphur ore, contains 3% copper, 44% sulphur, and is shipped to acid makers; the richer ore carries 6% copper and 32% sulphur, and is smelted at the mines; the concentrating ore with 1.8% copper and 22% sulphur, is treated by water concentration and by the Elmore process; waste, carrying 0.25% copper and 3% sulphur, is discarded. The total ore mined averages 2.45% copper and 45% sulphur. Of the sulphur ore exported, about 90% is fines and 10% lumps, shipped to various points in Norway, Sweden, Denmark, Great Britain and the Continent.

Development: is mainly by 4 tunnels, 2,500, 1,250, 500, and 200′ long. Workings total over 12 miles. Reserves in 1919 were given as 1,725,000 tons. Underground haulage is by electricity. Longwall stoping is the general method used. Power includes a 970-h. p. hydraulic plant, 1,220 h. p. electric plant, 780-h. p. compressor plant, and 10 h. p. gasoline plant.

Equipment: includes eight 20-h. p. hoists, 5 air compressors, 3 at the mines and 2 at the smelter. The mine has 2 pneumatic drills, 1 Temple electric drill, and 18 pneumatic hammer-drills in service. There are 3 sawmills, a general store, 3 schools, a church and a lodge, with a large number of dwellings for employees, the company owning a total of 320 buildings.

There is an extensive system of aerial tramways, with 15 stations and 2 power stations, the tram system including a 4-mile line to the Jakobesbakken mine.

The frame concentrator, of 36,300 sq. ft. area, is equipped with 3 Hadfields and five 13x24″ Krupp Grusonwerk crushers, 15 sets of rolls, 76 Harz jigs, 17 Ferrari concentrating tables, 1 slime table and 62 sizers.

There is a separate mill of 12,800 sq. ft., containing an Elmore vacuum oil flotation plant, the largest Elmore plant in the world, having 18 units, with a productive capacity of about 25,000 tons of 6.5% copper concentrate yearly. The plant went into commission April, 1909, and in the first year of operation produced about 8,000 tons of concentrate, carrying 6.75% copper, with a recovery of better than 80%. This Elmore plant is not only the largest installation in existence, but has given perfect satisfaction, redeeming all promises. Many small Elmore units, installed at other copper mines in other parts of the world, have proven unsuccessful, but the high saving and low costs of the Elmore plant at the Sulitjelma show that the process,

under suitable conditions, is a commercial as well as a technical success. The Elmore people stated that the plant was operating at minimum working costs, and was consuming, for each ton of ore treated, only 2.7 lb. of the cheapest kind of common fuel oil, and no acid. Practically the entire production of the Elmore plant at Sulitjelma has been from tailings that were wasted before the installation of this process. The daily capacity of the milling department is 1,600 tons.

The 160-ton smelter, at Fagerlid, 2 to 5 miles from the various mines and receiving ore by aerial trams, has a 50-ton water-jacket blast-furnace; one reverberatory furnace; two 50-ton pyrite smelting converters of the Knudsen type; a Wedge calcining furnace, with 8 hearths, 21′ 6″ in diameter; 1 gas-fired reverberatory furnace, with hearth 15x60′, and a converter stand, with 10 shells of the Manhes type, 5′ diam. and 5′ 6″ long. First-fusion product is a matte of 30 to 40% copper and final product is blister copper assaying 99.2%, sent for refining to the Helsingborg Kopparverks Aktiebolag, at Helsingborg, Sweden, where there is a leaching plant, in connection with the works. Ores smelted average 6 to 8% copper, 32 to 34% sulphur, 34 to 36% iron and 2 to 4.5% alumina, with traces of lime and magnesia.

The smelter employs the Knudsen discontinuous pyrite process, which largely utilizes the calorific value of the sulphur and requires a minimum coal consumption, effecting a considerable saving in fuel cost. Pyritic and chloritic ores are smelted, the former yielding a fusible slag, the viscosity of which is much increased by the addition of the chloritic ore. For this reason slag is run into the forehearth and allowed to settle for 90 minutes, after which pyritic fines are added. The Knudsen furnaces, of 20 tons capacity each, are lined with magnesite blocks, set close together and luted with a bond of magnesite mortar and tar, applied hot. The wear is confined to the under portion of the furnace, up to 30 to 50″ above the tuyeres, and is comparatively small, the working furnaces having run for 179 to 459 charges before linings required repairing. Two men are sufficient to work a furnace, 2 others attending to the forehearth, each forehearth sufficing for 2 or 3 furnaces. The loss in smelting low-grade ores amounts to 10% only, slags running only 0.2 to 0.3% copper, as against a former loss of about 15% of assay values, and the cost of smelting under the Knudsen process is given as 3s. per ton of ore, this covering wages, transportation of ore to the smelter and cost of fuel. Converter costs were said to be under $1 per metric ton in 1913.

Miscellaneous enterprises of the Sulitjelma include the ownership and operation of 7 steamers, 2 tugs, 40 barges, and a 13-kilometer private railway system, known as the Sulitjelmabanen, of 750-mm. gauge, equipped with 3 locomotives and 120 freight cars.

Production: the total to May, 1919, was 1,917,354 tons of cupreous iron pyrite and 368,836 tons of smelting ore.

Year	Tons Raw Ore,	Lb. Copper,	Year	Raw Ore, Tons	Copper, Lb.
1918	133,433	.....	1910	130,000	9,000,000
1917	224,488	.....	1909	.....	.....
1916	215,675	.....	1908	.....	.....
1915	.....	.....	1907	120,000	8,140,562
1914	.....	.....	1906	.....	7,000,000
1913	.....	.....	1905	90,000	6,225,856
1912	134,750	11,000,000	1904	100,000	7,614,688
1911	.....	.....			

Sulitjelma has by no means reached the peak of its productive capacity, though by far the largest copper producer in Norway, and one of the richest copper mines in Europe. The management is progressive and competent and has shown a very high degree of technical ability. Reported in January,

1920, that mine was closed indefinitely on account of large stocks on hand. The present control is said to have invested large sums, but made no profits.

PORTUGAL

MASON & BARRY, LTD.

Office: 87 Cannon St., London, E. C. England. **Mine office:** Pomarao, Alemtejo, Portugal.

Officers: Jas. Francis Mason, chairman; D. H. Barry, deputy chairman; Edw. O. Barry, managing director; Philip O'D. Greene, sec.; Wm. Neville, resident administrator.

Inc. June, 1878, in Great Britain, and reorganized June 2, 1892. **Cap.,** £210,000; shares £1 par; 158,172 issued.

Net profits were £68,325 in 1906; £66,135 in 1907; £56,701 in 1908; £30,934 in 1909; £65,458 in 1910; £64,546 in 1911; £85,665 in 1912; £76,211 in 1913; £31,338 in 1914; £59,737 in 1916; £99,167 in 1916; £18,499 in 1917; £772 in 1918. Balance forward to 1918 was £34,892.

Dividends: paid regularly since organization, ranging from 2s. to 13s. per share. Recent dividends have been as follows: 13s. in 1901, 11s. in 1902, 7s. in 1903, 7s. in 1904, 7s. in 1905, 7s. in 1906, 6s. in 1907, 6s. in 1908, 5s. in 1909, 6s. in 1910, 6s. in 1911, 7s. in 1912, 7s. in 1913, 3s. in 1914, 6s. in 1915, 9s. in 1916, 2s. in 1917, all less income tax. Total to date, £1,472,109, plus return of capital £740,688.

Property: the San Domingos copper and sulphur mine at Mertola, Portugal, just over the border of Spain, and in the same belt of pyrite deposits as the Rio Tinto, Tharsis and others. The mines are operated under a 50-year lease ending October, 1958.

Development: is by several shafts, deepest level being at 300 meters from surface. A mineral zone of about 200′ width, and proven length of 2,000′, carries lenses of cupriferous pyrite averaging slightly under 1% copper and about 50% sulphur, the principal values being in sulphur rather than in copper. With increasing depth copper contents have decreased slowly but steadily.

Ore reserves: were 7,500,000 long tons at the end of 1918.

Ore is leached for copper as at the Rio Tinto and at end of 1916 there were 480,000 tons in stock containing 1,400 tons of fine copper. Sulphur ore is shipped to various works in Europe and America.

The company owns a railway to Pomarao, a tide-water port on the Rio Guadiana, where there is a shipping pier and tugs.

Production: maximum was 8,353,229 lb. fine copper in 1901, and recent production has been as follows: 6,605,750 lb. in 1904; 6,088,320 lb. in 1905; 5,519,360 lb. in 1906; 5,871,040 lb. in 1907; 6,186,880 lb. in 1908; 5,299,840 lb. in 1909; 6,619,200 lb. in 1910; 6,548,280 lb. in 1911; 7,925,120 lb. in 1912; 202,176 tons of ore in 1916; 154,762 tons of ore in 1917; and 80,079 tons in 1918.

Apparently the San Domingos is no longer an important copper producer, but the property, which has a long and honorable record of production, is carefully managed. Abnormal conditions due to the war have hampered operations for several years.

WOLFRAM MINING & SMELTING CO., LTD. PORTUGAL

Office: D. S. Whitelaw, sec., 20 Copthall Ave., London, E. C. 2, England.

Directors: M. Philips, chairman; F. Gates, F. Goddard, E. Laffargue and A. F. Maclaren. G. F. Cowper, mgr.

Inc. July 15, 1909, in Great Britain. **Cap.,** £100,000; shares £1 par; 80,000 issued. **Dividends:** total 55% from 1909 to 1916, inclusive; none since. Receipts from ore sales in 1917 were £32,446 and profit, £4,194; in 1918, receipts were £50,126 and profits £16,606.

Property: a tract of 1,800 acres near Silvares, province of Beira Baixa,

Portugal, carrying tungsten (wolfram) deposits, and equipped with two concentrators.

Production: 235 tons of wolfram concentrate in 1914; 300 tons in 1915, and 337 tons in 1916.

RUSSIA

See under Siberia, Asia, for Siberian mines which were listed under Russia in former volumes.

CAUCASUS COPPER CO. **RUSSIA**

Office: E. W. Lowe, Pinners Hall, Austin Friars, London, E. C. 2, England.

Directors: J. Colquhoun, chairman; M. Grancini, Viscount Grimston and E. B. Lockhart.

Inc. Oct. 4, 1900, in England. **Cap.,** £1,000,000; shares £1 par; 513,500 issued. **Debentures:** £42,620 of 5% firsts, and £1,238,500 of 5% seconds issued.

No accounts have been available for 5 years owing to the war, but in 1915 the debit balance was £178,319. Creditors, loans, and bills payable amounted to £236,400; and debenture interest accrued, £76,447.

Property: near Dzansul, Department of Kutais, Caucasus, southern Russia. In 1912 reserves were estimated at 3,600,000 tons of 3.1% copper ore. In 1914 the Turkish army took possession, but was ejected 5 months later. A little work was done late in 1916, but none in 1919.

Equipment: includes a 1,000-ton mill using flotation.

Production: 3,030 tons of copper in 1911; 2,992 tons in 1912; 3,936 tons in 1913.

KYSHTIM CORPORATION, LTD. **RUSSIA**

Head office: J. P. B. Webster, sec., Pinners Hall, Austin Friars, London, E. C. 2, England. **Operating office:** Moscow, Russia. **Mine office:** Kyshtim, Perm, Russia.

C. J. C. Scott, chairman of board of directors; Leslie Urquhart, mng. director; P. A. Ivanoff, mng. director; R. G. Brown, cons. engr; and T. J. Jones, advisory eng. in Russia.

Inc. Oct. 29, 1908, in Great Britain, to acquire the entire share capital of the Kyshtim Mining Works, a Russian corporation. **Cap.,** £1,260,000; shares £1 par; 1,254,240 issued and fully paid. Debentures authorized, £650,000 at 6%, all issued and redeemed.

Dividends: initial 5% dividend paid in December, 1912; total in 1912, 22½%; 25% in 1913; 5% in 1914; 10% in 1915, paid in November, 1916.

Balance-sheet for year ended Jan. 13, 1918, submitted Dec. 19, 1918, showed a balance carried forward of £82,401. The Kyshtim Mining Works Co.'s reports have not been issued. Its profits in 1916, before charging depreciation and income tax, was about 6,111,000 rubles.

In December, 1917, the interest held in the Kyshtim Mining Works Co. was transferred to the Russo-Canadian Development Corporation, which see, the Kyshtim Corporation receiving debentures in the new company in exchange.

Property: 2,198 sq. miles, or 1,406,700 acres, the mineral lands covering 189,000 acres, the remainder being farm and forest areas, all situated in the Government of Perm, southern Urals, Russia. The copper mines, 36 miles from Kyshtim, are connected by company's own line with the Government railroad. The iron mines are of importance, and the timber is used for fuel and mining purposes, also sold to the public.

Principal copper mines are the Amerikansky, Ivanoff, Koaniukoff, Smirnoff, and Tissoff. Ore reserves June, 1917, were given as 2,835,000 tons, averaging 2.75% copper.

Geology: as described by A. W. Stickney, the pyritic ore deposits of Kyshtim are a compact, dense, massive aggregate of granular pyrite, barite,

and quartz, carrying irregular blotches, streaks, and minute grains of chalcopyrite, sphalerite, and tennantite. The evidence indicates that the ore is the result of the metasomatic replacement of alternating bands of a sheared and broken schist by a rather fine-grained, cracked, and broken pyrite, anhedral barite, and quartz. This granular aggregate contained considerable open interstitial space, which was later filled by contemporaneous chalcopyrite, sphalerite, and tennantite. Tennantite probably also marks a slightly-later stage in the primary mineralization, and with it are contemporaneously associated chalcopyrite and quartz of a second generation. The paragenesis of the sulphide minerals is one of decreasing iron and increasing copper content. The orebodies, as viewed in a vertical section, normally show four distinct, roughly horizontal and parallel zones. From the outcrop downward they may be designated as: (1) the gossan zone, which extends from the surface to a maximum depth of 60′; (2) the zone of loose baritic sand, extending from the bottom of the gossan to a maximum depth of 150′, the greater part of which lies beneath the level of the ground-water; (3) the loose, leached sulphides, which reach from the bottom of the baritic sand to a maximum depth of 180′, where they gradually pass into (4) the underlying, firm, massive, mainly unaltered sulphide ore. Downward enrichment of secondary sulphide does not occur in the form of a shallow, well-developed, commercially important, horizontal zone, typical of many other localities, but has taken place to a relatively slight degree along the immediate walls, especially the hanging wall, to the greatest depth yet attained in exploration, which is 600′ below the ground-water level.

Equipment: complete mine plants, also smelter at Karabash capable of producing 10,000 tons of copper yearly. There are 3 blast-furnaces of a total capacity of 1,500 to 1,800 tons daily, and one 100′ gas-fired regenerative-type reverberatory for fine ore and flue dust. Company has an electrolytic refinery at Kyshtim, with annual capacity of 13,000 tons of copper, where it also treats blister copper from other companies.

Production, years ending January:

Year	Copper, Tons	Year	Copper, Tons
1917	5,000	1915	7,642
1916	6,392	1914	7,588

In 1914 total cost was £37.84 per ton of copper, which is equal to 8.1c per lb. in January, 1918, the Bolsheviks nationalized the Kyshtim properties, but they were ousted and work resumed early in 1919. Late in 1919 company was merged into the Russo-Asiatic Association, which see.

PROSPECTING COMPANY, THE **RUSSIA**

Office: Basildon House, Moorgate St., London, E. C. 2, England.

Inc. in Russia, Cap., 200,000 rubles. Company holds the mining interests of the Russo-Canadian Development Corporation during the development stage.

Property: concessions covering about 73 sq. miles have been located. In the mineralized area of 1,550 acres of the Steppe region there are 5 porphyry deposits and 7 veins with favorable indications. Prospecting has been done by drilling.

RUSSIAN MINING CORPORATION, LTD. **RUSSIA**

Officers: Henry Richards, sec., 441 Salisbury House, London, E. C. 2, England.

Directors: F. W. Baker, chairman; A. B. Haig, Walter McDermott, A. S. Elmore, Baron A. de Gunzberg. Advisory engineer in Russia, A. Gernet; J. P. Hutchins, cons. engr.

Inc. Jan. 6, 1911, in England. **Cap.,** £250,000; shares £1 par; 245,250 issued.

Property: in the Altai region of western Siberia was sold to Altai Mines, Ltd., which see, in 1917. Company has an interest in collieries in

southern Russia and in the Inter-Russian Industrial Corporation, which has construction contracts in Petrograd and other places.

SOUTH URALS MINING & SMELTING CO., LTD. RUSSIA

Inc. in Russia, but controlled by the Tanalyk Corporation, which see.

TANALYK CORPORATION, LTD. RUSSIA

Office: J. P. R. Webster, sec., Pinners Hall, Austin Friars, London, E. C. 2, England.

Directors: Leslie Urquhart, chairman; D. P. Mitchell, R. Gilman Brown, cons. eng.; T. B. Reynolds, C. A. R. Scott, V. V. Meller-Zakomelsky, and H. Gibson.

Inc. April 15, 1912, in Great Britain. **Cap.**, £450,000; shares £1 par; £362,991 outstanding. **Debentures:** £200,000 authorized and £198,357 issued.

Property: 28,350 acres of mineral land, and timber rights on 300,000 acres of forest in the Orenburg Government, in the southern Urals. The actual title to the property is held by the South Urals Mining & Smelting Co., Ltd., which itself is a subsidiary of the Tanalyk Corporation. The London company advances funds to the Russian company for development.

Development: the mines, several miles apart, which are being worked, include the Mambet, Ulali, Tanalyk, Troitsk, Tuba, Epaevsky, and Sebaeva, containing an estimated total of 570,700 tons of sulphide ore averaging 2.63% copper, 0.084 oz. gold, and 1.45 oz. silver per ton. The Sabaeva contains 450,000 tons of this total. There is also 157,340 tons of oxidized ore assaying 0.38% copper, 1.35 oz. gold, and 6.73 oz. silver per ton. The Semeonovsky mine contains a reserve of 98,500 tons of ore, carrying no copper, but with 0.50 to 0.61 oz. gold and 0.65 to 0.75 oz. silver per ton. The Tuba mine contains 45,000 tons of 1% copper, 3 to 3.1 oz. gold, and 16 to 20 oz. silver ore. These reserves are much larger than those for 1916. The profit in sight, at pre-war prices for metals, is estimated at £2,500,000.

Equipment: steam-power, hoists, compressors, railway, smelter of 8,000 tons monthly capacity, amalgamation mill at Tuba, and cyanide plant at Semeonovsky. Blister copper is refined by the Kyshtim company.

Production: in 1914, 252 tons blister copper, and 12,000 oz. silver; in 1915, 564 tons copper, 11,415 oz. gold, and 98,440 oz. silver; in 1916, 687 tons copper, 22,000 oz. gold, and 137,000 oz. silver; in 1917 (9 months), 700 tons copper, 22,000 oz. gold, and 145,000 oz. silver.

The Russian revolution interfered greatly with operations, but Tanalyk will eventually be a large producer of copper and precious metals. Late in 1919 company was merged with the Russo-Asiatic Corporation, which see.

SERBIA

BOR, SOCIÉTÉ DES MINAS DE

Address: Bor, Serbia. Head office in Paris, France.

Property: a copper mine of note that was operated by the Germans during the war. In January, 1919, the French administrators visited the property, reporting that it had been actively worked from 1915 to 1918; that the physical condition was good, and that all machinery, equipment, and furnaces, were intact.

SPAIN

ALMADEN QUICKSILVER MINES CO.

Address: Almaden, Province of Ciudad-Real, Spain.

Company is controlled by the Government of Spain, but the output is sold under contract to the Rothschilds in London. Part of the output is reserved for domestic consumption, the remainder being for export. By

reason of its great production and cheap costs, Almaden is one of the controlling factors in the quicksilver industry of the world.

Property: probably the greatest quicksilver mine in the world, at Almaden, 120 miles N. E. of the Rio Tinto copper mines and 130 miles S. W. of Madrid, province of Ciudad-Real. The Athenians, Romans, and Moors worked deposits for several centuries.

Geology: the rocks consist of steeply upturned shales of Silurian and Devonian age, with intercalated quartzites, which weather out in steep, rocky outcrops. The strata are often broken by diabase dikes and huge intercalations of igneous rocks. The deposits consist of 3 quartzite beds impregnated with cinnabar, the beds being of a mean thickness of 26 to 32′. The mercury content increased with depth down to 1,300′. Zones of impregnation do not always follow one and the same stratum of quartzite, but occasionally jump across to a neighboring bed. A little metallic quicksilver occurs with the cinnabar and pyrite. The principal orebody carries 14%, and subsidiary orebodies 2½% mercury.

Development: is very extensive, but no details of extent of workings or of methods are obtainable.

Equipment: includes 10 pairs of Bustamente subliming furnaces, two Cermak-Spirek continuous-movement furnaces for fine material, and 3 double-pan furnaces of the same system for coarse ore.

Metallurgical methods have been considered rather antiquated, certainly not as efficient as in the mercury mines of Austria, Italy or California.

Production: from 1564 to 1895 estimated to total over 4,500,000 flasks, is possibly greater than the Idria mines in Austria, but is less than that of the Santa Barbara mine at Huancavelica, Peru, which was recently reopened after many years of idleness. In the nineties of the 19th century the Almaden produced 50,000 flasks per annum; in 1915, 34,778 flasks. In 1917 the Bustamente furnaces treated 7,550 tons of ore, yielding 984,486 lb. of mercury, and the older system handled 5,616 tons giving 688,795 lb., or over 22,000 flasks.

In October, 1916, the mines were leased for 15 years, to avoid the rising cost of production while under government control. The maximum price that the Treasury must pay for mercury is based on an average net cost of production for the period 1911-'16. The Treasury will fix the number of flasks to be produced and the dates of delivery. The contractor is to spend 30,000 pesetas ($6,000) yearly in exploration and to erect an electric power plant. The Government is to pay the contractor for improvements either by amortization of 5% yearly on the works and 10% on the machinery; or if preferred by the Treasury, through appraisal of their real value at the time it resumes charge of the improvements.

Costs: $8.29 per flask in 1900, when the selling price was $45; and $15.22 in 1915, when the price was $94.

ARAMO COPPER MINES, LTD. **SPAIN**

Office: 2 Metal Exchange Bldg., London, E. C. 2, England. **Mine office:** Pola de Lena, Asturias, Spain.

Officers: A. van Straalen, E. R. Merton, H. Gardner and L. Corvilain, directors; C. W. Aston Key, sec., at last accounts.

Inc. July 3, 1897, in Great Britain. **Cap.**, £40,000; shares £10 par.

Property: the Aramo copper and cobalt mine, bought for £20,000 in full-paid shares. No accounts are made public. Idle some years owing to litigation terminated in 1914 in company's favor. Resumption of operations since then delayed by European war.

CALA; SOCIEDAD ANONIMA MINAS DE **SPAIN**

Office: Estacion S. 2d, Bilbao, Spain. **Mine office:** Cala, Santa, Olalla, Huelva, Spain.

Officers: Don Enrique Areilza, pres.; Don Jose del Castano, Bilbao, v. p.; Don Ernesto Bengoa, sec.; Don Juan de Areito, managing director.

Inc. Aug. 31, 1900, in Spain. **Cap.**, 15,000,000 pesetas shares (acciones) and 7,000,000 obligaciones.

Accounts for 1916 showed a current balance of 143,240 pesetas and expenditures of 175,573 pesetas for construction account; 185,540 pts. for interest on bonds; 98,198 pts. for interest on accounts and 50,000 pts. loaned to Coto Teular Co., leaving a balance of 30,050 pts. Total expenditures to date amount to 5,803,317 pts., for mine account, and 14,914,332 pts. for railway account. Total all accounts, 31,153,638 pts.

Property: a group of 8 mines, 345 hectares, at Cala, near the Pena and Rio Tinto mines, carrying extensive bodies of magnetic iron ore and cupriferous pyrite. Company owns and operates a 97-kilometer railroad from the mines to San Juan del Aznalfarache, on the Guadalquivir river, in the adjoining province of Sevilla. The mill and reduction works were installed in 1917.

Production: for 1916 was 23,973 tons of ore. Shipments were 12,669 tons crude ore; 7,346 tons calcined ore, 1,010 copper mineral, the total value being 286,536 pesetas. No later figures procurable.

CAMPANARIO; SOCIÉTÉ DES MINES DE CUIVRE DE **SPAIN**

Address: 5 Rue du Helder, Paris, France. **Mine office:** Valverde del Camino, Huelva, Spain.

Baron A. de Dietrich, chairman of board of directors; Arthur Marshall, gen. mgr.

Inc. Dec. 20, 1906, in France. **Cap.**, f5,000,000; shares f500 par.

Property: seven hundred hectares, including 6 old mines, and actually having about 250,000 tons of cupriferous pyrite in sight.

Equipment: includes an elaborate and extensive surface plant.

Production: about 40,000 tons of pyrite annually, ore being first treated by lixiviation and cementation to recover its copper content, and residue sold for sulphur. No exact figures available.

CASTILLO DE LAS GUARDAS; SOC. ESPANOLA DEL **SPAIN**

Office: Apartado 12, San Sebastian, Spain. **Mine office:** Castillo de las Guardas, Sevilla, Spain.

Officers: Edmond Delage, chairman; Julio Astoreca, sec.; Enrique Largillier, managing director, with Louis de Beauce, Georges Thirel, Henri Juan, directors. Francisco Zarraga, manager; Manuel Fernandez Balbuena, engineer.

Inc. July 12, 1901, in Spain. **Cap.**, 7,500,000 pesetas, increased later to 10,000,000 pesetas; shares 500 pesetas par; issued 9,000,000 pesetas. Annual meeting in March.

Property: 240 hectares, 23 kilometers from Zalamea la Real, having a 15½ kilometer private railway, known as the Ferrocarril de Minas Castillo y Empalme Ronquillo, connecting at Estacion Ronquillo with the Ferrocarril Sevilla y Cala.

Mine shows granite-porphyry and diabase, carrying 5 orebodies, one of which under development, has a lens of 40 meters width and 220 meters length, proven for depth of 165 meters, carrying cupriferous pyrite averaging about 1.5% copper, 0.5% lead, 0.13% zinc and occasionally up to 2 oz. silver and 4 grams gold per metric ton. Mine was discovered 1843, and worked in a small way, until taken over by the present company, 1901.

Development: by the following shafts: Menesses, 142 meters; Don Pablo, 142 meters; Malacate, 100 meters; Colorado, 110 meters; Dos de Mayo, 40 meters; Remedies, 42 meters.

Equipment: includes a 683-h. p. steam and electric plant, with two 200-h. p. hoists, good for 140 meters each, 250-h. p. air compressor.

The company owns 353 buildings, with stone shops, also maintains separate schools for boys and girls, a hospital for workmen and their families, and a town hall.

CORDOBA COPPER CO., LTD. **SPAIN**

Office: 5-6 Queen St. Place, London, E. C. 4, England. **Mine office:** Estación de Cerro Muriano, Sevilla, Spain.

Officers: Edgar Taylor, chairman; Hugh F. Marriott, C. H. Villiers, Lord Vaux of Harrowden, Richard E. Carr, J. E. Champney, directors; F. H. Williams, sec.; John Taylor & Sons, mgrs.; J. Hocking, mine supt.

Inc. Aug. 5, 1908, in Great Britain. **Cap.**, £200,000; shares 5s par; all issued, and fully paid. Company is a consolidation of the Cerro Muriano Mines, Ltd., and North Cerro Muriano Copper Mines, Ltd.

For year ending Dec. 31, 1911, profits were £14,899; for 1912, £39,405; 1913, £83,321; 1914, a loss of £4,203; in 1915 profits were £10,077; in 1916, £45,665; in 1917, £13,513. In 1919 there was a loss of £11,603. Net cash assets were £73,773 at end of 1919.

Dividends: in 1912, 20%; in 1913, 20%; in 1914 and 1915, nil; in 1916, 10%; nothing since.

Property: 469 hectares, 10 miles N. E. of Cordoba, in the south of Spain, held under perpetual lease from the crown, and reached by the Andalusian railway. Mines show old workings, dating from the Roman era, extending to a depth of 400′, notwithstanding a heavy flow of water. There are 6 large veins and several small veins in mica-schist, diorite and quartzite, carrying chalcopyrite and pyrite, with gangue of calcite, quartz and country rock, the ground being soft, requiring the filling of stopes with waste. Veins are reported to have widths of 12′ to 40′, with proven lengths as follows: Calavera, 1,635′; Excelsior, 635′; Lorenzo, 4,575′; Isabel, 5,550′; Cerro Muriano, 8,500′. Some ore taken from the old Roman workings assayed 28 to 34% copper.

Development: by 8 main shafts—the Santa Victoria, bottomed in footwall at 950′; San Rafael, 1,571′; San Arturo, 1,115′; Esperanza, 196′; Eastern, 1,539′; Excelsior, 850′; Lorenzo, 1,018′, and the Isabel, 620′. Development work for year 1916 totaled 6,821′, including 260′ of shaft sinking. The San Rafael shaft, 300 meters from the Santa Victoria, shows a vein of 5 to 13 meters width with the better portions worked out by the Romans. Ore reserves were estimated, Dec. 31, 1916, at 142,914 long tons, averaging 2.39% copper, against 99,139 tons of 2.16% in 1917, and 64,894 tons of 2.23% in 1918. The San Rafael and Eastern sections have been abandoned. Development work at the mine has been retarded considerably by water.

Equipment: about half of the product is treated by the mill and half by the smelter. The mill has 6 units of the Murex magnetic separation process which treats the re-crushed jig middlings, other flotation processes being unsuitable owing to the presence of calcite. In 1916 Murex plant treated 14,599 tons of re-ground jig middlings and tailings, averaging 1.34% copper, and produced 1,374 tons of concentrates averaging 10.6% copper, with 74% recovery.

The smelter includes a calcining plant and a converter plant. The blast-furnace, blown-in, August, 1908, is used only alternate months, its capacity being double that of the mine.

Production: in 1916 the mine output was 95,947 tons of 2.18% copper content. After sorting, 84,800 tons of 2.47% copper content were treated in the milling, concentrating and smelting works. The concentrator treated 48,727 tons of 1.57% ore, which yielded 4,798 tons of 9% concentrates, and 14,599 tons of middlings assaying 1.34% copper. The recovery for the Murex and concentrating plants was 75% as compared with 70.7% of the previous year. Yield in 1916 was 1,746 tons of blister copper. In 1917 the output was 1,554 tons of copper from 61,373 tons of ore treated; and in 1918, 1,453 tons from 46,369 tons. In 1919 the yield was 284 tons of blister copper.

This property is one of the largest and most interesting of the old Hispana-Roman mines and was famous before the Christian era for the high quality of copper and brass produced from its ore, but was entirely idle for 2,000 years, until re-opened, 1903, by the predecessors of the present company. In September, 1919, company announced the sale of its mining properties for 1,000,000 pesetas; assets now consist of £70,000 government bonds, which is to be spent partly in developing an option secured on

promising ground of the Cape Copper Co. in the Singhbhum district of Bengal, India, near the Rakha Hills mine.

ESPERANZA COPPER & SULPHUR CO., LTD. SPAIN

Office: 65 London Wall, London, E. C. 2, England. **Mine office:** Zalamea La Real, Huelva, Spain.

Officers: T. D. Lawther, sec. and managing director; Alex. McNab, G. Mure Ritchie, chairman; preceding are directors.

Inc. Feb. 14, 1906, in Great Britain as successor of Spanish Minerals Development Co., Ltd. **Cap.,** £350,000; shares £1 par; fully issued, fully paid.

Net earnings were £27,553 in 1908; £19,961 in 1909; £14,754 in 1910; £29,562 in 1911; £32,730 in 1912; £14,647 in 1913; £8,412 in 1914; £23,499 in 1915; £50,277 in 1916; £20,368 in 1917; £4,761 in 1918.

Dividends: 5% in 1908; 5% in 1909; 2% in 1910; 3% in 1911; 5% in 1912; 10% in 1916; 5% in 1917 and 1918.

Property: the Esperanza group, 1,833 acres, including 833 acres of mining rights, 55 miles from the port of Huelva. Holdings includes the Esperanza, Nueva Esperanza, Angostura, Forzosa and Santo Tomás mines. Some of these properties were worked in very ancient times, showing characteristic narrow Roman shafts, with foot-holes alternately, on either side, for ingress and egress of miners.

The Angostura mine had 231,000 tons ore reserves, and Esperanza and Forzosa mines 507,000 tons ore reserves, January, 1917.

Nueva Esperanza yielded 1,029 tons in 1912, 107 in 1913, and 534 in 1914. Development of Nueva Esperanza, San Daniel, and Forzosa properties by diamond drilling, shaft sinking and crosscutting, was in progress, 1917-'18; results were disappointing and operations were suspended October 1918, at Angostura and Forzosa, and in January, 1919, at the Esperanza.

Total ore reserves at end of 1916 estimated at 738,000 tons, 872,000 tons in 1917, and 886,000 tons in 1918.

In 1919, reserves totaled 190,000 tons cementation ore and 86,000 tons smelting ore.

Equipment: includes two leaching plants dealing with mine liquors and making 98 tons of copper in 1913; 82 tons in 1914; 135 in 1915, and 127 in 1916.

Company has a private narrow-gauge electric line connecting with the Buitron railroad. The power plant consists of 4 Premier gas engine units, each with a suitable gas producer plant, with electric generators, giving economical and satisfactory service.

Production: begun July, 1906, has been as follows: 20,421 long tons of ore in 1906; 54,276 tons in 1907; 87,894 tons in 1908; 103,140 tons in 1909; 112,143 tons in 1910; 108,650 tons in 1911; 97,681 tons in 1912; 95,897 tons in 1913; 111.457 tons in 1914; 86,288 tons in 1915; 108,725 tons in 1916; 86,633 tons in 1917; 62,720 tons in 1918. Company produces no metallic copper directly from its ore, but the copper contents of the pyrite shipped amounts to about 10,000 tons yearly. In 1919 company acquired control of the New Lymni company, Cyprus.

HUELVA COPPER & SULPHUR MINES, LTD. SPAIN

Office: C. Forbes, sec., 6 Old Jewry, London, E. C. 2, England. **French office:** 31 Rue Lafayette, Paris, France. **Mine office:** Almonaster, Huelva, Spain.

Directors: P. Lyttleton Gell, chairman; H. Gaillochet, v. p.; G. Dyckhoff, E. Chopy, P. E. de Caplane, G. Chanlaire, J. Roux-Brahic, H. Bondonneau, and Comte C. de Leusse; L. Delafosse, mgr.; H. F. Collins, cons. engineer.

Inc. Oct. 28, 1903, in Great Britain. **Cap.,** £400,000; increased 1907 to £600,000, but reduced again in July, 1912, to £420,000; 279,139 shares issued and fully paid. Company is a reconstruction of the Huelva Central Copper Mining Co., Ltd.

Financial Statement, years ending June 30:

Year	Revenue	Operating Charges	Profit
1919	£218,611	.....	£4,227*
1918	203,490	£186,896	16,594
1917	247,928	225,436	22,493
1916	178,578	169,185	9,393

* Loss, abnormal costs and fluctuations in Spanish Exchange are given as causes of the above poor results.

Dividends: none have been paid since October, 1907, when 5% was distributed.

Property: the Cueva de la Mora and Monte Romero mines, comprising 246 hectares (507 acres) and other properties of 650 hectares, lying between the Rio Tinto and Tharsis properties, Huelva, Spain. The total area in 1916 was 3,400 hectares. Lands are favorably located and are traversed by the Olivargas and Juliana rivers. The company is re-foresting its lands with pine and eucalyptus.

Ore reserves, are estimated as follows:

	Monte Romero	La Corta	Aguas, Tenidas
Smelting ore, 1918, tons	42,000	10,000	25,000
Smelting ore, 1917, tons	44,300	50,000	9,500
Smelting ore, 1916, tons	37,000	26,000	.....
Cementation ore, 1918, tons	6,000	20,000	5,000
Cementation ore, 1917, tons	11,500	56,000	.....
Cementation ore, 1916, tons	10,000	.....	.....
Total	150,800	162,000	39,500

In 1919, reserves totaled 190,000 tons cementation ore and 86,000 tons smelting ore.

Equipment: includes a pyrite smelter, cementation beds, etc. The company has built a complete town for its workmen, numbering about 1,200 men, the town having a normal population of about 5,000. The company's buildings include schools and hospitals, with necessary mine structures Transportation is by a 13-kilometer railway, connecting with the Zafra y Huelva line.

Production: was 5,563 tons of cupriferous pyrite in 1905; 20,523 tons in 1906; 34,905 tons in 1907; 48,511 tons of ore and 67 tons of cement copper in 1908. Production of fine copper is estimated at 175,000 lb. in 1905; 600,000 lb. in 1906; 1,000,000 lb. in 1907; 1,350,000 lb. in 1908; 25,000 tons of 5% ore shipped and 45,000 tons sent to cementation plant in 1909; in 1915-'16, 61,730 yielded 3,856,600 lb. copper; in 1917-'18, 70,042 tons gave 3,621,200 lb. of copper; and in 1919, 61,996 tons of company and 7,625 tons of custom ore yielded 4,437,440 lb.

PENA COPPER MINES, LTD. **SPAIN**

Office: Ernest Johnston, sec., 295 Salisbury House, London, E. C. 2, England. **Mines office:** Nerva, Huelva, Spain.

Directors: C. C. D'Anvers, chairman; M. Paisant, C. A. Massaouti, R. G. Levy, E. Porgès and Horace Barrett. Henrique Schreck, gen. mgr., Peña Mines, Huelva, Spain; F. Allen, cons. eng.

Inc. Sept. 19, 1900, in Great Britain. **Cap.**, £750,000; shares £1 par; 537,600 issued.

Dividends: 1903, 5%; 1904, 5%; 1905, 4%; 1906, 7½%; 1907-1914, nil; 1915, 6%; 1916, 6%; 1917, 7½%.

Accounts for 1916 showed a net profit of £64,933, out of which £31,248 was paid as dividend. In 1917 the profit was £23,201 and reserve fund £100,000. In 1918 the working profit was £20,925; expenditures, amounted to £17,495 for administration and taxes and £10,384 for interest on loans.

Company was formed in London in 1900 to acquire a copper and sulphur mine in the south of Spain that had, for two or three years previously, been worked by a Belgian company. Small dividends were paid from 1903 to 1906, but subsequently conditions became less favorable. About six years ago the contract with the Rio Tinto company in connection with railway transport to the coast was terminated, and an independent branch railway to the mine was constructed. During the period of building, deliveries of ore were suspended. The railway was opened in 1914, and since that time the position of the company has steadily improved.

Property: 1,724 acres, the Pena del Hiero group of 17 old mines, 2 miles N. E. of the Rio Tinto mine. Ore extraction is by open quarry work, the overburden being stripped off. Ore reserves are estimated as 3,454,718 tons.

Production: Year	Tons mined	Ore shipped, tons	Copper recov'd, tons	Ore on dumps, tons
1910	132,559	144,810	1,017	529,938
1911	131,367	124,323	1,004	500,714
1912	84,698	80,844	793	511,704
1913	68,759	5,734	703	580,802
1914	58,832	31,028	597	613,645
1915	122,120	140,616	607	589,956
1916	161,283	210,438	598	.....
1917	160,121	145,120	587	.....
1918	91,827	72,023	554	.....

PENARROYA, SOCIÉTÉ MINIERE ET MÉTALLURGIQUE DE

Office: Paris, France; and Peñarroya, Spain. Henri Jequier, metallurgist; Dr. Auguste Hollard, cons. eng.; Bradley Bruff & Labarthe, cons. construction engs. (San Francisco, Calif.)

Inc. in France. **Cap.,** 73,125,000 francs; ($14,625,000) in 292,500 shares of 250 francs par value.

Profit in 1917 was equal to $2,799,723, from which $279,978 was applied to amortization and reserve, leaving $2,519,808 net. Dividends absorbed, $2,350,000.

Dividends: 40 francs per share, equal to 16% on the capital, was paid in 1917. No previous or later figures available.

Property: lead-silver mines at Peñarroya, Province of Teruel, Spain; also coal mines nearby; lead mines in the Pyrenees and mines in Algiers and Tunis, northern Africa.

Equipment: includes a 10,000-h. p. hydro-electric plant, a smelter at Peñarrova, and one at Marseilles, France. A complete new reduction works is now being erected at Peñarroya, consisting of crushing and sampling machinery, roasters, Dwight-Lloyd sintering machines, 4 blast-furnaces for lead and one for copper ore, powdered coal plant, converters, and refinery. Entire equipment was made in America during 1919, and is expected to be in commission by 1921.

Production: in 1917, the output was 756,000 tons of coal, 3,740,600 lb. of spelter, 330,708,400 lb. of lead, and 7,715,354 oz. of silver.

Company controls or owns every lead smelter in Spain. In August, 1919, it became sole owner in Spain of the Minerals Separation flotation patents.

RIO TINTO CO., LTD. SPAIN

Secretary and offices: J. Gordon Macleod, 3 Lombard St., London, E. C. 3, England. **Mine,** at Rio Tinto, Huelva, Spain. **Works office:** Port Talbot, South Wales.

Officers: Sir Charles Wm. Fielding, chairman; Rt. Hon. Earl of Denbigh, Sir Arthur D. Steel-Maitland, and John M. Macdonald, directors; Turquand, Youngs & Co., auditors; Walter J. Browning, mine mgr.

Inc. March 29, 1873, in Great Britain. **Cap.,** £3,500,000; increased, No-

vember, 1905, from £3,250,000, shares £1 par, in £1,625,000 cumulative 5% preference shares and £1,875,000 ordinary shares, fully issued and paid. The new issue of 50,000 ordinary shares, par £5, was sold to shareholders at £63 per share, netting the company £3,150,000, for the redemption of an outstanding bond issue of £2,989,740, at 4%, which was fully retired. Transfer form, common; fee, 2s. 6d.; warrants to bearer are issued in denominations of 1, 5, 10 and 25 shares, fee 1s. per warrant, fee for conversion into registered shares, 2s. 6d. per certificate. Stock Exchange settlement; all shares quoted in the official list. Fiscal year ends with the calendar year; accounts are issued in April, and an interim semi-yearly report is issued in October. Dividends are also payable in Paris by the Société Générale, 29 Boulevard Haussmann.

Dividends: were begun 1879, and have been paid continuously, varying greatly, according to net earnings. Dividends on the old ordinary shares, of £10 par, 1879 to 1896, ranged from 6s. in 1886 to 38s. in 1896. On the present ordinary shares of £5 par, dividends have ranged from 40% in 1897 to 110% in 1906. Dividends were small at first, because the company was seriously handicapped by 3 different sets of mortgage bonds, bearing 5% interest. In 1895 the mortgage debt was consolidated into a single issue of £3,600,000 first mortgage debentures, bearing 4% interest, with a sinking fund and semi-annual redemption, which would have extinguished the mortgage in 1919, but, by the use of new share capital November, 1905, floated at the tremendous premium of 1,160%, the company placed itself in an impregnable financial position, the credit for this able stroke of finance having been due mainly to Mr. Fielding. Recent dividends on ordinary shares have been as follows: £3 12s. 6d., or 72½%, for 1901; £2 10s., or 50%, for 1902; £3 10s., or 70%, for 1903; £3 10s., or 70%, for 1904; £4, or 80%, for 1905; £5 10s., or 110%, for 1906; £4 7s. 6d., or 87½%, for 1907; £2 15s., or 55%, for 1908; £3, or 60%, for 1909, with an interim dividend of £2 10s. for 1910; £2 12s. 6d., for 1911; £4 10s. in 1912; £3 15s. in 1913; £1 15s. in 1914; £2 15s. in 1915; £4 15s for ordinary and 5s. for preferred in 1916; £4 10s. in 1917, and £2 10s. in 1918. The company has a reserve fund of £500,000, of which £400,000 are invested in Consols and £100,000 in gilt-edge shares. In 1918 company issued 50,000,000 pesetas 1st mortgage bonds, which were sold in Spain.

Profit in 1915 was £1,292,260; £2,198.092 in 1916; £2,355,157 in 1917, and £1,561,194 in 1918.

Property: 16,000 acres, freehold, of which 4,710 acres were secured from the Spanish Government. Mining operations are conducted in an area of practically 5 sq. miles.

Geology: orebodies of the Rio Tinto occur in mammoth lenses, with clay-slate on the S. and porphyry to the N., and are surmounted by large masses of iron-ore gossan. The deposit has been leached to a depth of 100′ where the zone of secondary enrichment begins, continuing to an average depth of 300′. Diamond-drill borings have shown untouched orebodies carrying upwards of 130,000,000 long tons of ore, giving sufficient reserves for about 60 years' production, and it is unlikely that the full extent of the orebodies available has been proven. The ore is of 2 classes, by far the larger part being slightly cupriferous pyrite, used largely in the manufacture of sulphuric acid, the second class consisting of copper sulphides disseminated in a silicified porphyry gangue. For removal of overburden there are 14 steam shovels, the largest having dippers of 4 cu. yds. capacity, and about 2,000,000 cu. meters of overburden is removed yearly, though this figure has been considerably exceeded in some years under exceptional requirements.

The ore produced is graded in 3 classes: (1) smelting ore carrying 4 to 6% copper; (2) export ore about 3.5% copper, and 45 to 50% sulphur; (3) leaching ore has 1.5 to 2% copper only. The average amount of copper contained in the ores treated has ranged from 1.5% copper, in 1876, the first year of production by the present company, to 3.234% in 1884. The output

of the mine for 1912 was 2,406,969 tons, carrying 2.18% copper. Tonnage was gradually increased for the last 7 years, but the copper content has varied and is now higher than it has been for 4 years past. The ores carry an average of 1.5 oz. silver per long ton, with traces of gold, and considerable silver is saved, by the Claudet process, at the smelter. About one-third of the total production is exported for sulphur contents, about one-third smelted, and the balance either leached or sent abroad. The ores average 4 to 5% copper in the zone of secondary enrichment, and with depth decline gradually in value, until at about 1,000′ depth the average copper tenor is only about 1.25%. The main orebody is cupriferous pyrite, carrying copper in the form of minute grains of chalcocite and chalcopyrite. Owing to the ore being unusually rich in sulphur the shipping ores of the Rio Tinto are in good demand, and in addition to supplying various British works the company exported washed sulphur ore in large quantities to Germany, France, Belgium, and a number of acid works in the United States. The reserve heaps at the mine are estimated to carry about 150,000 long tons fine copper.

Development: Rio Tinto has 3 mineral zones, carrying a succession of lenses, these being known as the South or Nerva lode, the San Dionisio or Middle lode and the North lode, in addition to which there are 2 smaller detached lenses adjacent to the North lode, which also are being worked opencast. There are 5 different mines, of which 4 are worked opencast and 1 underground. The underground mine is worked pillar-and-stall, with levels at intervals of 12½ meters, levels being opened 4 meters high and the entire floor divided into galleries and crosscuts of 4x4 meters, leaving pillars of 6x6 meters, which is not an entirely satisfactory method of extraction, leaving as it does more ore in the pillars than is mined.

The San Dionisio mine, the westernmost and deepest of the group, has a shaft of nearly 1,200′ depth. The work of changing over the San Dionisio for opencast extraction was begun 1907, and completed 1911. The overburden, consisting principally of porphyry and slate, was removed by steam shovels and carried through tunnels on the different levels, similar work being done on the South lode opencast extension. Ore will be mined by steam shovels to as great a depth as practicable, below which it will be necessary to hoist by shafts to the lowest tunnel level. The San Dionisio is likely to be the chief source of ore supply for several decades to come and work has been planned systematically for 10 years in advance.

Most of the ore mined is hauled out through tunnels without the need of shafts or engines. The lowest tunnel now in use for the 2 main lodes, the South and Dionisio, has not proven deep enough and management plans driving a new tunnel, 200′ below the present one, which will be 3 miles long, and will require 3 to 4 years for completion.

Wherever possible mining has been done by open pit workings which have the great advantage of giving complete extraction of the ore, and also are more economical in tonnage costs in the long run, though requiring enormous initial expenditures for the removal of overburden. Fortunately, the financial resources of the company permit the outlay of vast sums, the principal of which will not be repaid for many years, but which eventually will be returned in full with very handsome interest. The possibility of using the caving system for underground mining was considered, but an adverse decision was reached. Timber is scarce and high-priced. The depth of the largest pit is about 600′ and beyond the great pit the immense orebodies are worked by drift-stopes, the capping being blasted and sent down the shafts to fill and hold the ground as the ore is removed. Steam shovels recently have replaced manual labor to a considerable extent in opencast ore extraction.

Production: 1876-1916, was 20,000,000 tons of pyrite shipped, and 40,000,000 tons of ore treated locally, a total of 60,000,000 long tons, this ore yielding 730,000 long tons fine copper. No production figures are available since 1913, on account of war reasons, but considering strikes and temporarily

reduced yields, these figures are approximately correct. In 1913 there was shipped 652,168 tons of pyrite, while 1,207,403 tons of 2.19% ore was treated at the mines. This total of 1,859,571 tons compares with 2,406,969 tons in 1912; respective copper outputs were 44,978,880 and 57,395,520 lb.

The management of the company is both technically and financially above criticism, and the mine itself, after 3,000 years of production, requires no commendation.

SAN MIGUEL COPPER MINES, LTD. **SPAIN**

Office: E. Johnston, sec., 295 Salisbury House, London, E. C. 2, England. **Mine office:** Almonaster, Huelva, Spain.

Officers: C. C. D'Anvers, chairman; H. Barrett, R. B. Levy, M. Paisant, E. Porges and C. A. Massaouti, directors; J. F. Allen, con. eng.

Inc. Oct. 12, 1904, in Great Britain. **Cap.,** £150,000; shares £1 par; increased, November, 1908, to £200,000; fully issued and fully paid.

Dividends: 18¾% in 1906; 7½% in 1913; 5% in 1914; 18¾% in 1915. Accounts for 1915 show a loss of £1,835, and in 1917 a loss of £7,180.

Property: 1,900 acres, including the San Miguel and adjoining mines containing cupriferous pyrites. The property was worked for some years by Sociedad Miniera de San Miguel de Huelva, a Portuguese company, until taken over in 1904 by the present owners. In 1907 the opencast levels of the mine caved, since which time production has been limited to underground ore extraction. The mine has ore reserves, estimated, 1912, at 700,000 long tons, and in addition there are about 450,000 tons of partly leached ore on surface, in heaps. Underground ore reserves are estimated at 2.5% copper tenor.

The company owns a 12-mile private railway, built at a cost of £40,000, from Almonaster to El Cerro, connecting at the latter point with the Ferrocarril Zafra y Huelva.

Production: 1,612,800 lb. copper in 1904; 978,880 lb. in 1906; 797,440 lb. in 1907; 1,124,480 lb. in 1908; 1,438,080 lb. in 1909; 1,635,200 lb. in 1910; 1,729,280 lb. in 1911; 1,422,400 lb. in 1912; 1,379,840 lb. in 1913; 952,000 lb. in 1914; 1,252,160 lb. in 1915; 828,000 lb. in 1916; 707,840 lb. in 1917.

The mine was reported closed down late in 1919 and company is to be liquidated.

THARSIS SULPHUR & COPPER CO., LTD. **SPAIN**

Head office: George Reid, sec., 136 W. George St., Glasgow, Scotland. **Mine office:** Huelva, Spain. **Works in Great Britain:** Hebburn-on-Tyne, Willington Quay, Cardiff; and Glasgow.

Directors: Lord Glenconner, chairman; L. Oscar Schmidt, René Millet, Albert J. J. Messéan, Hugh Brown, F. Alexis Ducoing, Sir Herbert E. Maxwell, S. C. Hogarth; W. P. Rutherford, Jr., man. director.

Inc. Oct. 27, 1866, in Great Britain. **Cap.,** £300,000, since increased by amalgamation with other companies and the issue of new capital, to £1,250,000. Shares £2 par, fully paid.

Dividends: begun 1868, have been paid since without the lapse of a single year, and have averaged 18½% per annum. To the end of 1918 they aggregated 948 1/6%, amounting to the magnificent total of £10,758,432, putting this company well to the front among the profitable mines of the world. In 1918 dividends amounted to £125,000, or 10%.

In addition to dividend disbursements, the company has written off sums aggregating £2,630,855, and on Dec. 31, 1917, had £458,996 in cash and securities. Net profits of operations have ranged from a minimum of £27,052 in 1868, to a maximum of £478,878 in 1899, with £162,743 in 1909; £161,211 in 1910; £188,140 in 1911; £253,066 in 1912; £246,727 in 1913; £156,310 in 1914; £103,291 in 1915; £199,150 in 1916; £158,078 in 1917; £126,295 in 1918.

Property: company owns a number of cupreous and iron pyrite mines in the province of Huelva, Spain, some of which were worked in ancient times by the Romans, and possibly by the Phœnicians before them.

At the present time its supplies of ore are principally drawn from the

Calañas, or La Zarza, mine, from which 402,097 tons of sulphur ore were extracted in 1917, and 328,601 tons in 1918. This mine has many million tons of ore now awaiting extraction. The depth of the orebody is still undetermined.

In the earlier years of the company, the Tharsis group of mines was its principal source of supply, but the richer ores of that property becoming exhausted, the Calañas mine became the mainstay of the company's prosperity. Now that the demand for sulphur is increasing, the company during the last few years has been preparing on a large scale for the renewal of extraction from the Tharsis group. The Tharsis mines still contain many million tons of pyrite, of low copper but high sulphur contents, and the company is now in a position to again supply large quantities annually from that source.

The company also owns the Almagrera and Lagunazo mines, both within a few miles from the Tharsis group.

The Tharsis group is connected with the port of Huelva by the company's railway, 29 miles long, from which a branch line, 18 miles, runs to the Calañas mine. In 1917 the Calañas produced 402,097 tons of ore, an increase of 12,900 tons compared with 1916.

The company's iron pyrite, containing 48 to 50% sulphur, is shipped all over the world for its sulphur content, but its cupreous pyrite is principally shipped to Great Britain and Ireland, where, after the sulphur has been extracted by the acid-makers, the residue, or cinder, is forwarded to the company's works for the extraction of the copper by the wet process and the preparation of the iron residue for the market. A small quantity of silver and gold is also recovered at the copper extraction works.

Production: owing to the low copper content of the ore now being worked, the company's production of refined copper is much reduced, having fallen from 13,544 tons (30,258,560 lb.) in 1884 to 4,066 tons (9,107,840 lb.) in 1917 and 3,246 tons in 1918.

UNITED ALKALI CO., LTD. **SPAIN**

Office: Cunard Bldg., Liverpool, England. **Mine office:** Valverde del Camino, Huelva, Spain. **Works office:** St. Helens, Lancashire, England.

Officers: Max Muspratt, chairman; E. Mount, sec.; J. H. Cresswell, gen. mgr.; C. Kaesmacher, asst. mgr.; Alex. Hill & Stewart, cons. engrs.

Inc. in Great Britain. **Cap.,** £6,550,000. Net earnings were £584,809 in 1915, from which £118,714 was disbursed for interest on debentures.

The company is primarily a chemical and manufacturing corporation, copper mining being merely a small branch of its business, which embraces 46 subsidiary works and corporations, some of the plants of very great size. The company has its principal works at St. Helens, Runcorn, Flint, Widnes and Glasgow, making extensive use of Spanish and Portuguese pyrites, which are burned for sulphur, after which the cinder remaining is leached for copper.

The company's copper properties in Spain include the Sotiel Coronada mines; also the Castillo del Buitron mines, held under lease from the Cia. Anonima de Buitron, and Tinto and Santa Rosa mines, all in the province of Huelva. These properties show typical Huelvan slates, carrying lenticular contact deposits between slate and porphyry, having a general N.-W. strike, with dip from 30° to vertical, carrying cupriferous pyrite.

The Sotiel Coronada mine, 666 hectares, produces cupriferous pyrite ores and cement copper equivalent to an annual output of about 1,000,000 lb. fine copper yearly.

Extraction is by underground and opencut operations, and mining is by overhand stoping, with dry walling and rock filling for depleted stopes. All pyritic ore above 1.5% copper is exported, the low-grade ores being leached at the mine, and washed sulphur ore exported.

The Castillo del Buitron property is a group of 4 concessions, 47 acres, at Zalamea La Real, and includes La Poderosa group of 6 hectares, adjoining, and the Concepción mine of 6 hectares, at Almonaster. The Castillo

del Buitron group has 2 principal lenses of ore, these being the Levante, with a length of 150 meters, but of decidedly irregular outline, and the Poniente, about 200 meters long. Production of this group averages 1,500,000 lbs. fine copper yearly.

The Tinto & Santa Rosa group includes La Santa Rosa and El Tinto mines, having a combined area of 141 hectares, at Zalamea La Real. The Santa Rosa mine has 2 parallel lenses, with 7 levels opened, and the Tinto mine has ores said to average about 1.5% copper and 46% sulphur. The group has 9 shafts, and was estimated 1908, by the Spanish Government, to have 1,500,000 metric tons of ore developed. Production from this group is estimated at about 2,000,000 lb. fine copper yearly.

The company controls the Ferrocarril del Buitron, a narrow gauge railroad running from Castillo del Buitron to Huelva, equipped with 18 locomotives.

Production: from Spanish mines was 180,000 metric tons of cupriferous pyrite and 1,000 tons of copper precipitates in 1916. The company formerly was a large purchaser of iron pyrite, but now supplies its own requirements in the main.

SWEDEN

LAKE COPPER PROPRIETARY CO., LTD. **SWEDEN**

Office: E. M. E. Culverhouse, sec., 85 London Wall, London, E. C. 2, England.

Directors: Col. Lynch-Staunton, chairman; R. C. Lambert, and S. W. Millard. James Swinburne, cons. elec. engr.

Inc. March 19, 1906. **Cap.,** £300,000 in 298,000 ord. £1 shares; 255,000 issued and 40,000 pfd. 1s shares, all issued. Debentures; £500,000, 6%, issued June, 1912; repayable in yearly drawings between December, 1922-1932; issued, £99,420.

Company paid £200,000 cash for all the shares of the Lake Copper Grufoors Aktiebolaget, owning 1,500 acres of mining leases.

Statement for 15 months ended September 30, 1918, shows assets of £27,583 in excess of current liabilities.

Property: the Stora Strand and Vingnas mines, about 90 miles N. of Gothenburg, Sweden. Orebody on the Stora Strand has been proven for over 10 miles in length and to 800′ depth and carries copper-silver-gold values. Reserves estimated at 100,000 tons of ore. Ore occurs in a slate bed and averages 2% copper.

Development: by 13 shafts on the Stora Strand and 4 on the Vingnas.

The latest report dated March 3, 1919, states that creditors and debenture holders are being taken care of; a new process of concentration has been tried giving a recovery of 90 to 92%; and ultimate ore production will be 250 tons per day.

ASIA

The mines are arranged alphabetically by countries.

KARA BURUN MERCURY SYN., LTD. **ANATOLIA (ASIA MINOR)**

Address: Aidin, near Smyrna, Turkey in Asia.

Property: yields quicksilver ores from cinnabar-bearing quartz veins in schist near limestone. Mining is done by open-cuts, and ore as low as 0.25% mercury is mined, concentrated by screening and the lump ore calcined in two double Spirek furnaces, the fines going to a Cermak-Spirek furnace. Total output of mine 30 tons daily.

Production: about 3,000 flasks of quicksilver yearly.

CHINA

It is difficult to procure specific data concerning the operating mines or active mining companies of China.

The geology of the country and its mineral resources, are described in various books, but the foreign owned mines are few and those operated by Chinese firms are with few exceptions, private enterprises. The American consular service reports that the following firms are interested in mining:

Chater, C. P.	Hongkong Iron Mining Co., Ltd.
China Mining & Metal Co., Ltd.	C. E. Richardson.
The China Crude Ore Export Co., Ltd.	R. W. Weymouth.

The above firms can probably be reached through the American Consulate at Hongkong.

The Wah Chang Mining and Smelting Co. is the world's largest producer of antimony. The largest iron mines of China are in Tayeh. The Han-yeh-ping company's mines produced 600,000 metric tons during 1919, compared with 596,000 tons in 1918. About half of this is used in the company's iron and steel works.

NEW YORK-ORIENT MINES CO. **CHINA**

Address: H. Foster Bain, Box 994, American Post Office, Shanghai, China; or D. C. Jackling, Hobart Bldg., San Francisco.

This syndicate composed of various well-known American engineers has been endeavoring to secure desirable mining concessions in the Orient for several years, but apparently, thus far without success.

WAH CHANG MINING & SMELTING CO., LTD. **CHINA**

Main office: Changsha, China. **Other offices:** 9 Ningpo Road, Shanghai, China; Wah Chang Trading Corporation, Woolworth Bldg., New York; H. M. Newhall & Co., Newhall Bldg., San Francisco; and H. E. M. Bourke, 21 Great Winchester St., London, E. C. England.

Officers: Y. H. Wang, pres.; H. Y. Liang, v. p.-chief engr.; K. C. Li, v. p.-New York mgr.; M. C. Wang, v. p.; N. F. Chu, v. p.-treas.; S. L. Tang, supt.-asst.-treas.; K. K. Chang, sec.; T. W. Tseng, asst. sec.; D. C. Chow, Shanghai mgr. **Auditors:** Y. G. Chow, M. H. Li, and C. F. Tsai. **Directors:** H. L. Shuan (chairman); H. Q. Liang, Q. Yang, C. T. Chow, D. W. Tang, P. Q. Yuen, H. K. Liang, L. C. Tsow and F. C. Chow.

The Wah Chang company was formed in 1898, under the name of Kiu-Tung Antimony Mining Co., and was the first antimony mining company in

China. In 1908 it was reorganized, and obtained a patent for its antimony smelting process from the Chinese Government. In addition to this, the company obtained a monopoly of the smelting of antimony in the province of Hunan, to extend over a period of 10 years as from 1908. It has since been extended for a period of 25 years. Under this monopoly, no company has the right to erect works in the province, unless the consent of the Wah Chang company is obtained. The patent granted extends over the whole of China.

The main office is situated at Changsha, next to the antimony works, which extend over a large area, and includes in addition, a lead plant, warehouses, etc.

Antimony Mines: (1) the Yi-Yang, a good property with modern mining equipment. A railway has been built to connect the mine with the river; (2) the An-Hua mines; and (3) the Lu-Lin mines.

Tin Mines: the An-Yuen and Poo-sha.

Tungsten Mines: the Yao Kan Sian and Ton An mines. Each mine is controlled by a subsidiary of the Wah Chang Company.

Lead Mines: the Tien For Tai mines.

Products: the principal product is the WCC Antimony, with a guaranteed minimum purity of 99% Sb, but assaying 99.6% and over. Company also markets Chinese needle antimony, white oxide of antimony, and antimony ore; tungsten concentrates, which assay 70% WO_3 and over; lead and zinc ores; and Chinese No. 1 tin ingots. The antimony tin and tungsten are shipped all over the world. The lead is entirely disposed of in China for domestic purposes.

At the antimony works the Herrenschmidt process is used. This was described by K. C. Li in a paper prepared for the American Institute of Metals, and reprinted in the E. & M. Journal of October 20, 1917, also by C. Yu Wang in Bull. 136, of the A. I. M. E. in April, 1918. The ore mined is low-grade. In 1915 and 1916 there was extracted from accumulated residue over 9,000 tons (20,160,000 lb.) of metal. The works treat custom ore.

This company is the largest antimony producer in the world and supplied 55 to 65% of American imports since 1915. Exports of antimony from Changsha to the United States during 1916, amounted to 4,762 tons valued at $2,681,190, against $1,500.000 in 1915. The 1917 figures were 3,292 tons worth $245,672 (U. S.) plus 454,836 Hankow taels (83 to 106 cents U. S.) Exports from Changsha in 1917 to all countries were 21,333 tons of crude antimony, valued at $2,252,807; 102 tons of ore, $9.394, and 14,804 tons of regulus, $3.258,712.

Wah Chang Trading Corporation.

Head office: Woolworth Bldg., New York.

Officers: K. C. Li, pres.-treas.; H. T. Liang, v. p.; Chas. Gitlan, sec.

History: in the winter of 1914-'15 the Wah Chang Mining & Smelting Co., Ltd. decided to open a branch office in America for the direct sale of its products. The business, which began in a small way with the handling of antimony metal and tungsten ore only, rapidly developed, and in 1916 it was decided to form a New York corporation under the above title with a capital of $10,000. It did not become operative until March 1, 1918, when the capital was increased to $100,000, and the entire business of the Wah Chang Mining & Smelting Co., Ltd. branch office was taken over.

In April, 1918, the capital was increased to $1,000,000, and in May, 1919, was again increased to $2,000,000. The Wah Chang Trading Corporation became the sole representative of Wah Chang M. & S. Co., outside of China, and consequently took control of Wah Chang M. & S. Co.'s agencies abroad. The scope of the business has been greatly extended, and now includes antimony metal (crude and oxide), tungsten and other ores, tin, silk, etc. as imports, and machinery, pig iron, railway equipment, soda ash and other chemicals, aluminum, brass and sporting equipment as exports. It is hoped to extend the business still further.

DUTCH EAST INDIES

These islands are noted for their important production of tin (up to 20,000 tons a year) and oil (13,000,000 bbl. a year), but about 400,000 oz. of silver and up to $4,000,000 of gold per year is also produced.

BILLITON COMPANY — **BILLITON**

Address: C. W. A. Lely, engineer, Tandjong Pandan, Billiton, Dutch East Indies.

Property: a concession that includes the Tikoes tin mine granted in 1852 and expiring in 1927.

Geology: two types of deposits, the first of the ore in irregular lenses of quartz and greisen that carry 2½% cassiterite; the second of tungsten, as a mass of gneiss containing uniformly distributed wolframite.

Development: the deposits were formerly worked by Chinese in open-cuts to depth of 90′; present workings comprise 350′ shaft, with 3 levels, and over 6,000′ of openings.

Equipment: hoist, 628 cu. ft. compressor and drills, 7,200-h. p. Diesel engines (3 erected in 1919), and 2 concentrating mills, handling 200 tons of ore daily.

KETAHOEN, MYNIBOUW — **SUMATRA**

Office: Batavia, Java; or at mine, via Benkoelen, Sumatra, Dutch East Indies.

Property: on island of Sumatra, is a large and well equipped silver-gold mine.

REDJANG LEBONG MYNIBOUW — **SUMATRA**

Office: Batavia, Java, Dutch East Indies.

Property: on island of Sumatra, is a large and well-equipped mine producing silver and gold.

FEDERATED MALAY STATES

This peninsula is best known for its tin mines which produce 40,000 tons annually, or about 30% of the world's supply. Gold mining is also carried on, though apparently not very profitably.

The mineral industry is controlled by British and Australian investors, as is also the case in Siam, and to some extent in the Philippine Islands.

ASAM KUMBANG TIN DREDGING, LIMITED — **MALAYA**

Offices: Challis House, Martin Place, Sydney, New South Wales, Australia; and Taiping, Federated Malay States.

Directors: W. A. Freeman, chairman; A. W. Freeman, managing; F. Leverrier, and J. R. McGregor. W. E. Hills, sec.; J. S. Henry, cons. eng.

Inc. April, 1915, in New South Wales. **Cap.,** £100,000; £1 par; 75,000 issued. Financial statement at end of 1917 showed £11,560 cash, and £2,391 sundry creditors.

Property: 734 acres of tin-bearing alluvial ground near Taiping, Malaya. There were 331 holes put down, revealing 18,850,000 cu. yd. carrying 0.9 lb. tin oxide per yard; also 32 bores showing 2,000,000 yd. of 0.58 lb. gravel.

Equipment: a dredge of 100,000 yard monthly capacity built by Charles Ruwalt Proprietary at Melbourne, Australia, was operating February, 1920. Costs are estimated at 8c per cubic yard.

AUSTRAL MALAY TIN, LIMITED — **MALAYA**

Offices: directors and officers, same as Asam Kumbang Tin Dredging, which see.

Inc. November, 1912, in New South Wales. **Cap.,** £50,000; £1 par; 20,000 issued.

Company is a holding corporation, interested in the Asam Kumbang, Kampong Kamunting and Kamunting Tin, which see. Other properties

after being explored and proven are organized into operating companies. Dividends so far have been in shares of the subsidiaries.

BADAK MINING SYNDICATE **MALAYA**

Office: R. W. Stringer, 31 Queen St., Melbourne, Australia.

Inc. 1919, in Victoria. Cap., £6,000; £10 par.

Property: 5,000 acres at Jeneri, State of Kedah, Malaya. On strength of drill holes giving up to 22 lb. tin per yard, shares jumped to £2,000 each early in 1920. These high results being checked at last accounts.

CHENDAI CONSOLIDATED, LIMITED **MALAYA**

Offices: Station Hill, Redruth, Cornwall, England; and Ipoh, Perak.

F. D. Bain, chairman of board of directors; S. Wickett, sec.

Inc. March 19, 1914, in England. **Cap.**, £60,000; £1 par; £45,950 issued.

Balance sheet for year ended April 30, 1917, shows revenue of £6,046, and profit of £278. Supplies and cash amounted to £963, and accounts payable £3,381. Income for 1918 was £7,632, profit, £1,188.

Property: 300 acres in Kinta district, State of Perak, Malava. Part of area is leased to tributers, who mined 92 tons of black tin in 1917. **Equipment:** includes a 60-ton mill.

Production: 6,981 tons of ore yielded 45 tons of tin oxide, equal to 14.3 lb. per ton. The recovery was 64%, and total cost was $3.46 (U. S.) per ton in 1917. In 1918 the Chendai properties produced 143 tons of concentrate.

CHENDERIANG TIN DREDGING, LTD. **MALAYA**

Office: 7 Martin's Lane, London, E. C. 4, England.

J. I. Philips, chairman of board of directors. J. W. H. Fenner, gen. mgr.; M. T. N. Bluck, cons. eng.

Inc. Feb. 6, 1914, in Great Britain. **Cap.**, £120,000; £1 par; 92,500 issued. During year ended March 31, 1918, net profit was £11,762. With previous balance there was available £14,925, of which £9,250 was distributed. Excess of assets over liabilities was £20,094. Profit in 1919, £906.

Dividends: 7½% in 1915-'16; 5% in 1916-'17; and 10% in 1917-'18.

Property: 927 acres of tin-bearing ground, with options on 250 additional acres in State of Perak. **Equipment:** includes pipe-line, giants, elevators, etc.

Production: Year	Ground moved, cu. yards	Black tin saved, tons	Average per yard lb.	Cost per yard cents
1918-19	890,000	169	0.44	...
1917-18	1,035,000	254	0.54	8.0
1916-17	1,100,000	260	0.53	7.4

GOPENG CONSOLIDATED, LIMITED **MALAYA**

Offices: Station Hill, Redruth, Cornwall, England; and Ipoh, Perak, Federated Malay States.

James Wickett, chairman of board of directors; Tom Wickett, sec.; Osborne and Chappel, gen. mgrs.; W. R. Marks, mgr.

Inc. Sept. 24, 1912. **Cap.**, £400,000; £1 par; 395,768 issued.

Revenue for year ended September 30, 1917, was £130,569, of which £120,065 came from tin production and £6,902 from rubber output. The profit was £88,997, and with balance from preceding year made £105,990 available. Dividends absorbed £69,259. After making allowance for reserve and depreciation, balance forward was £33,727. Company has investments valued at £59,645. Profit in 1918 was £135,010, and paid £75,855 in dividends.

Dividends: 10% in 1912-'13; 6 2/3% in 1913-'14 and 1914-'15; 15% in 1915-16; 17½% in 1916-17; 14 1/6% in 1917-18; and 3¾% in 1918-19 to January.

Property: 1,843 acres of tin-bearing placer ground at Gopeng, Perak. The gravel is 50′ deep in places, and rests on limestone. Reserves are large. Company also owns a rubber plantation which is very profitable.

Equipment: storage dams, 45″ pipe-line, 8 miles long (the minimum flow being 5,500 cu. ft. per minute), and several giants.

Production:

	1918-19	1917-18	1916-17
Gravel hydraulicked, yards	1,976,950	2,477,850	2,2'2,800
Recovery per yard, pounds	1.06	0.90	1.09
Value per yard, cents	....	23.26	23.96
Cost per yard, cents	.....	7.60	6.72
Total black tin, tons	937	1,018	1,019

IPOH TIN DREDGING, LTD. MALAYA

Office: 4 London Wall Bldgs., London, E. C. 2, England; and Ipoh, Perak, Federated Malay States.

R. Pawle, chairman of board of directors; E. W. Sandeman, sec.; L. G. Attenborough, mgr.

Inc. Sept. 25, 1913, in Great Britain. **Cap.,** £90,000; £1 par; 89,600 issued; increased to £225,000 in February, 1920; 110,400 issued.

Profit in 1917 was £10,338, of which £8,960 was distributed. Cash investments and supplies, amount to £23,096, and accounts payable, £4,769. Profit in 1918 was £14,916.

Dividends: 5% in 1916; 10% in 1917; 10% in 1918; and 5% in January, 1919.

Property: 563 acres of tin-bearing ground being worked by one dredge, another to be erected in 1920. Additional ground was bought from the Borneo Co., Ltd., early in 1920 for 20,800 shares.

Production:

Year	Ground dug, yards	Black tin, tons
1918	635,420	246
1917	603,700	264

KAMPONG KAMUNTING TIN DREDGING, LTD. MALAYA

Offices: Challis House, Sydney, New South Wales, Australia, and Kamunting Taiping, Perak, Federated Malay States.

A. W. Freeman, chairman and managing director; W. E. Hill, sec. in Sydney; H. K. Bennett, sec. at mine. A. J. King, mgr.

Inc. Nov. 24, 1916, in Federated Malay States. **Cap.,** £150,000; £1 par; £140,000 issued.

Revenue for half year ended June 30, 1918, was £54,499, of which £32,365 was profit. Dividends absorbed £28,000, and £6,003 was carried forward. Current assets total £69,404, and liabilities £1,522.

Sales during half year ended June 30, 1919, were £43,830, of which £19,402 was profit; £24,500 was distributed as dividends.

Dividends: 30% in 1916; 32½% in 1917; 20% in 1918; 17½% in 1919 for half year.

Property: 602 acres of tin-bearing alluvial ground near Taiping, which is worked by two dredges. The estimate life is from 10 to 12 years.

Production (half years):

Year	Ground dug, yards	Tin oxide, tons	Cost per yard, cents	Profit per yard, cents
1919 (June 30)	907,000	350	...	...
1918	915,300	324	8.4	20.1
1917	965,000	432	7.2	21.0

Drilling showed an average of 1.07 and 0.75 lb. of tin per yard, and in the last period the respective recoveries were 86% and 88%.

KAMUNTING TIN DREDGING, LTD. MALAYA

Office: 7 Martin's Lane, London, E. C. 4, England; and Penang, Federated Malay States.

J. I. Philips, chairman of directors; Bright & Galbraith, Ltd., sec.; R. L. Naish, gen. mgr.

Inc. May 2, 1913. **Cap.,** £150,000; £1 par; 130,000 issued.

A profit of £35,195 was made during year ended June 30, 1918. With previous balance and other income there was available £45,646. Dividends absorbed £13,000. After writing off development, taxes, etc., £12,771 was was carried forward. **Dividends:** 20% in 1915-'16; 5% in 1916-'17; and 10% in 1917-18.

Property: 750 acres of tin-bearing alluvial ground near Taiping, Perak. From 220 drill-holes put down to an average depth of 36' the average tin content was 1.37 lb. A 7-cu. ft. dredge is at work.

Production: Year	Gravel dug, yards	Black tin, tons	Average value per yard	Cost per yard
1917-18	834,013	397	34c.	10c.
1916-17	936,500	369	20c.	8c.

KINTA TIN MINES, LTD. **MALAYA**

Offices: 65 London Wall, London, E. C. 2, England; and Osborne and Chappel, mgrs., Ipoh, Federated Malay States.

W. A. Luning, chairman of board of directors; H. P. Hood, sec.

Inc. May 17, 1900, in Great Britain. **Cap.,** £120,000; £1 par; all issued.

Profit for year ended June 30, 1917, was £22,653, plus £2,622 from previous year. Dividends absorbed £24,000. Working capital was £13,587. Profit in 1919 was £85,738, of which £36,000 was distributed.

Dividends: 255% to Oct. 21, 1918.

Property: 923 acres owned or under lease, situated in State of Perak.

Equipment: storage dams and pipe-lines used jointly with the Gopeng Consolidated, and hydraulic apparatus.

Production: 476 tons of black tin in 1915; 548 tons in 1916; and 510 tons in 1917; 742 tons in 1919.

KRAMAT PULAI, LTD. **MALAYA**

Offices: 265 Winchester House, London, E. C. 2, England; and Ipoh, Federated Malay States.

A. L. Knaggs, chairman, board of directors; A. H. Cullen, sec.; B. W. Thunder, mgr.

Inc. Oct. 19, 1907. **Cap.,** £100,000; £1 par; all issued.

Profit in 1917 was £32,337, and dividends absorbed £20,000. Balance from 1916 was £7,767, and that carried to 1918 was £20,104. Working capital, £37,725. Profit in 1918 was £35,551.

Dividends: 10% in 1912; 10% in 1913; 7½% in 1914; 12½% in 1916; 10% in 1916; 20% in 1917; and 15% in 1918 to November.

Property: 1,395 acres of tin ground at Pulai, Kinta district, State of Perak, a prospecting license on 1,114 acres adjoining, and a lease on 57 additional acres, worked by 3 hydraulic elevators.

Production: 206 tons of tin oxide in 1916, 227 tons in 1917, and 177 tons in 1918.

LAHAT MINES, LTD. **MALAYA**

Offices: Portland House, 73 Basinghall St., London, E. C. 2, England; and Ipoh, Federated Malay States.

W. J. Payne, chairman of board of directors; A. H. Cullen, sec.; Osborne and Chappel, mgrs.

Inc. Nov. 26, 1906. **Cap.,** £120,000; £1 par; all issued.

Revenue in 1917 was £59,335, of which £25,089 was profit, and £18,000 was paid in dividends. Cash, investments, and reserve, total £27,884, with accounts payable, £7,087.

Dividends: 91% from 1909 to December, 1918.

Property: 283 acres of tin land at Lahat, worked centuries ago. The main deposit is on a granite-limestone contact. Ore is mined by open cut work.

Equipment: 220-k. w. Diesel generator, 160-h. p. gas engine, hoists at pits, water and gravel pumps, monitors, elevators, puddlers, etc. Electric power is purchased.

Production: Year	Ground treated, yards	Tin oxide, tons	Yield per yard, lb.	Cost per yard, c.
1918	.....	399	....	..
1917	242,433	...	4.28	58
1916	242,461	...	4.03	48

MALAYAN TIN DREDGING, LTD. **MALAYA**

Offices: Portland House, 73 Basinghall St., London, E. C. 2, England; and Batu Gajah, Perak, Federated Malay States.

E. W. Birch, of board of directors; A. H. Cullen, sec.; A. J. Kelman, act. mgr.

Inc. May 9, 1911, in England. **Cap.**, £125,000; £1 par; 121,000 issued.

Accounts for year ended June 30, 1918, show a revenue of £138,796, of which £66,854 was profit. Balance carried forward was £47,054 (less excess profits duty), compared with £15,089 brought forward from previous account. Cash, investments, and supplies totaled £110,832, and current liabilities £22,886. Profit for 1919 was £40,497, of which £33,200 was distributed.

Dividends: 10% in 1913; 5% in 1914; 20% in 1915; 25% in 1916; 25% in 1917; and 10% in 1918.

Property: 1,583 acres in tin-bearing ground in the Kinta valley, State of Perak. In 1918, dredges dug to a depth of 30′ to 60′.

Equipment: includes 4 steam-driven (coal) dredges, with 2 more to be added in 1920. Operations began in 1913.

Production: Year	Yardage	Tin saved, lb. per yd.	Cost per yd., cents
1918-'19	3,256,540	0.49	..
1917-'18	3,220,300	0.57	8.2
1916-'17	3,141,300	0.59	8.2

PAHANG CONSOLIDATED CO., LTD. (THE) **MALAYA**

Office: A. Giffard, sec., Blomfield House, London Wall, London, E. C. 2, England.

J. E. Champey, chairman of board of directors; J. T. Marriner, mgr.; W. O. Pou, medical officer.

Inc. 1906. **Cap.**, £500,000, in 100,000 7% pfd. shares; £1 par; all issued; and 1,600,000 common shares; 5s par; 1,500,000 issued.

Financial statement for the years ending July 31, shows a profit in 1915 of £103,963; £98,925 in 1916; £161,113 in 1918 and £68,414 in 1919. Total revenue in 1918 was £372,220. Current assets were £303,008, and liabilities £73,494. Balance from 1917-18 was £39,728, and that carried forward to 1918-19 was £54,321.

Dividends: on preferred shares have been paid regularly, plus extras of 2½% in 1913; 5% in 1914 and 1915; 8% in 1916 and 1917. Common shares received 12½% in 1913; nothing in 1914; 15% in 1916; and 20% each in 1917 and 1918.

Property: mining rights over approximately 200 square miles of land containing tin lodes in State of Pahang, including 3,800 acres devoted to rubber plantations.

Development: there are 8 deep mines, in which a total of 7.24 miles of new work was done in 1917-'18, against 8.9 and 8.6 miles in the two previous years. Ore reserves amount to 600,000 tons (350,000 tons in 1916), with favorable prospects for additions to this quantity. The Nicholson shaft is down 1,626′, in granite. Electric pumps are working on the 1,200′ level. In 1919, Willink's lode was cut at 900′, and for 115′ the tin content was from 2½ to 3%.

Equipment: is remarkably complete, including hoists, pumps, turbo-generator power-plant, compressors, ground tramway, steamers and barges on river, Diesel oil engines, 50 gravity and 4 Holman pneumatic stamps and

concentrating plant, also complete medical department for 4,500 employees (mostly native).

Production: Year	Ore treated, tons	Tin oxide saved, %	Tin oxide tons	(U. S. Value of oxide, per ton	Cost per ton of ore treated	Rubber lb.
1918-'19.....	236,100	....	1,815	...	....	.....
1917-'18.....	187,300	1.69	2,114	$879	$5.38	412,251
1916-'17.....	156,700	[illegible]	2,772	595	5.95	389,101

The tin oxide contains 71.5% metal.

This company is doing a large business, about which the shareholders are kept well informed.

PENGKALEN, LIMITED **MALAYA**

Offices: Station Hill, Redruth, Cornwall, England; and Osborne & Chappel, cons. engrs., Ipoh, Federated Malay States.

J. Wickett, chairman of board of directors; Tom Wickett, sec.; W. Kellar, supt.

Inc. Aug. 22, 1907, in Great Britain. **Cap.,** £200,000 in 100,000 pfd. ord. 10% and 90,000 ord. shares; £1 par; increased from £100,000 March, 1920.

Financial statement for year ended September 30, 1917, showed total revenue of £26,478, of which £11,035 was from tin and £10,040 from power sales. The profit was £10,850. After paying dividends and depreciation, the balance for 1918 was £3,902. Cash and investments totaled £12,360, and accounts payable, £2,135. Profit for 1918 was £16,972, of which £6,000 was distributed.

Dividends:

Year	Preferred, %	Common, %
1918-'19.....	15	5
1917-'18.....	15	5
1916-'17.....	12½	2½
1915-'16.....	12½	2½

Property: 450 acres near Lahat, State of Perak, carrying alluvial tin to depth of 50'. Operates a dredge and an electric power-plant.

Production: 102 tons of black tin (71% metal) in 1916, and 111 tons in 1917, and 97 tons in 1918.

Company's mining operation are fairly profitable and it derives a further profit from royalties and from power furnished other companies.

RAMBUTAN, LIMITED **MALAYA**

Office: Station Hill, Redruth, Cornwall, England; and Osborne & Chappel, Ipoh, Federated Malay States.

James Wickett, chairman of board of directors; Tom Wickett, sec.

Inc. May 30, 1905, in Great Britain. **Cap.,** £100,000; £1 par; all issued.

Revenue for year ended June 30, 1917 was £29,275, of which £19,084 was profit. Dividends absorbed £13,333. Cash and investments amount to £19,291, and sundry creditors, £3,411. Profit in 1918 was £29,327, of which £13,333 was distributed.

Dividends: 5% in 1907; nothing from 1908 to 1914; 5% in 1915; 10% in 1916; 13⅓% in 1917 and 1918; and 10% in 1919 to February.

Property: 719 acres of tin-bearing ground in Kinta district, State of Perak.

Equipment: hydraulicking plant, storage dam, and 20" pipe-line carrying 2,000 cu. ft. of water per min. for four 1½ to 2½" nozzle monitors, one water-lifter, with 1½" nozzle, and 6 elevators with 1½ to 2½" nozzles. Pressure varies from 90 to 140 lb. per sq. in. Elevators lift from 15 to 69 feet.

Production:

Year	Yardage sluiced	Recovery per yd., lb.	Black tin, tons	Value per yd., c.	Cost per yd., c.
1917-18.....	505,700	1.07	242	.....	.....
1916-17.....	580,000	1.0	259	23.70	7.52
1915-16.....	607,000	0.8	215	17.18	7.48

TEKKA LIMITED **MALAYA**

Officers: Station Hill, Redruth, Cornwall, England; and Osborne & Chappel, Ipoh, Federated Malay States.

James Wickett, chairman of board of directors; Tom Wickett, sec.; C. H. Preedy, mgr.

Inc. Jan. 21, 1907, in Great Britain. **Cap.,** £90,000; £1 par; all issued. Company controls Tekka-Taiping, Ltd., which see.

Profit for year ended January 31, 1919, was £72,166, plus £13,336 from 1918, making £85,502 available. Dividends absorbed £39,987, and £37,987 was carried forward to 1920.

Dividends: 69/6 ($16.62) per share since 1909; 8/6 in 1918, exclusive of shares of Tekka-Taiping distributed in 1913.

Property: about 500 acres of tin-bearing land in Kinta district, State of Perak. Bedrock is limestone.

Equipment: water supply for monitors, elevators, and Pelton wheels.

Production:

Year	Yardage sluiced	Yield per yd., lb.	Black tin tons	Cost per yd., c.
1918.....	487,950	2.35	510	21.04
1917.....	452,000	2.43	507	16.00

Company is an important tin producer, with a promising future.

TEKKA-TAIPING, LIMITED **MALAYA**

Subsidiary of Tekka Limited, which see.

Offices: Station Hill, Redruth, Cornwall, England; and Osborne & Chappel, cons. engrs., Ipoh, Federated Malay States.

James Wickett, chairman of board of directors; Tom Wickett, sec.

Inc. Sept. 29, 1913, in Great Britain. **Cap.,** £90,000; £1 par; 65,000 issued. In September, 1919, company was reorganized with a capital of £500,000, shares £1 par.

Accounts for year ended October 31, 1917, show a revenue of £55,821, of which £37,832 was profit. Dividends absorbed £12,998. After allowing for all charges, £25,541 was carried forward. Current assets were £51,907 above liabilities. Profit in 1918 was £59,642, of which £12,999 was paid as dividends.

Dividends: 20% in 1916; 20% in 1917; 20% in 1918; and 5% in January, 1919.

Property: 2,046 acres of tin-bearing gravel ground near Taiping, State of Perak.

Equipment: includes a dredge and gravel pumps.

Production:

Year	Yardage	Tin saved per yd., lb.	Value per yd., c.	Cost per yd., c.
1918.....	767,000	1.21	.....	.....
1917.....	903,200	1.15	28.26	9.26
1916.....	938,000	1.26	29.00	6.40

TRONOH MINES, LTD. **MALAYA**

Offices: Portland House, 73 Basinghall St., London, E. C. 2, England; and Tronoh, Federated Malay States.

C. V. Thomas, chairman of board of directors; A. H. Cullen, sec.; J. H. Rich, mgr.

Inc. Dec. 3, 1901, in Great Britain. **Cap.,** £160,000; £1 par; all issued.

Profit in 1917 was £51,047, plus balance of £20,529 from 1916, making £71,676 available. Dividends amounted to £40,000; and £23,393 was carried forward. Current assets were £190,157, and liabilities £8,228.

Profit in 1918 was £124,095, of which £80,000 was distributed.

Dividends: total 500% from 1902 to December, 1918.

Property: 2,679 acres of tin land and 2,000 acres of timber land in Kinta district, State of Perak. Washing machines and 3 dredges are at work.

Production:

Year	Yardage	Yield per yd., lb. tin	Cost per yd., c.
1917	1,399,835	1.66	15
1916	1,639,661	2.25	13

In 1918 the total output of black tin was 1,367 tons, compared with 1,044 tons in 1917. This is one of the largest producers of Malaya.

YUKON GOLD CO. **MALAYA**

See Addenda, under United States, for operations in Malaya.

INDIA

The Kolar goldfield, in the State of Mysore, is the one important producing area of India. The mines are all under one management with offices in London, and are all operating on one lode—the Champion Reef. This is a rather thin quartz vein, much folded in places, encased in hornblende-schist, which is surrounded by granite rocks. Operations are now at a depth of 4,000′ or more. The gold is free and its extraction simple by amalgamation and cyanidation. Production is very regular, averaging around £2,250,000 for several years. All machinery is driven by electricity, generated 90 miles distant. The field has a very promising future.

BALAGHAT GOLD MINING CO., LTD. **INDIA**

Office: W. L. Bayley, 6 Queen St. Place, London, E. C., England.

Lord Ribblesdale, chairman of board of directors, John Taylor & Sons, gen mgrs.; W Pritchard, supt.

Inc. Dec. 7, 1896. **Cap.,** £308.000, in 95,400 preference and 212,600 ord. shares of £1 par; all issued.

Dividends: total 132½% on pfd. shares from 1900 to 1907 and 52½% on ord. shares from 1901 to 1906; none since.

Profit in 1917 was £5,493. Assets are £4,651 above liabilities. Reserve fund amounts to £13,000. Profit in 1918 was £5,072.

Property: 1,565 acres in the Kolar gold field, State of Mysore, India.

Development: by shafts and extensive workings. Reserves in 1918 were 38,614 tons, compared with 30,076 tons in 1917, and 26,133 tons in 1916.

Equipment: is complete, including mine plant, stamp-mill, and cyanide works.

Production:

Year	Ore, tons	Tailing, tons	Gold, oz.
1918	26,745	54,130	22,135
1917	28,525	61,600	19,929
1916	29,476	57,438	17,725

BALUCHISTAN CHROME CO., LTD. **INDIA**

Office: E. Price, 19 St. Swithin's Lane, London, E. C. 4, England.

E. Davis, chairman of board of directors and mgr.; E. Oughton, mgr.

Inc. July 29, 1914, in Great Britain. **Cap.,** £1,650,000 in 55,000 10% cum. pfd., and 110,000 ord. shares of £1 par, all issued.

Profit in 1917 was £17,500, and £8,703 was carried forward. Net current assets were £22,000. **Dividends:** 10% on pfce. in 1917; and 11½% on pfce. and 15% on ord. in 1918.

Property: 6,176 acres of mineral land in the Hindubagh district of Baluchistan, India.

Production: 10,417 tons of chromite in 1917, and about 20,000 tons in 1918.

BURMA CORPORATION, LTD. INDIA

Office: D. Anderson, 1 London Wall Bldgs., London, E. C. 2, England. Company controls the Burma Mines, Ltd., which see.

BURMA MINES, LTD. INDIA (BURMA)

Office: D. Anderson, 1 London Wall Bldgs., London, E. C., England. Sir T. R. Wynne, chairman of board of directors. Burma Corporation, Ltd., gen. mgrs., taking 75% of the profits as management fee.

Inc. March 6, 1906, in England. **Cap.**, £200,000; shares 4s par; 724,577 issued, all fully paid.

Revenue during 1917 was £796,227. After paying for operating charges, bad debts, depreciation, and debit balance, the net profit was £11,913. Current assets totaled £433,343, and liabilities £794,079. The latter includes loans from banks, £196,860, and £453,498 due Burma Corporation.

During 1918, metal sales returned £913,696, and total revenue was £1,008,244, with operating costs of £591,277.

Property: 2,496 acres, including the ancient mines at Bawdwin, Upper Burma, India, is one of the greatest lead-silver-zinc mines developed in the past decade. Company also owns iron and limestone deposits and timber lands. (See "Mining and Scientific Press" of November 29, 1919.)

Geology: ore deposit is a replacement of a fine-grained, dark-colored, silicified rhyolite, the impregnated zone being over 100′ wide in places. Walls are not well defined. Ore is an intimate and complex mixture of sulphides, with irregular and varying amounts of lead and zinc. The best ore, carrying up to 50% lead, 50 oz. silver, and 25% zinc, is in the core of the deposit. Silver, which occurs as argentite, is constant as 1 oz. silver for each 1% of lead, irrespective of the zinc content. The vein has been developed for over 2,000′ along its strike. A fault cut off the shoot at south end. Copper is making its appearance in the north end.

Development: by the Chinaman tunnel and the 7,400′ Tiger tunnel, 8′ by 10′ in cross section and driven 500′ below the former. The two tunnels are connected by an interior shaft. The Tiger tunnel is the main haulage and drainage-level. Mining is done by square-set and timberless rill system.

The Chinaman and Shan orebodies are connected by haulage-ways on the 653, 430, and 300′ levels.

Ore reserves: at end of 1918 were 4,404,000 tons, assaying 24.1 oz. silver, 26.2% lead, and 18.4% zinc; with 283,000 tons averaging 21.6 oz. silver, 14.2% lead, 8.72% zinc, and 10.2% copper.

Equipment: a 60-mile 24″ gauge railway connects the mines with the new reduction works at Namtu, 13 miles distant, and with the Government line at Namyao. Mine has Diesel engine, compressors, machine-drills, crushing plant, 1,000-ton concentrating mill employing jigs, tables, and flotation; roasting furnaces, sintering pots and machines, 3 blast-furnaces, and steam turbo-blower. A 3,000-h. p. hydro-electric plant 40 miles distant is to be constructed soon. The metallurgical problems are not yet fully solved, and the consulting engineer, Lawrence Addicks, recommends: (1) that average ore be sent to the mill operating on the preliminary flow-sheet previously described, (2) that the lead concentrate produced be treated for the time being at the present Namtu smelter, with such temporary capacity additions as may be required, any excess base bullion over refining capacity being exported to England, (3) that a zinc-retort smelter and acid plant to treat 25,000 tons of zinc concentrate per year be erected at once at Sakchi, India; any excess concentrate produced being sent to England when shipping conditions permit, (4) that the experiments already under way for the choice of a suitable process for the treatment of middling be prosecuted vigorously, and that upon satisfactory results a commercial plant be erected in England.

Late in 1919 company decided to erect a smelter at Namtu, capable of pro-

ducing 60,000 tons of lead and 5,000,000 oz. of silver per annum. Plans have been drawn for a plant to handle 10,000 tons of spelter and 30,000 tons of sulphuric acid per year.

Production:

Year	Lead, tons	Silver, oz.
1919 (approximate)	19,000	2,100,000
1918	18,641	1,970,503
1917	16,957	1,525,844
1916	11,088	1,105,603

Despite its substantial output, Burma Mines is in the preparatory stage and spending large sums in development and equipment, but in 1920 should reach an output of 300,000 tons of ore yearly, and be fully able to pay dividends.

CAPE COPPER CO., LTD. **INDIA**

Company operates the Rakha Hills copper mine at Surda, also a smelter, details of which will be found under the above head in the African section. Company has optioned part of its ground to the Cordoba Copper Co. of Spain.

CHAMPION REEF GOLD MINING CO. OF INDIA, LTD. **INDIA**

Office: F. H. Williams, 5 Queen St. Place, London, E. C. 4, England. J. Taylor, chairman of board of directors; Lord Ribblesdale, v. c.; C. F. Heathcote, supt.; John Taylor & Sons, gen. mgrs.

Inc. June 3, 1889, in England. **Cap.,** £260,000; 2s. 6d. par; all issued.

Financial Statement, years ending September 30:

Year	Revenue	Profit	Previous Balance	Dividends	Current Assets	Current Liabilities
1919	£344,513	£43,145	£38,479	£69,333	£220,598	£66,101
1918	407,260	99,962	5,915	104,000	.....	.....
Total since 1892	13,383,702	.....	.....	4,582,300	.....	.....

Dividends: since 1893, total 1997%, 27% being paid in 1918-'19. The grand total is £4,582,300.

Property: 1,095 acres in the Kolar field, State of Mysore, India.

Development: by shafts, the deepest being Carmichael's—5,500′ vertical—and many miles of workings. During 1919 there were 8,692′ of new openings, including 933′ of shaft sinking, against 9,079′ in 1918. Ore reserves are estimated at 293,000 tons, a slight decrease of 42,000 tons. Results in 1919 were not of great importance, yet many stoping areas yielded good quantities of ore above that which could be estimated in reserves.

Equipment: complete modern mining plant, with 140 stamps, tube-mills, and cyanide plants. Native labor is employed, the pay roll numbering several thousand. A modern medical department is maintained by this and the other companies in the field.

Production:

Year	Ore, tons	Tailing, tons	Gold Value
1919	140,553	206,922	£356,104
1918	138,030	205,320	399,505
1917	149,612	200,616	435,111
1916	194,311	285,492	497,329
Total since 1892	4,229,993	.....	13,383,702

The Champion Reef is one of the world's great gold mines.

JIBUTIL (ANANTAPUR) GOLD MINES, LTD. **INDIA**

Officers: W. L. Bagley, 6 Queen Street Place, London, E. C. 4, England. W. B. McTaggart, chairman of board of directors; John Taylor & Sons, gen. mgrs.

Inc. Nov. 29, 1913, in Great Britain. **Cap.,** £250,000; in 50,000 pfce. all

issued, and 450,000 ord., 422,465 issued; shares 10s. par. Preference shares get 20% per annum.

The year ended Sept. 30, 1917, resulted in a loss of £6,671. Cash and supplies totaled £28,182, and accounts payable £9,226. The following year showed a loss of £8,054.

Property: about 3 sq. miles in Anantapur district of Madras, India.

Equipment: 20-stamp mill and cyanide plant.

Production: 29,600 tons yielded 7,531 oz. of gold in 1917, and 16,100 tons yielded 12,983 oz. in 1918. A good tonnage of tailings was also treated in 1918. By July, 1919, returns had fallen to 900 oz. per month, and it was decided to suspend mining operations. From December, 1913, to September, 1918, the total output was 35,816 oz. gold from 128,570 tons of ore.

KANBAUK (BURMA) WOLFRAM MINES, LTD. INDIA

Offices: 34 Great St. Helen's, London, E. C. 3, England; and Foucar & Co., Rangoon.

W. Nuding, chairman of board of directors; C. M. Lyons, mgr.; H. D. Griffiths, cons. eng.

Inc. March 24, 1917, in Burma. **Cap.**, £190,000; £1 par; 140,000 issued. Debentures, £60,000 authorized; £50,000 issued at 10% for 5 years.

Profit for 18 months ended Dec. 31, 1917, was £26,380. Current assets were £16,800, and liabilities £22,500.

Property: lease of 4,732 acres in the Tavoy district of Burma, carrying tungsten and tin deposits. A concentrating plant is at work.

Production: 305 tons of wolframite in 1916, and 358 tons in 1917.

MAWCHI MINES, LTD. INDIA (BURMA)

Office: J. A. Henderson, sec., 18 St. Swithin's Lane, London, E. C. 4, England. **Mine office:** Mawchi, via Toungoo, Burma.

F. D. Holroyd, chairman of board of directors; M. B. Geeson, mgr. in Burma; E. Adamson, technical manager.

Inc. Nov. 2, 1914, in Great Britain. **Cap.**, £250,000; £1 par; 221,120 issued. Also £29,590 of 6% debentures.

Profit for year ended June 30, 1918, was £33,690. Dividends absorbed £33,168; £17,303 was carried forward. Current assets exceeded liabilities by £60,000.

Dividends: 5% in 1916; 10% in 1917; and 5% in 1918.

Property: a concession of 11 sq. miles, 16 miles from Pazaung, in southern Burma, for which company pays rental and royalty to the government. Tin and tungsten deposits are worked, and reserves were 83,000 tons of ore esimated to carry 3.95% mixed concentrate.

Production: 639 tons of mixed concentrate from 22,071 tons in 1916, and 678 tons in 1917.

MYSORE GOLD MINING CO., LTD. INDIA

Office: W. F. Garland, 5 Queen St. Place, London, E. C. 4, England.

Lord Ribblesdale, chairman of board of directors; R. H. P. Bullen, supt.; John Taylor & Sons, gen. mgrs.

Inc. July, 1880, in England. **Cap.**, £305,000; shares 10s. par; all issued. Late in 1919 it was proposed to increase the capitalization to £610,000, and issue 610,000 shares, 10s. par.

Profit in 1917 was £404,296, of which £259,250 was distributed. Balance from 1916 was £111,665, and that carried to 1918 was £83,044. Reserve fund was £150,000; cash and gold, £243,624; and stores, £132,817. Profit in 1918 was £126,513. Revenue in 1919 was £663,826, of which £186,443 was profit. After paying dividends, £66,189 for taxes, and £37,694 for depreciation, balance forward to 1920 was £7,201. Cash assets are £197,707 net.

Dividends: total 3230% to end of 1919, equal to £8,847,844.

Property: 3,051 acres at Kolar, State of Mysore, India.

Development: by shafts over 4,000′ deep and extensive workings on a narrow lode. Reserves were 870,000 tons at end of 1919. Due to ab-

normal conditions, development was 51,000′ less than normal during the years 1914-1918.

Equipment: complete, with 160 stamps, tube-mills and cyanide plants.

Production: to end of 1919 was 5,179,025 oz. gold from 5,701,861 tons of ore.

Year	Ore, tons	Gold Yield, oz.
1919	270,425	163,719
1918	293,186	174,208
1917	307,126	198,446
1916	307,023	198,258
1915	305,000	207,981

The Mysore has been one of the world's largest gold mines. Its depleted ore reserves are quite low-grade, but inasmuch as zones of impoverishment overlying high-grade ore are a feature of the mine, deeper development is to be done.

NORTH ANANTAPUR GOLD MINES, LTD. **INDIA**

Office: W. L. Bayley, 6 Queen Street Place, London, E. C. 4, England. J. Taylor, chairman of board of directors; L. C. Oliver, supt.

Inc. June 23, 1908, in Great Britain. **Cap.**, £125,000, in 25,000 pfce. (all issued), and 100,000 ord. (91,253 issued); £1 par. Preference shares are entitled to 20% per annum.

Profit for year ended June 30, 1919, was £18,445, which is £3,410 less than in 1918.

Dividends: from 1912 to March, 1919, the pfce. shares received a total of 140%, and ord. shares 20%.

Property: 1½ square miles in Anantapur district, Madras, India; also holds a 2-year option on the Baragunda copper mine in northern India.

Development: by 5 shafts. Ore reserves are 11,000 tons, compared with 20,000 tons in 1918, and 32,000 tons in 1917.

Equipment: includes 35-stamp mill and cyanide plant.

Production, years ending June 30:

Year	Tons	Gold, value
1919	14,200	£49,569
1918	20,100	57,287
1917	26,500	57,705

The gold mine appears to be nearly exhausted, but the new copper property is considered promising.

NUNDYDROOG COMPANY, LTD. **INDIA**

Office: W. L. Bayley, 5 Queen St. Place, London, E. C. 4, England. W. B. McTaggart, chairman of board of directors; C. H. Richards, supt.; John Taylor & Sons, mgrs.

Inc. April 20, 1893, in England. **Cap.**, £283,000; shares 10s; all issued.

Profit in 1918 was £123,424, of which £63,675 was distributed, against £141,558 and £94,333 in 1917. The reserve fund remains at £50,000.

Dividends: since 1888 total 968%.

Property: 1,497 acres at Kolar, State of Mysore, India.

Development: by 5 main shafts, 3,440′, 4,037′, 3,993′, and 4,085′ deep; the fifth being 18′ diam. and under construction. Reserves are estimated at 202,300 tons.

Equipment: complete with 80 stamps and cyanide plant.

Production:

Year	Ore, tons	Gold Yield, oz.
1918	102,731	78,757
1917	99,345	79,586
1916	98,000	80,401
1915	94,000	82,822

OOREGUM GOLD MINING CO., LTD. **INDIA**

Office: F. H. Williams, sec., 5 Queen St. Place, London, E. C. 4, England.

M. Low, chairman of board of directors; H. M. Cooke, supt.; John Taylor & Sons, mgr.

Inc. Oct. 25, 1880, in England. **Cap.,** £410,000; in 240,000 pfd. (all issued), and 580,000 ord. 10s. shares ((481,544 issued).

Profit in 1917 was £171,506, of which £120,232 was distributed. Profit in 1918 was £125,145, and dividends, £102,193. Reserve fund stands at £95,000.

Dividends: on previous capital 87s. on pfd. and 63s. 9d. on ord. shares, and on present capital 60s. 3d. on pfd., and 47s. 3d. on ord. shares.

Property: 931 acres at Kolar, State of Mysore, India.

Development: by vertical shafts, two being 5.419′ deep. Reserves amount to 392,690 tons, a decrease of 22,093 tons.

Equipment: complete with 120-stamp mill and cyanide plant.

Production:

Year	Ore, tons	Gold Yield, oz.
1918	152,780	89,357
1917	155,080	90,688
1916	155,317	90,619
1915	153,266	86,643

This is the third largest mine in the Kolar field.

INDO-CHINA (FRENCH)

MINES DE CHODIEN **TONKIN**

Address: M. G. Bault, owner, 180 Quai du Commerce, Hanoi, Tonkin, Indo-China.

Property: a concession, 27 kilometers in area, that contains fissure veins and replacement deposits of zinc and lead in limestone and schist. About 8,000,000 francs have been spent thus far in ore development and constructing a 35-kilometer railway. First shipments were made in 1914. Production is normally about 18,000 tons of ore yearly.

JAPAN

FUJITA MINING & SMELTING CO., LTD. **JAPAN**

Office: 20 Dojima-Kitamachi, Osaka, Japan. **Branch office:** 6 Yamashiro-cho, Kyobashi-ku, Tokio; 27 2-Chrome, Asahi-machi, Korea.

Officers: Tokujiro Fujita, pres.; Nakasuke Saka, gen. mgr.; Baron Heitaro Fujita, Hikosaburo Fujita, Yotaro Takagi, Seiichi Saito, Kotaro Suzuki, mgrs.; Otojiro Sasano, Kennosuke Tsujimoto, inspectors.

Inc. in Japan, with capital of Y30,000,000 ($15,000,000) to operate the mining and smelting department of the Fujita Company (Gomei Kwaisha Fujitagumi), which see.

The company is also extensively engaged in forestry (Nam Heng rubber estate in Kota Tinggi, Johore State, Malay Peninsula, 6,000 acres; Kokkaido forest in northern island of Japan, 180,000 acres; Yawataya sawmill in Osaka, Nagakisawa sawmill near Kosaka mine, etc.), and agriculture including reclamation work at Kojima bay, near Okayama, Japan.

When metallic mining was started in Japan, the Fujita Company was among the first to take an active interest in it, and the company led the way in adopting the latest appliances then used in Europe and America. The total number of mining claims and mines owned by the Fujita Mng. & Sm. company, in Japan, Korea, and Formosa, are 181 and 70, respectively. Some of them are being exploited, while 32 are being successfully worked. The total value of the mineral products of the company for 1916 amounted to 10,500,000 yen, and 19,500,000 yen in 1918, including:

Metal and unit	1916	1918
Gold, ounces	27,000	32,000
Silver, ounces	1,169,000	831,000
Copper, pounds	22,640,000	33,502,000
Lead, tons	382	140
Zinc, tons	336	1,600
Other ores, tons		36,000

Of silver, the company produces about 30% of the total yield of Japan; of copper, about 17%; and gold, 13%. The company employs 12,509 miners, of whom 4,491 are underground and 8,018 on surface.

Kosaka Mine: situated at Kosaka-machi, Kazunogun, Rikuchu, in the extreme northern part of Hondo, the main island of Japan. The mine is about 10 miles from the Government railway. It was worked until 1897 as a silver mine, passing in 1881 to the present ownership. The Kosaka employed 6,500 hands in 1918.

Geology: country rock is brecciated porphyry tuff, ranging from a fine conglomerate to a coarse grit, of tertiary age, with a covering of volcanic ash and with intrusions of liparite and andesite. The orebodies constitute a fine example of metasomatic replacement occurring along the contact zone between the tuff or liparite and andesite, and is surrounded by the clay with dissemination of pyrite, but are shading imperceptibly into the liparite. There are 5 of these orebodies, of immense size, ranging from 20 to 270′ thick, and proved for a length of a half-mile, while drills have shown the formation to continue to a depth of 1,700′. The area of deposit so far explored is 2,000′ long, 800′ wide, and 500′ deep. There are three kinds of ores; a complex sulphide, pyrite both compact and loose, and silicious. They carry much barite.

All ores are more or less argentiferous, and the product is divided into 3 grades. The first grade is the complex sulphide, averaging 2.43% copper, 2.28% lead, 9.80% zinc, and 15.64% iron, with 7 oz. silver per ton, and from a trace to $2 gold per ton, the gangue carrying 40 to 45% barium sulphate. The pyritic ore, second grade, averages 2.3% copper, 0.47% lead, 3.15% zinc, and 26.83% iron. The silicious ore, third grade, carries 1.27% copper, 0.26% lead, 1.48% zinc, and 19.4% iron.

Development: the Kosaka ore deposit is mined by tunnels. The slicing and filling system is used, but underground mining was practically abandoned in 1908 for open-cut workings, similar to those of the Utah Copper Co. From 1,000 to 1,800 cu. yd. of overburden is removed daily, the entire overburden being estimated at about 4,000,000 cu. yd. Stripping is partly by hand labor and partly with drills, and with electric trolleys to remove waste.

The open pit is of funnel shape, about 1,000′x2,000′ in size, with the sides terraced. Owing to extraction of ore by tunnel and open-cut workings only about 500 h. p. is required at the mine.

Equipment: includes two 8-drill Leyner air compressors and one 12-drill compressor, and an electric pump on the 500′ level.

The smelter: 1¾ miles from the mine, with electric rail connection, is of about 1,000 ton daily capacity. There are 6 pot roasters, 3 Brück-Kretschel briquetting machines, and several stamps used for briquetting fine ores. The percentage of fines is 35% of the raw ore. There are 10 open-top water jacket blast-furnaces, 7 of which are 24′ long, and 4′ wide at tuyere level; the others are smaller. One 15′ furnace is used for matte concentration. Semi-pyritic smelting is employed, coke charged from the furnace top is about 1.5%, and powdered coal inserted through the tuyeres about 3% of the crude ore. The blast pressure is about 1 lb. About 25% limestone and 10% slag and matte to raw ore are used as fluxes. The average of all ores is only 2.5% copper, with small gold and silver contents. The grade of the first matte is 35%, and the second, 45%.

The converter plant has 2 stands, with 8 shells. There are 2 Brown-

Boveri-Rateau blowers, a complete lining department, and 140-ton electric crane. Blister copper from the converter is refined electrolytically, the product being 99.95% copper. The slime from the electrolytic tanks is treated in two cupel furnaces. The monthly capacity of the electrolytic plant is 1,200 tons.

The electrolytic zinc refinery at the Kosaka mine was installed in 1915. There are 4 Herreshoff calcining furnaces, which were used before the matte calcining, one muffle furnace, and 5 Ding's magnetic separators. The daily production of electrolytic spelter is about one ton.

Power is all electric, the Kosaka installations aggregated 3,550 k.w. a.c. and also 220 k.w. d.c. for the mine, smelter, shops, and rail lines. It is generated by 4 water plants on the river Oyu, near the mine, also by a Locomobile steam plant.

The Kosaka mine operates an electric trolley, with 9 miles of main line and branch lines, equipped with 35 locomotives and 400 three-ton ore cars. The lines reach all principal points at the mine, smelter, and shops, and connect with the Kosaka railway at the Kosaka depot. The Kosaka railway, which is 15 miles between Kosaka and Odate, connects with the Government railway at Odate.

Production: the annual output of the Kosaka has been as follows: 12,761 long tons of copper, 335 tons of lead, 829,970 oz. silver, 20,000 oz. of gold, and 251 tons of zinc.

The Tokito dressing plant is 2 miles from the smelter, with aerial tram connection. Mixed ores from the branch mines of the Kosaka mine are dressed, the capacity being 100 tons per day.

Hanaoka Mine: in Kita-akita-gun, Akita Prefecture, Japan, owned by the Fujita Co. since 1915.

Ore: the deposit is massive and worked by filling methods. The ore contains chiefly copper and iron pyrite, galena, zinc blende, and gypsum. After hand-picking, it is transported to the Kosaka smelter, 18 miles away.

Production: in 1918 was 125,582 tons, which contained 0.000092% gold, 0.00513% silver, and 3.112% copper.

Omori Mine: situated in a mountainous region in the province of Iwami (Omori-machi, Nima-gun, Shimane-ken), in the northwest of Hondo, near the coast of the Japan Sea. This mine is said to have been discovered some 600 years ago, and reopened in 1525. The mine once was highly productive, but was closed in 1872 by an earthquake, and reopened in 1884 by the present company, which, after spending considerable capital, equipped the mine with a modern plant.

Geology: the district is composed of Tertiary tuffs and sandstone, interspersed with a great mass of andesite containing ore. There are five veins which have been produced by the fillings of the fissures with mineral solutions. The dip of veins varies from 80° to 70° N., with from 10″ to 3′ width. Ore exists in bands in the veins, its average width being 7″, but it sometimes swells to 6′. Some of the veins are 2,000′ long, composed principally of chalcopyrite, galena and zinc blende, containing gold and silver. Five of the veins—Sato, Honnakase, Nakase, Sanjio and Umanose—are now being worked. The ore contains 0.00148% gold, 0.05001% silver, 6.66674% copper and 0.58771% lead.

Development: the veins are worked by stoping, and material is removed by adits and shafts. The ore, after being cobbed and picked, is mechanically dressed by breakers, rolls, trommels, jiggers, etc. The dressed ore, with the requisite quantity of limestone and coke, is smelted raw in an ordinary circular jacketed furnace. The matte formed from this semi-pyrite smelting is once more smelted, forming blister copper (98%Cu), containing 2.3% gold, 77% silver, and lead. This last operation is carried out according to the Japanese Mabuki process.

Production: the output was 1,071,100 lb. of blister copper in 1916; 854,679 lb. in 1917, and 729,366 lb. in 1918. All blister copper from this mine is shipped to the Kosaka electrolytic refinery.

Oarasawa Mine: about 17 miles W. of Kurosawajiri station on the Government railway, to which a tramway has been constructed from the mine, is situated at Yuda-mura, Waga-gun, Iwateken (east district of Akita-ken, not far from the Kosaka mine). It was opened 33 years ago, passing in 1910 to the present ownership.

Geology: country rocks are granite, tuff, and liparite of Tertiary age. Traversing these rocks, especially tuff, many veins in various widths from 6″ to 6′ occur, running nearly parallel in the strike of N. 35 to 60° E. and dipping N. W. at 60 to 70°. A few veins dip at the same angle as the former, but in the opposite direction. The gangue is principally quartz, and the veins carry mainly chalcopyrite and iron pyrite, also some oxides of copper.

At five miles W. from the Oarasawa mine is the Unekura mine. This is a branch of the Oarasawa at present. The district consists mainly of liparite and tuff of Tertiary age, and fissure veins are found in liparite and tuff. These can be classified into two general groups; the strike of one is N. 25° E., the other N. 85° E. The minerals contained in the ore are chalcopyrite and a little iron pyrite; the gangue is quartz.

Development: the veins of Oarasawa and Unekura are worked by overhand stoping, and the material is removed by adits and shafts. The ore mined is mechanically dressed to 7.5% grade.

Production: is about 151,000 long tons of dressed ore yearly, plus 1,000 tons of purchased ore. The blast-furnace process is generally similar to that at the Omori. Annual production of blister copper (anode) contains 98% copper, 0.0005% gold, 0.05% silver, is 1,650 long tons, which is transported to Kosaka refinery. About 1,000 men are employed, including branch mines.

Matsuoka Mine: situated at Yamada-mura, Okachi-gun, Akita-Ken, and three miles W. from Yuzawa station on the Government railway, to which a light railway has been laid from the mine. The mine was worked in the eighteenth century by Shinen Sato, a famous economist, miner and metallurgist, to whom modern mining in Japan is greatly indebted. Since the end of 1906 the present company has operated the property.

Geology: country rocks are liparite and tuff of Tertiary age. Ore deposits consist of a network of veins in the upper part, but only a few veins in the lower part. The ore consists of chalcopyrite, galena, and zinc blende, gold, and silver; and assays 0.003% Au, 0.0085% Ag, and 0.95% Cu. This is dressed to 0.006% Au, 0.015% Ag, and 2.3% Cu, and is transported by railway to Kosaka. Production was 15,000 tons of dressed ore in 1916.

Yanhara Mine: situated in Kume-gun Okayamaken, about 10 miles from the Tsuyama railway station of the Chugoku line. Property is traversed by the River Yoshii, a stream of considerable size, so that the mine output is carried by boat to the port of Kuban on the Island-Sea, at the river mouth, 35 miles below. The ore deposit was discovered in 1911.

Geology: a Mesozoic clay slate is intruded at several places by a basic rock of the gabbro family. The deposit is a magmatic segregation near the slate and in the gabbro itself, in several masses, one of the largest measuring 400′ by 500′ by 250′. The ore is an iron pyrite, containing only 0.4% copper and 46% sulphur, and is used mostly for making sulphuric acid.

Production: 420,000 tons of pyrite and 30 tons of copper ore yearly.

Hirota Steel and Ferro-Alloy Works: situated near Aizu, in Fukushima Prefecture. Owing to the war, Japan has suffered from the lack of some materials imported from foreign countries in ordinary times, and all ferro-alloys are among them. The company taking advantage of this opportunity, started to produce these alloys and special steels. The works are operated by hydro-electric power, and now produce ferro-silicon, ferro-manganese, ferro-chromium, ferro-tungsten, ferro-molybdenum, ferro-titanium, ferro-vanadium, silico-spiegel of every description, and special kinds of high-speed steel, etc.

Most of the products are used in Japan by the navy and army arsenals, also by various engineering works, while some alloys are exported to Russia and other foreign countries.

FURUKAWA GOMEI KAISHA (FURUKAWA & CO.) JAPAN

Directors: Baron Toranosuke Furukawa, pres.; Rokusaburo Kondo, chief director; Masayuki Otagawa, Koji Inoue, Bunjiro Kondo.

In 1875 the late Ichibei Furukawa established the Furukawa Copper Firm in Tokyo. He was very energetic, and devoted himself to developing and equipping the mines he had prospected. In 1903 the late Junkichi Furukawa, the son of the founder, succeeded his father and became president of the firm. In the same year the concern was reorganized into a company under the Japanese law. On his death, in 1906, Toranosuke Furukawa, his brother, succeeded him, and since then he has been president of the company.

The company has 11 offices, 4 copper works, and 25 mines, whose total area of concession is about 70,000 acres; 1,200 officials and 25,000 men are employed; the annual production is 35,000 tons of copper, 20,000 tons of copper wire and plate, 220,000 tons of copper ore, 1,200,000 tons of coal, and quantities of bullion, pig lead, silver ore, zinc ore, etc.

Head Office: Yaesucho, Kojimachi-ku, Tokyo, Japan.

Branches:	**Address:**
Osaka Branch Office	Ajikawa kamidori, Kita-ku, Osaka.
Moji Branch Office	Hamamachi Moji.
Wakamatsu Branch Office	Kaigan dori, Wakamatsu, Fukuoka-ken.
Hakata Branch Office	Hakata Kaigan dori, Fukuoka.
Keijo Branch Office	Nandaimon-dori, Ni-chome, Keijo, Chosen.
Shanghai Branch Office	Pekin Road, British Concession, Shanghai, China.
Hankow Branch Office	French Concession, Hankow, China.
Tairen Branch Office	Yamagata-dori, Tairen, Manchuria.
Hongkong, in China; Branch Office	Des Vouex Road, Central Hongkong.
London Branch Office	Bishopsgate St., London, E. C.
American Office	120 Broadway, New York.

Principal Mines:

Ashio Copper Mines	Ashio Kamitsuga-gori, Tochigi-ken.
Ani Copper Mines	Ani, Kita-akita-gori, Akitaken.
Nagamatsu Copper Mines	Shiraiwa, Nishimurayama-gori, Yamagata-ken.
Mizusawa Copper Mines	Jwakimura, Waga-gori, Iwateken.
Otori Copper Mines	Oizumimura, Higashi-tagawa-gori, Yamagataken.
Kawaiyama Copper Mines	Ikumo-mura, Abu-gori, Yamaguchi-ken.
Kune Copper Mines	Sakuma-mura, Iwata-gori, Shizuoka-ken.
Furokura Copper Mines	Oyu-mura, Kazuno-gori, Akita-ken.
Kijo Gold Mines	Todo, Kijo-gun, Heinanhoku-do, Chosen.
Innai Silver Mines	Innai, Ogachi-gori, Akitaken.
Daira Lead Mines	Fujikoto-mura, Yamamoto-gori, Akitaken.
Shakanoo, Shiogashira and Daini-Shakanoo Colleries	Otani-mura, Kano-gori, Fukuoka-ken.
Shinshakanoo Colleries	Nishiawa-mura, Kurate-gori, Fukuoka-ken.
Shimoyamada Colleries	Kumada-mura, Kaho-gori, Fukuoka-ken.
Yoshima Colleries	Yoshima-mura, Ishiki-gori, Fukushima-ken.

Works:

Mizushima Smelter	Mizushima Is., near Tamashima, Kojimagori, Okayama-ken.
Amagasaki Refinery	Amagasaki, near Osaka.
Nikko Copper Works	Nikko, Tochigi-ken.
Honjo Copper Works	Yanagiwara-cho, Honjo-ku, Tokyo.

Ashio Mines.

These mines are in Ashio, Kamitsuga-gori, in Tochigi-ken, about 100 miles from Tokyo, connected by the Imperial government railroad and the Ashio railroad. They are 11 miles W. of famous Nikko. Area of the concession is 4,000 acres.

Geology: the district consists mainly of Paleozoic sediments and Tertiary liparite (rhyolite). The liparite forms a volcanic neck erupted through the paleozoic sedimentary rocks and is 2 miles in diameter. The ore deposit of Ashio occurs in veins, most of which traverse the liparite. The strike or course of the veins is either N. 60° E. or N. 80° W. The veins of the first named direction are called the 60° lodes, or the Yokomabu series, and the others the 100° lodes, or the Shinsei series. The mines have more than 200 veins, of which 40 of the Yokomabu series and 60 of the Shinsei series are now being worked. The most important veins of the first series are named as follows: Yokomabu, Kosei, Jimbo and Deai. The second series embraces the Shinsei, Eisei and Tengu. They intersect each other and form rhombic nets of veins. The lodes are generally 1 to 16′ thick, 400 to 6,000′ long, and generally have steep dips. The chief minerals are chalcopyrite and pyrite, with accessory amounts of zinc blende, arsenopyrite, galena and pyrrhotite. Bornite, chalcocite, cuprite, malachite, pisanite and sometimes azurite and native copper are found in the oxidized zone. The gangue minerals are found in small amount; clay and chlorite are common, quartz is also common, and calcite is found at deep workings. Native bismuth, bismuthinite, wolframite, fluorite, crystallized vivianite, ludlamite and apatite are rarely found.

Development: the mines have three main adits, namely: the Ariki, Kotaki and Isudo, which are three miles apart.

The Ariki adit is driven mainly along the strike of Yokamabu vein and is 10′ high, 10′ wide and about 8,000′ long. It is an important level for transportation and drainage. The Kotaki adit, whose portal is to the N. W. of the mine, is driven chiefly along the course of the Kosei and Tengu veins, and is connected with the Ariki tunnel. Both the Kotaki and Ariki tunnels are used as trunk haulage ways for underground transportation. The 6 levels below and the 12 levels above are within the reach of the Tsudo adit.

Tsudo adit: this adit is S. of the mine, on the bank of the Watarase river, 475′ lower than the Ariki. This level was begun in 1885, and driven northward for 12,000′. More than 50 veins were cut in the tunnel, most of them still being profitably worked. The Tsudo tunnel is the main drainage and transportation way of the mine. It is 11′ high and 13′ wide. There are 12 mine levels below it, the lowest one 1,500′ beneath the tunnel.

Honkuchi shaft: which is 6′x9′, is a half mile from the portal of the Honkuchi tunnel, connects with the 10th level and extends down to the Ariki tunnel level. It is equipped with electric hoists.

Yokomabu No. 1, or first shaft, which is 6′x11′ in the clear, is sunk on the Yokomabu vein at a point 4,600′ from the portal of the Ariki adit, connecting at 457′ below with the Tsudo level. There are 7 levels and many working faces that are now being profitably operated.

Yokomabu No. 2, or second shaft, which is 6′x18′, is sunk on the same Yokomabu vein, at a place 2,500′ from the Ariki adit. It taps the Tsudo adit at a depth of 410′ and goes 100′ below it. The shaft has 7 levels between the Ariki and Tsudo tunnels, and 6 levels below the Tsudo adit.

Yokomabu No. 3, or third shaft, 5′x12′, is 1,900′ from No. 1 Yokomabu and passes through Tsudo level at 466′ below Ariki level, and reaches to the depth of 1,300′, and more sinking is going on. A hoist is fitted up at the mouth of this shaft for the workings below Tsudo level. The Kolaki shaft, 6′x14′, is near the Kosei vein, 2,100′ from the Kolaki adit, and it reaches Tsudo level at depth of 448′. No. 1 Kosei shaft, 6′x18′, near the Kosei vein, is along No. 23 vein, 2,600′ W. from the Tsudo adit. It is

900′ deep, and further sinking is in progress in 1917. There are 8 levels connecting with the shaft for the working of the Kosei, Kosei-maehi, Tengu, etc., veins. No. 2 Kosei shaft, 6′x18′ and 660′ deep is 2,000′ W. from No. 1, on the Kosei vein. There are several levels connecting with the shaft, which open up to the eastern part of the vein. The Kosei-machi shaft, 6′x23′, is over 1,500′ below the Tsudo adit.

The vertical depth of the underground workings from the highest outcrop to the lowest level is as follows: Outcrop on Bizendate peak to Tsudo adit, 2,200′; below Tsudo adit, 1,500′; a total of 3,700′.

The aggregate length of drifts amounts to about 1,000,000′, or 190 miles

Overhand stoping is generally used, but also square set work. Each stope is 6′ high, and more than 2½′ wide, varying according to the thickness of the vein.

General features: waste water from the precipitating tank for cement copper and the slimy water from the dressing plants are treated with milk-of-lime, after passing through slime setting ponds.

The smoke from all furnaces passes through Cottrell treaters. Ashio being in a very mountainous region, aerial tramways are widely used for transportation of timber, etc.; their total length is 25 miles. The Tanamura system is adopted in all lines.

Power is supplied from the Hosoo hydro-electric power plant (12 miles from Ashio), developing 20,000 h. p.

Production: has increased gradually during the past 10 years as follows: 6.315 long tons in 1907; 7,191 in 1908; 7,526 in 1909; 7,453 in 1910; 7,932 in 1911; 8,470 in 1912; 10,428 in 1913; 12,204 in 1914; 11,624 in 1915; 14,816 (33,187,840 lb.) in 1916.

Cost of Ashio copper is probably a little less than 10c per lb. finished.

Ani Copper Mines.

(Annual production, 1,500 tons of copper.)

The Ani Copper Mines are at Ani, Kitaakita-gōri, on the western side of the Moriyoshi Mountain, in Akita-ken. The concession is over 4,600 acres, and is over 5 miles long.

Geology: rocks include Tertiary tuff, tuffaceous shale, liparite, and andesite. Veins traverse the whole formation, there being two sets of veins, one running N. S. and the other E. W. The dip is generally steep, though a few of the N. S. lodes have a dip less than 40°. The E. W. lodes are cut by the N. S. lodes, which are sometimes brecciated veins, and occasionally have a clay filling. The E. W. lodes are numerous, though not thick nor long; while the N. S. lodes are big, though few in number.

The principal metallic minerals are chalcopyrite, associated with pyrite, some galena and zinc blende. The gangue or vein stuff is mainly quartz, but sometimes calcite and barite are found. The oxidized zone is deep, and contains bornite, chalcocite, native copper, etc.

For timbering, only rough, round logs are used. There are several forms of timbering used including legs and caps, saddle back, and polygonal sets. It is interesting to note that large excavated spaces such as the hoisting and pumping stations and chambers, each 40′ wide, 25′ high, are timbered with big logs.

Transportation: underground of ores, waste and supplies is by electric locomotives and electric hoists; the former in the Ariki-Kotaki adit, Tsudo adit and No. 4 and 8 levels below the Tsudo. The total length of electrically equipped trackage is 10 miles. All shafts are equipped with electric hoists. Total electric power used is 1,200 h. p.

The Ariki and the Kotaki levels drain the water coming from above and the remainder by the Tsudo adit. There are many kinds of pumps, including the Sulzer and Escher-Wyss turbine types. Total electric power used for pumping is 1,300 h. p.

All the machinery of the mines is driven by electricity, transmitted at 22,000 volts from the Hosoo hydro-electric power plant to five substations,

where it is transformed down to 2,200 volts, again stepped down to 500 volts at underground substations.

Ore dressing: the mines have three concentration mills at Honzan, near the portal of the Ariki, Kotaki and Tsudo tunnels. Crude ore is sorted into two grades underground, one averages 12% copper, the other 0.8%. The daily output of crude ore for the three mills is 250 long tons of 1st and 1,500 tons of 2nd grade. The former is selected mostly by hand, the latter is treated by jigs, tables and flotation. Concentrates from these mills amount to 300 tons of 12.5% grade daily.

Cement copper: is recovered from old workings and weathered rubbish. The daily production is 2½ tons of 66% copper, which is sent direct to the smelter.

Smelter: this is at Honzan, the eastern part of Ashio. The lumps and fines from the concentrating mills being silicious, some basic ores and limestone is supplied from other places. About 105,000 tons of 12.5% product is treated annually, indicating a production of 13,000 tons of copper.

The lumps are charged raw to the blast-furnace, the fines are reduced in reverberatory furnaces after roasting in 5 McDougall furnaces. The matte is bessemerized as usual.

There are four blast-furnaces, 160x42" at the tuyere level; the height from the center of the tuyeres to feed floor is 8½'. Blast is supplied by a Root No. 8 blower, also by turbo-blower. Matte averages 40% copper. Slag assays silica, 39%; iron, 25%; lime, 19%; aluumina, 9%, and copper, 9.2%.

The reverberatory furnace is 19'x110'. Waste heat is utilized by steam boilers. Matte is ladled into converters by an electric traveling crane.

There are 7 converters of the barrel type, 72" diam. and 100" in length. The tuyeres have Dyblie ball valves. Blast for the converters is produced by two turbo-compressors. Lining for converters is a decomposed rhyolite porphyry (liparite).

The converters produce more than 100,000 lb. of blister copper daily. Blister is cast into 70-lb. ingots or anode plates, and carried to the Nikkō Copper Works by rail.

Gases from the roasters, blast and reverberatory furnaces, and converters, pass through two Cottrell treaters to eliminate the fumes and dust. Arsenic is also saved. The dust carries 1.37% copper, 19.72% sulphur, and 31.83% arsenic.

Analysis of the blister copper is as follows: copper, 99.077%; gold, 0.0003%; silver, 0.1065%; arsenic, 0.029%; bismuth, 0.006%; iron, 0.052%; sulphur, 0.028%, and selenium and tellurium, 0.038%.

Mining: there are many levels and shafts, including the Manaita, 10' wide, 7' high, and 8,000' long, the most important transportation and drainage level. Below this there are four levels at present. The Kanbun is 7' high, 4' wide, and 4,500' long. There are ten other levels above the Kanbun tunnel with intervals of 60' to 80', the lower five now being used. The Kosawa main shaft, 4'x4', is one of the blind shafts, which is sunk down to Maehi vein in Manaita level, and is 400' deep. It is equipped with hoists and pumps. The Chōmatsu crosscut opens nearly all of the chief veins in this mine. It is 7' high, 10' wide, and 1,000' long and is the most important transportation level. There are seven levels above and six below it.

The Sosuido level is the third below the Chōmatsu, and is 4' wide, 6' high, and 1,700' long. It is used for drainage only. The Kayakusa, 4'x14', is one of the blind shafts sunk to the Shinsei vein on the Chōmatsu level, and is 800' deep at present. The Koganehira level is the lowest for transportation and drainage, and is 7' high, 4' wide, and 1,500' long. The Motosawa level is 50' above the former, and is 6' high, 4' wide, and 3,000' long. There are 10 levels above the Koganehira, connected by winzes. The Amaike tunnel is cut through at the foot of the mountain range between the Kayakusa and Sammai valleys. It is the lowest level in the mine, and is 7' high, 8' wide and 9,000' long, with double tracks. During the driving

the chief veins in Kosawa and Sammai were found. The Suidōkō adit is driven first as a crosscut; then, after proceeding along the Shōgorōhi vein, it cuts several other veins. It is 7′ high, 8′ wide and 6,600′ long, and is the most important transportation and drainage level. There are 10 levels above it connected by winzes.

Treatment: the main concentration mill is at the Kosawa mine, and contains Hancock jigs, tables, and flotation plant. The 1% crude ore feed is concentrated to 10% Cu.

Ores: the dressed ore treated contains 40% silica and 10% copper. About 16,000 tons of ore are treated annually, yielding 1,500 tons of copper.

The fines and sands are briquetted or roasted in pots. The briquets, roasted ores, and raw material are reduced in 2 blast furnaces with limestone. Matte is blown to blister copper by the Japanese Mabuki hearth (7).

Blister copper, containing 98% copper and 0.11% silver, is sent to the Nikkō Copper Works and electrolytically refined.

Power is chiefly supplied from the Hitachhinai hydro-electric power station, which generates 1,000 h. p. There are also two small auxiliary plants. Another plant for supplying 2,000 h. p. is under construction.

Nagamatsu Copper Mines.

(Annual production, 1,000 tons of copper.)

These extend over Shiraiwa-machi, Nishimurayama-gōri, and Okura-mura, Mogami-gōri, in Yamagata-ken, and are situated on the south of Mt. Gassan. The area of the concession is 1,300 acres.

Geology: the district consists of Tertiary shale, tuff, and sandstone, with extensive intrusives of liparite and andesite. The ore deposit forms clay veins which traverse all the rocks and consists chiefly of chalcopyrite and pyrite; zinc blende and galena are frequently found; quartz and baryte are found occasionally.

Mining: there are many levels, of which the Ogiri and Chugiri are the most important. The former is 5,000′ long. The latter is 380′ above the former, and is 4′ wide, 6′ high, and 2,500′ long.

Treatment: dressing is done by hand and by mechanical means. Crude 1% copper ore is concentrated to 8.5% grade. The dressed ore averages 8.5% copper and is easily smelted. The fine concentrates are roasted in pots; raw lumps and roasted products are smelted into matte in blast-furnaces. Matte is blown into blister at Mabuki. The blister contains 97% copper and 0.18% silver, and is sent to Nikkō Copper Works for refining.

Power: a hydro-electric power plant of 200 h. p. is at work.

Mizusawa Copper Mines.

(Annual production, 500 tons of copper.)

These are in the village of Iwasaki-mura, Waga-gōri, in Iwate-ken. The area of concession is about 1,882 acres.

Geology: this district is composed of granite, Tertiary tuff, and liparite. The important lodes are the Maehi, Okuhi, and Uwabanhi. They run mainly in the granite, with a N. 60° E. strike.

Principal minerals are chalcopyrite and pyrite; but occasionally galena and zinc blende are found in small quantities. The gangue is quartz, but is not abundant. Calcite is found in druses.

Mining: Tsudo adit level, 500′ long, is the lowest level and is used for transportation and drainage. No. 6, 1,400′ long, is the main transportation level.

Treatment: is mechanical concentration. All machinery is driven by electricity.

The crude ore contains 1.2% copper, and concentrates 7.4%.

Smelting: the dressed ores are silicious, containing 7.4% copper. They are classified into lump ore, small ore, fines and slime. The last three are roasted in pots, the roasted fines and fine dust are briquetted. The raw lump briquets and roasted materials are smelted in the blast-furnace, and

the resulting matte is blown to blister copper by the Japanese Mabuki process. The blast furnace is rectangular and water-jacketed, 33″x66″ at the tuyeres, and 10′ 6″ high; the diameter of the 8 tuyeres is 2½″.

Otori Copper Mines.

(Annual production, 500 tons of copper.)

These are in the village of Oizumi-mura, Higashitagawa-gōri, in Yamagata-ken. The area of the concession is 296 acres.

Geology: the ore occurs in fissure veins which traverse the Tertiary agglomeratic tuff and liparite. The Hompi is the main lode and strikes E. W., and dips 80° N. It is 1′ to 6′ wide, and 2,500′ long. Minerals are chalcopyrite and pyrite, and the gangue is quartz and rhodochrosite, both in small quantity.

Mining: Tsudo adit is 1,600′ long. The Ogiri level is 420′ above it and is 1,200′ long.

Treatment: concentration is mechanical. Crude ore carries 3.6% and the concentrates 8% copper.

Kawaiyama Mines.

(Annual production, 500 tons of copper.)

These are situated in Ikumo-mura, Abu-gōri, in Yamaguchi-ken, 20 miles N. W. of Yamaguchi. The area of the concession is about 400 acres.

Geology: the deposit is a contact metamorphic one, which is found on both sides of quartz-porphyry dyke cutting through paleozoic limestone. It is 1′ to 30′ thick, and consists of a mosaic of granite, hedenbergite, quartz, chalcopyrite, and occasionally zinc blende and galena.

Mining: there are five levels, of which the 4th is the longest, being 2,500′ long. A shaft is 350′ deep.

Treatment: the crude ore is sorted by hand. The quantity of dressed ore is 85% of the original run of mine.

Smelting: is done by blast furnaces and Mabuki hearths. The fineness of the blister is 95% copper, and 0.6 to 0.7% silver.

Kune Copper Mines.

(Annual production, 170,000 tons of copper ore.)

These are in the village of Saguma-mura, Iwata-gōri in Shizuoka-ken, and are situated on the eastern bank of the River Tenryu. The area of the concession is 3,000 acres. The mines have no concentrating mill and no reduction works, the pyritic ores being sold.

Geology: the formation is a graphitic schist and chlorite schist of the Algonkian system. The ore deposit consists of epigenetic beds of pyritic ores (copper 3-8%), which strike N. 35° E., and dip 30° to 60° N. W. The deposit contains six orebodies, the Okuhi orebody being the largest; it is 45′ to 100′ wide and 1,500′ long on the strike, and 1,500′ deep. The ore consists of pyrite and chalcopyrite with some pyrrhotite and compact granular texture. Quartz is sometimes found, and occasionally magnetite occurs in separate layers.

Mining: there are 14 levels, of which two are important. The Ogiri, 1,500′ long, is a crosscut, and is the most important transportation level. The Tsudō adit, the lowest drainage level, is 400′ below the former, and is a crosscut, for drainage and transportation. It is 9′ wide, 8′ high, and 3,000′ long at present. A shaft, with cages, 500′ below the Tsudō adit, is working at present; an other shaft with skips is under construction.

Overhead stoping is followed. According to the thickness of the bed, the stoping is done in two ways: (1) stoping in the direction of the strike, which is employed in the working places, where the bed varies 4′ to 8′ thick; and (2) stoping in the horizontal direction at right angles to the strike, which is used generally in the thicker part of the bed.

The mines produce both basic pyrite copper ore, and silicious ore, and there is also a small output of cement copper. Annual production of pyritic ore amounts to 170,000 tons, averaging 4% copper.

Transportation: the ores from the sorting house are carried by a ropeway to bins built on the bank of the River Tenryu, and then are loaded on boats and carried to the Tenryu station of the Imperial Government Railway.

Power: 2,500 h. p. is generated by water at Toyone, 5 miles N. W. of the mines.

Furokura Copper Mines.

(Annual production, 50,000 tons of copper ore.)

These are in the village of Oyu-mura, Kazuno-gōri, in Akitaken. The area of the concession is 2,322 acres.

Geology: the rocks in which the orebodies occur comprise Tertiary tuff, shale, and andesite, cut by quartz veins that traverse all of the rocks. The Hompi vein is the master lode. It strikes N. 30° to 40° E., and dips steeply N. W. or S. E. The thickness varies from 1′ to 12′, and the known length is 5,000′. In the middle part of the Hompi vein, there is a branch called the Shijunenhi vein, whose strike is N. 60° W. and dip 60° S. The chief minerals are chalcopyrite and pyrite, and the vein stuff is quartz. Micaceous hematite occurs with the quartz, and sometimes calcite is found in the druse.

Mining: the Ogiri tunnel is driven along the strike of the Hompi vein; it is 5′ wide, 7′ high, and 5,000′ long, and is the most important transportation and drainage level. The Kyushichi tunnel, 260′ above the former, is also driven on the Hompi vein for a distance of 5,000′: The Hosoji tunnel is 530′ above the lowest or Ogiri level. All levels are connected by shafts and winzes. Stoping is practiced. Excavation is by hand-drilling and by Leyner rock drill and Ingersoll stopers.

Treatment: high-grade ore is mostly screened and picked, and the low-grade ore is concentrated mechanically. The dressed ores treated are silicious, containing 5.5% copper. They are divided into lumps, grains, and sands, and are sent to the smelter of the Kosaka mines owned by Fujita & Co.

Power: gas engines of 600 h. p. are used, and a hydro-electric power plant of 1,300 h. p. is under construction.

The ores and all supplies are transported by aerial tram between the mines and the Kosaka property.

Kijo Gold Mine.

(Annual production, 2,000 tons of lead containing gold.)

This mine is in Tōdō, Kijo-gun, Heianhoku-do, in Chōsen (Korea). It is 27 miles N. E. from Sensen station of Chosen railway. All supplies are transported on horseback from the station. The concession covers 20,000 acres.

Geology: quartz veins are in gneiss, and number over 15, varying from 1′ to 20′. The principal minerals are native gold and galena, with some zinc blende and a little argentite. Iron pyrite, arsenopyrite, and chalcopyrite occur as accessory minerals.

Mining: exploitation of the deposits began in 1912, and the work soon disclosed numerous commercial gold veins and gold-lead veins. Work is proceeding on a large scale.

Smelting: the mines have a small concentrating mill and blast furnaces for experimental work. Lead ingots, containing much gold, are produced, and sent to the Amagasaki refinery.

Innai Silver Mines.

(Annual production 400,000 ounces of silver.)

These are in the town of Innai, Ogachi-gōri, in Akita-ken, and are within 3 miles of Innai station of the Imperial Government Railways. The area of the concession is over 2,613 acres.

Geology: the district consists of Tertiary tuff, tuffaceous shale, and tuffaceous sandstone, as well as liparite and andesite, the latter two intrud-

ing the Tertiary. The deposit consists of quartz veins that traverse all rocks.

Mining: the portal of the Sosuidō adit is near the concentrating mill; it is first a crosscut, and then a drift along the Hompi vein, the champion lode of the mines. It is 7,800′ long, and is used for drainage and transportaion.

No. 1 Yamaichi shaft, 4′x13′, is 1,370′ deep and develops the Hompi vein. It is equipped with an electric hoist. No. 2 Yamaichi is on the E. end of the Hompi vein, connects with the Sosuidō adit level at a depth of 300′, but it has no connection with other levels.

Ore treatment: crude ore is crushed by gravity stamps and concentrated on Wilfley tables. Concentrates and old tailings are treated by cyanidation. The former contains 1.09% (355 oz.) silver, and the latter 0.02% (6.5 oz.) silver. The cyanide plant was completed in August, 1917, and produces 400,000 oz. of silver annually.

Daira Lead Mines.

(Annual production, 600 tons of lead, 5,000 tons of zinc ore.)

These are in the village of Fujikoto, in Yamaoto-gōri, Akita-ken. The mine is 17 miles from the Futatsui station of the Ou line of the Imperial Government Railway.

Geology: the rocks include Tertiary tuff, andesite, and liparite. The quartz vein carries mainly argentiferous galena, and zinc blende. The deposit is reached by a tunnel driven along the vein.

Treatment: dressing is done by hand, mechanical crushing, screening, jigging, and flotation, and finally by an electro-magnetic separation. The lead ore is smelted here, and the zinc ore sold. The former is roasted in pots with limestone, and is reduced by charcoal in Mabuki hearths, and made into base bullion. A 400-h. p. hydro-electric power plant was erected, and a light railway connecting the mines and Futatsui station of the Government Railway has been constructed.

Coal Mines.

Name	Coal	Tons per Annum
Shiogashira, Shakanoo, Daini-Shakanovo	Bituminous	380,000
Shimoyamada	Anthracite	160,000
Shinshakanoo		60,000
Yoshima		500,000

Mizushima Smelter.

This is a customs smelter, situated on the islet Mizushima, 5 miles S. E. of the Havour Tamashima, near Okayama City. It includes pot roasters, blast furnaces, and Mabuki hearths. The blister copper is sent to Nikkō Copper Works.

Production is 3,500 tons of copper per annum.

Amagasaki Refinery.

This refinery is in the town of Amagasaki, near Osaka. Copper is refined in reverberatory furnaces. Lead ingots and silver bullion are also produced.

Annual production is 5,000 tons of refined copper, 2,000 tons of lead, and 10,000 oz. of silver bullion.

Nikko Copper Works.

The Nikkō works are at Kiyotaki, near Nikkō, and make electrolytic copper, copper wire, alloy wire, copper plates, etc.

Copper from Ashio and other mines is refined here. The plant consists of a tank house for the series system, and one for the multiple system, blue vitrol plant, refining furnaces, and slime house.

The wire plant has rolling mills for rods and plates, wire drawing mills, and brass foundry.

Gases from two cupellation and two reduction furnaces pass through a Cottrell treater to remove sulphur and arsenic.

A hydro-electric power plant at Hosoo develops 10,000 h. p.

Annual production is 30,000 tons of electrolytic copper and copper wire; 1,500,000 oz. of bullion, etc.

Honjo Copper Works.

These are at Yanagiwara-chō, Honjō-ku, Tokyo. Copper and brass sheets are produced by the mills, which are driven by electric power.

Annual production is 500 tons of copper and brass sheet.

KUHARA MINING CO., LTD. JAPAN

Head office: Osaka, Japan. F. Kuhara, pres.

Cap., 75,000,000 Yen ($37,500,000). Report for half year ended November, 1918, shows credit balance of 6,955,777 Yen, after paying dividend. Reserve funds total over 30,000,000 Yen.

Property: includes the Hitachi, the largest copper mine in Japan, and 63 others.

Refineries: Hitachi, Saganoseki, and three others. At the second named a chimney 570′ high, was built in 1918; it is 26′ inside diameter at the top, and located 1,000′ above the smelter.

Engineering works: at Hitachi and Tsukudajima.

Products: copper, gold, silver, spelter, and other minerals. (Company's electrolytic copper—Hitachi Brand—is well-known in the London market).

Kuhara Trading Co., Ltd.

Sole agent for the Kuhara Mining Co., Ltd.

U. S. offices: 26 Cortlandt St., New York City, and 309 Kohl Bldg., San Francisco.

Head office: Kobe, Japan. Branch offices are at Tokio, Osaka, London, Paris, Lyon, Rome, Berne, Port Said, Calcutta, Bombay, Singapore, Bankok, Batavia, Hongkong, Shanghai, Tientsin, and Vladivostock.

MITSUBISHI KOGYO KAISHI, LTD. (MITSUBISHI MNG. CO., LTD.) JAPAN

Head office: Maru-no-uchi, Japan.

Officers: K. Kimura, chairman; Managing directors: Y. Shigematsu, Dr. A. Nomi, I. Mitani, S. Miyoshi. Directors: Baron K. Iwasaki, S. Eguchi, K. Shimamura, H. Oishi.

Established: May 1, 1915, as successor of Metal Mining Department and Coal Mining Department of Mitsubishi Co.

Cap., 50,000,000 Yen. Company is an important producer of gold, silver, copper, tin, tungsten ore, and coal, possessing 26 metal mines and 11 coal mines, which in 1918 yielded 22,958 oz. gold, 475,481 oz. silver, 16,053,977 lb. copper, and 53,183,607 metric tons of coal.

Mitsubishi copper is marketed as electrolytic ingots branded with three diamonds, to insure identification, as it is considered to be unsurpassed in purity and electric conductivity. The larger part of the output is sold in the London market through the London branch.

Osarusawa Mines: about 22,321 acres, in Kazuno district, Akita prefecture, Japan. T. Segawa, mgr., V. Kijoto, asst. mgr. The mines are ancient, having been opened in the 8th century, but were worked for gold only until about 1650, when copper ores were developed.

Geology: ore carries chalcocite, chalcopyrite, bornite, and a little native copper, associated with pyrite, and small quantities of sphalerite, galena and hematite. Occasionally native gold is found mixed with copper ores and in a quartz fahlband, gold occurring mainly in the upper workings. Ores occur in a complicated system of interlacing fissure veins varying from less than 1′ to over 10′ thickness. Their dip is 15°, 45°, 75°; also in opposite directions. The average width is 3′, and the copper content 3 to 4%; most of ore is also high in iron pyrite. The veins, which are persistent

in strike, and workable to an average depth of 500′, traverse tertiary shales and tuffs, with intrusive augite-andesite and liparite.

Development: is by 8 working shafts and 12 main tunnels, with upward of 17 miles of workings.

Equipment: includes electrical installations aggregating 3,300 h. p. Working forces average 2,400 persons. The reduction plant has two 40-ton water-jacket blast furnaces, with a 250-h. p. electric plant, turning out blister copper of 98% tenor, sent to the Osaka electric refinery.

During 1200 years of operation, these mines have produced immense quantities of copper, gold and silver. Recent production is as follows:

Year	Gold, oz.	Silver, oz.	Copper, lb.
1918	862	37,267	5,407,820
1917	633	46,022	5,835,561
1916	640	33,920	5,046,122
1915	550	29,950	4,161,426
1914	390	31,010	4,824,936
1913	320	32,740	4,647,486

Ore production is 16,700 tons per month.

Arakawa Mine: about 5,176 acres, at Arakawa-mura, Sempoku district, Akita prefecture, Japan. H. Abe, mgr.; T. Otsubo, asst. mgr. The mine is connected with Sakai station on the railway by a 7-mile tram.

Geology: country rocks are Tertiary volcanic sediments and crystalline rock, including augite-andesite, liparite, and propylite, carrying 10 parallel veins in propylite, with strike approximately N. E. and S. W., and workable for 1,000′ to 4,000′ along their course. Ore consists of chalcopyrite and quartz with a little pyrite, galena, and blende. Oxide ores, mixed with sulphides, averaging about 2% copper, extend to 500′ below the surface.

Development: by 5 shafts, 300′ to 600′ deep, and numerous tunnels. The deepest working is at 800′ in the lower tunnel.

Equipment: includes 5 power houses, with aggregate of 4,000 h. p. About 1,400 persons are employed.

Production: is 5,000 tons of ore per month. Including the Hisaichi mine, the yield has been as follows:

Year	Gold, oz.	Silver, oz.	Copper, lb.
1918	136	23,130	2,532,467
1917	152	40,735	3,420,244
1916	75	28,000	2,391,087
1915	30	36,400	2,914,216
1914	50	34,520	3,755,182
1913	80	32,230	3,990,595

Omodani Mine: area 2,878 acres, at Kamianama-mura, Ono, district, Fukui prefecture, Japan, 50 miles S. of the railway at Fukui, and 27 miles from Ono-machi.

This property, opened A. D. 1,350, has numerous small veins, none of which exceed 3′ in width, impregnating sandstones and altered quartz porphyry. The ores carry bornite, chalcopyrite, sphalerite, and galena, all argentiferous, also some native silver. Four larger veins, up to 10′ in width, showing low-grade ore, are also worked. Ores average about 6% copper and 72 oz. silver per ton.

Development: by a shaft with 5 levels, the longest 12,110′, and all aggregating 58,380′ in length, with 23,750′ of track. Hydro-electric power is used.

Production: is about 3,878 tons of ore per month.

Year	Gold, oz.	Silver, oz.	Copper, lb.
1918	63	44,820	562,247
1917	509	86,017	1,001,168
1916	800	116,600	1,115,646
1915	1,000	129,310	987,742
1914	600	103,960	915,116
1913	320	79,640	650,185

Ikuno Mine: area 6,213 acres, at Ikuno Machi, Hyogo prefecture, Japan. G. Tajuchi, mgr., R. Kamada and C. Kato, asst. mgrs. The principal mines of this group are the Tasei, Kanagase, Akenobe and Kasei. There are 4 smaller ones.

Geology: the Tasei has a 14′ main vein with numerous branches in quartz porphyry and altered andesite tuffs. The ores carry native gold and silver, together with chalcopyrite, galena, zinc-blende, and pyrite. This vein is notable for its silver content, and has been the mainstay of the mine for centuries, giving it the name of "Silver Mine of Ikuno."

Production: copper is shipped in slabs carrying 96.83% copper, 0.0072% gold, and 0.4742% silver. Output for the past 6 years follows:

Year	Gold, oz.	Silver, oz.	Copper, lb.	Tin, lb.
1918	2,007	168,147	4,930,918	.....
1917	1,184	196,175	6,138,172	.....
1916	2,140	249,000	5,486,119	553,275
1915	2,110	223,200	5,219,481	684,069
1914	2,600	240,200	4,749,880	164,777
1913	3,200	258,900	3,870,311	41,072

Kanagase Mine: near the Tasei, has many veins in quartz trachyte, three of them being workable. The property is traversed by several andesite dikes, with fault dislocation of the veins along the dikes. The chief copper vein is 8′ to 10′, runs N. S., dips 60 to 80° E., and is 10,000′ long. The ore carries native copper, bornite, chalcopyrite, and tetrahedrite. Two other veins now being worked are 3′ to 9′ thick, nearly vertical, minable for 2,000′, and contain argentite, sphalerite, galena, ruby silver, and stibnite, besides copper sulphides.

The Akenobe mine has numerous copper and tin-bearing veins in Paleozoic slate, scattered along the Akenobe river. Eleven veins are worked, varying from 3′ to 4′ wide. Ores carry chalcopyrite, bornite, cassiterite, wolframite, and blende also.

The Kasei mine shows hornblende gneiss, cut by rhyolite and porphyry dikes with fissure veins carrying silver sulphides associated with chalcopyrite and native silver.

Equipment: includes steam, water, and electric power plant.

Yoshioka Mine: area 3,137 acres, at Fukiyamachi, a small town in Kawakami district, Okayama prefecture, 33 miles from Tatami, on the railway. M. Yamashita, mgr.

Geology: slates, sandstones, and phyllites are cut by porphyry and quartz porphyry. The ore deposit is divided into two parts, one in the sedimentary beds, increasing in richness with depth; the other an impregnation in metamorphic slates in an igneous contact zone. The former shows veins of erratic width, in the form of a stockwerk. Ore is chiefly chalcopyrite, with some pyrite, arsenopyrite, pyrrhotite, galena, and blende with a quartz gangue, and averages 3 to 8% copper.

Development: the mine has a 360′ shaft, with 9 levels, and a 375′ blind shaft. Total openings amount to 28 miles.

Production: 7,000 tons of ore annually. The output for the past 6 years was as follows:

Year	Gold, oz	Silver, oz.	Copper, lb.
1918	144	41,624	1,299,356
1917	158	60,608	1,749,627
1916	120	63,200	1,607,312
1915	130	64,500	1,608,555
1914	130	61,790	1,741,342
1913	130	61,250	1,519,989

Makimine Mine: area 1,388 acres, at Kitakata village, Higashi-Usuki district, Miyazaki prefecture, Japan. It is far away from railway lines, but in a well traveled region. It is accessible by steamer up the Gokase river to Tomi.

Geology: country rock is slate with interbedded standstone, and a capping of lava from the Aso volcano. These rocks are cut by veins of small size, carrying lenticular ore shoots of pyrite, averaging 5% copper, the ore shading into pyrite and lievrite. There are 11 main veins, whose orebodies are from 10′ to 20′ wide, though averaging but 1′ to 7′, and are 30′ to 300′ long.

Development: is by tunnels at 50′ to 60′ intervals, with inclined winzes of 310′ and 1,000′, and a vertical 240′ winze. Workings aggregate 23,300′.

Equipment: is hydro-electric.

Production: for past 6 years was as follows:

Year	Gold, oz	Silver, oz.	Copper, lb.
1918	597	3,735	853,505
1917	644	8,325	1,573,300
1916	630	8,350	2,121,223
1915	627	8,100	2,415,395
1914	618	7,740	2,103,181
1913	615	6,430	1,515,903

Naoshima Smelter: is on an islet called Naoshima, 1½ hours from Okayama City by train and boat. This smelter is divided into two departments—one smelting copper ore, the other lead ore. The copper department includes MacDougall furnaces, reverberatory furnaces, and converters; the lead department includes preliminary roasting furnaces, pots, blast furnaces, softening reverberatory furnaces, Park's pans, refining reverberatory furnaces, distillation furnaces, and cupellation furnaces. Furnace gases are treated by 5 units of electric precipitation apparatus. The blister copper and bullion are sent to Osaka Refinery.

Osaka Refinery: at Shinkawasaki-machi, Kita-ku, Osaka, adjoining the Imperial Mint, S. Namura, mgr. The works cover 12 acres and employ about 350 people. It includes 15 reverberatory furnaces, turning out anodes of 97 to 99% purity for conversion into electrolytic copper, cathodes assaying 99.89% copper, 0.0037% silver, 0.014% lead, 0.01% arsenic, and a trace of sulphur. Gold and silver slime yielded by electrolytic separation are washed and dried preparatory to roasting in a small muffle furnace. They are then leached with the waste solution of the refinery to dispose of the remaining copper, the residue being mixed with lead and cupelled. Blister copper produced by all Mitsubishi mines is refined here. Output is as follows:

Year	Gold, oz.	Silver, oz.	Copper, lb.
1918	26,301	690,451	23,976,397
1917	44,907	895,481	38,003,388
1916	60,500	1,099,960	42,574,255
1915	83,900	975,360	38,347,366
1914	71,190	982,630	36,327,107
1913	87,830	985,440	35,972,521

The Mitsubishi is one of the 5 large mining companies operating in Japan, and, like the others, is exceptionally progressive. Success has not

been won by the possession of mines of exceptional value, though the company has some excellent properties, but rather by the utilization of the most modern methods and appliances in mining and metallurgy, directed by the best technical skill available.

MITSUI MINING CO., LTD. **JAPAN**

Head office: No. 1 Surugacho, Nihombashiku, Tokyo, Japan. **New York office:** 65 Broadway, New York.

Directors: Gennosuke Mitsui, pres.; with Genyemon Mitsui, Dr. Naoya Yamada, Dr. Tamaki Makita, Dr. Buntaro Yamada, Dr. Heinojo Ueki, Kenzaburo Iwata, Dr. Takuma Dan, Kikusaburo Fukui, and Kwan-ichi Okamoto. **Auditors:** Jutaro Mitsui, Shogoro Hatano, and Tomojiro Ono.

Cap., 50,000,000 yen paid up.

Property: the Miike, Tagawa, Yamano, Hondo, Noborikawa, Sunagawa, Kushiro, and Kawakami coal mines; the Kamioka, Kushikino, and Kongo metal mines; the Iwaonobori sulphur mine; zinc refinery, by-product coke and gas power plant and dye manufactory. The Kamioka smelter is in the heart of a sericulture district and in order to prevent fumes and dust from damaging the mulberry trees and silkworms, a 3-unit Cottrell treater handles gases from the furnaces. Dust from the precipitator carries 1.13% free sulphur and 19.65% arsenic.

Production: in 1918 was 3,696,000 tons coal, 31,000 oz. gold, 657,000 oz. silver, 41,000 lb. copper, 5,750 tons lead, 10,400 tons zinc, 15,700 lb. arsenic, 94 tons tungsten ore, and 7,000 tons sulphur, also 114,000 tons coke, 1,300 tons sulphate of ammonia, several kinds of oil, intermediates, dye-stuffs, and chemicals.

SUMITOMO COPPER CO. **JAPAN**

Offices: Kitahama, 5 chrome, Higashi, Osaka, Japan. Kobe, Japan (shipping department); Niihama, Iyo, Japan (mine).

Directors: M. Suzuki, K. Nackada, K. Yukawa, M. Kubo, C. Kusaka, M. Ozura, and Y. Yamashita, two latter being managers.

Company owns the various mines and smelters described below, and other properties comprising 3 claims, 6,353 acres, besides a 5-acre mill-site, 33,452 acres timber lands, and 575 acres miscellaneous lands, are in the Besshi district. The Besshi mine proper, on Besshi mountain, 4,400′ in height, has an area of 209 acres. The timber lands carry large plantations of fir, set out yearly since 1879, which have now become available for mine timber, 15 to 20 years growth being required. Water supply is taken from the Kokuriu river.

The Besshi Mine.

The Besshi mine is situated near Kobe, 10 miles from the sea and 4,000′ above it. It has been in the possession of the Sumitomo family for more than 200 years, being successfully worked by native methods until 1874. In that year modern methods of mining were adopted and the property is now the second largest mine in Japan.

Geology: the Besshi copper deposit is a bedded vein occurring in crystalline schists considered to be of Archæn age and characterized by chloritic and graphitic schists with serpentinized dike rocks in the hanging country. The ore deposit itself is a vein of crushed quartz schist conformable in strike and dip to the enclosing rocks, but broken when they were folded. The vein is traceable for 6,000′ and has an ore shoot which is 5,000′ long, 2 to 25′ and averaging 7′ thick, that has been developed to a depth of 2,150′ without decreasing in size or value. The ore is a mixture of chalcopyrite and pyrite interbanded with schist and carries from 3 to 4% copper, singularly free from other metals, the smelter product selling at Lake Superior copper prices, without electrolytic refining. Numerous parallel E.-W. step-faults throw the orebody 10 to 20′ and rarely 50′.

Development: consists of an inclined shaft, 1,700′ deep on the dip, with various adits driven to connect the workings with the surface. The main working level has been the third adit, a haulage and drainage way, 10x11′ in section and 6,000′ long. This adit carries a stream through the mountain

which has a fall of 1,800′ after leaving the mine and generates 6,000 kw. The latest work is a fourth adit, 16,000′ long, from Hateba, the end of the private railway conveying ore from the mine to the sea. A shaft 16′ in diameter and 1,875′ deep was sunk vertically from No. 3, or main working tunnel, to meet the new level. Work in the tunnel was advanced at the rate of 200′ per month.

The orebody is worked by ordinary overhand methods and the output is sorted at the surface into lump ore, constituting 70% of the product, fines 20% and waste 10%.

The mine has 9 main levels with largest production from the 6th and 7th levels. There is a system of natural ventilation by which warm air from the valley entering through the Tonaru tunnel escapes through the mouth of the Toyen shaft, near the crest of the mountains, the air current being regulated by brattices. The mine has 61,268′ of workings, with about 2,500,000 tons of ore blocked out for stoping. The mine is well timbered, with a tram line on each level, and ore is blasted with guncotton, a little dynamite and occasional gunpowder. Electric pumps force water from the lower workings to a large sump on the 8th level, whence it is discharged through the Tonaru tunnel which is lighted throughout by electricity and has the terminal station of an aerial tram at its portal.

The **Nishinokawa mine** is at Oboki-mura, Nu-gori, Iyo, Japan. This property shows quartz-schists with lenses of 3 to 12′ width carrying chalcopyrite ore with 3 to 4% copper, associated with sphalerite, pyrite, magnetite and hematite, with quartz gangue. The mine employs an average of 225 men.

Mining equipment includes a 1,000-h. p. electric installation having three 200-h. p. electric hoists, good for 1,200′ depth each, with three 120-h. p. Rand, two 120-h. p. and one 75-h. p. Leyner, and one 50-h. p. Schramm air compressors. As ore extraction is mainly through No. 3 tunnel, no exceptionally powerful machinery is required.

The concentrator at the mouth of the Tonaru tunnel is of 700 tons daily capacity, equipment including 2 Blake crushers, 4 belt conveyors and 4 trommels, ore being assorted mainly by hand labor.

Owing to complaints by farmers of damage from copper-laden waters, a cementation plant was installed several years ago, and considerable copper is precipitated on scrap iron and coke, the production of 80% cement copper amounting to upwards of 200 tons yearly.

A 3,600-meter Bleichert aerial tram leads from the mill and tunnel to the railway at Hateba, this having a longest span of 600 meters, with an hourly capacity of 90 tons at an average speed of 2.5′ per second. Hateba is the terminus of a railway running to Niihama, the nearest port. The connections between the mine and shipping wharf include about 2 miles of aerial tram and several miles of railway. The mine also has 3 aerial trams of 2,276′, 5,200′ and 5,178′ lengths, respectively.

The company owns 2 private railways of 9.73 miles aggregate length, with 30″ gauge, rolling stock including 10 locomotives, 10 box cars and 184 ore cars.

The company operates 3 electric plants, 2 driven by steam and 1 by water. The steam plant at the mine and hydro-electric plant at Otoshi, on the Kokuriu river, distribute electric energy to the mine, mill and shops, while the steam-electric plant at Shisaka furnishes power to the smelter.

The general shops at Niihama, about midway between the mine and smelter, include a foundry making castings up to 5 tons in weight, extensive carpenter shoops, machine shops, boiler shops and smithies, these works not only making ordinary repairs, but turning out a large part of the machinery and castings used at the mines, works and smelter.

The Besshi smelter formerly was at Niihama, but owing to serious damage to neighboring farmers from smelter fumes, was transferred 1906, to the Island of Shisakajima, 12 miles from Niihama, only the general shops remaining at the old smelter site.

The **Shisakajima smelter,** 20 miles from the mine, built at a cost of about 4,000,000 yen, is thoroughly modern in design and equipment. Ore is received from barges, strings of 10 being towed by tugs 10 miles and unloaded by a 20-ton crane, into cars operated in counterbalance, on an incline leading to the top of the works, which are laid out in 7 terraces, gravity being used throughout for the flow of material.

The smelter handles 600 metric tons daily of ore containing 30 to 33% sulphur mixed with 7% gneiss as flux and 4 to 5% coke. The fines are nodularized with flux and water in a revolving conical wooden cylinder and afterwards pot-roasted in Nakamura roasting pots. The sintered ore, with lump ore and coke, is fed to the first blast furnaces which make a 20% matte and an 0.2% slag. This first matte is smelted a second time, making 33% matte and 0.3% slag.

The furnace building has four 160-ton 39x192" blast furnaces, of part water-jacket type for ordinary or pyritic smelting, and a 400-ton 48x288" blast furnace for pyrite smelting. There are four 37-metric ton circular blast furnaces, each with a corresponding light reverberatory forehearth, with blast, for smelting roasted matte and making blister copper. There are two 15-metric ton reverberatories for refining, 1 being used as a spare, and 4 sets of Mabuki hearths, using an old Japanese process, improved by the Sumitomo Co., for the conversion of matte, these having a daily capacity of 32 tons of roasted matte each, 1 being held as a spare. Barren quartz pebbles are used for fluxing. No custom smelting is done. The product is blister copper averaging 99.8% in copper tenor, carrying traces of silver and gold. About 20% of the product is sent to the Osaka rolling mill, owned by the Sumitomo family, and the greater part of the remainder is sent to Kobe, whence exported, mainly to Europe.

The smelter power plant has 3 No. 4 and 3 No. 6 Connersville blowers, and blast for the 4x24' pyritic furnace is furnished by a Curtis steam engine, direct-connected to a turbo-blower that delivers 750 cu. ft. per minute of free air, compressed to 1.24 atmospheres normally, with a maximum absolute pressure of 1.34 atmospheres. Steam for the turbo-blower is furnished at 200 lbs. initial pressure by a Babcock & Wilcox boiler. There is an air compressor for converter blast.

Fuel is coal at the mine, and coal, coke, and waste gases from coke ovens at the smelter, coal being used for the reverberatories and reverberatory forehearths, with coal and wood employed for the roast stalls. Fuel costs are 4.2 and 4.7 yen per long ton for coal, according to grade, and 8.46 to 21 yen for coke, yearly consumption being estimated by the management to average 9.333 long tons of coal and coke. The company has a coking plant at Niihama with 72 brick kilns, having a daily capacity of about 55 tons, using coal from the Keeki mine at Kiushiu.

The company owns a very extensive fleet of vessels, including 2 steamers for passengers and package freight, 1 steamer for carriage of coal, and 81 sailing vessels, with 20 sailing vessels held under charter. The company operates a passenger line, with a steamer plying between Niihama and Kobe, a distance of 125 miles.

The Besshi mine employs about 3.000 and the various enterprises of the company employ about 4,800 hands. The miscellaneous enterprises in connection with the Besshi mine are very extensive, including a large number of warehouses and stores, and a branch of the Sumitomo bank at Niihama. The company maintains a main hospital, with 4 branches, and supports 5 elementary schools for the children of employees.

Production: of the Besshi mine is about 20,000,000 lb. copper annually, at an estimated cost of between 9 and 10 cts. per pound for finished copper.

KOREA.

CHOSEN GOLD MINES, LTD. KOREA

Operations ceased at end of 1916. See Vol. XIII of this book for detail of organization, etc.

HUCHANG MINING CO. KOREA

Address: Koshagun, Hejanhokudo, Japan.

Inc. 1917, in Japan. **Cap.**, 4,000,000 Yen.

Property: in northern part of Chosen, not far from the Yabu river, contains a large deposit of copper ore on which mining operations were started late in 1918.

ORIENTAL CONSOLIDATED MINING CO. KOREA

Office: 15 Broad St., New York. **Mines and works:** Unsan district, Korea, Asia.

Officers: H. C. Perkins, pres.; Leigh Hunt, v. p.; Frederic Bull, 2nd v. p.-treas.; L. T. Haggin, 3rd v. p.; with Ogden Mills, J. S. Fassett, Wm. P. Palmer and H. F. Meserve, directors. George Kennaby, sec.

Officers in Korea: Alf. Welhaven, gen. mgr.; Thos. W. Van Ess, asst. gen. mgr.; C. A. Crispin, auditor; A. B. Palmer, cashier; E. S. Barstow, supt. of transportation; J. B. Lower, supt. of Tabowie, etc.; J. A. Vernon, asst. supt. of Chintui, etc.; E. H. Emerson, elec. engr.; W. H. Aldridge, mech. engr.; K. F. Hoefle, supt. of fuel and timber railway; E. L. Power, medical officer; S. E. Iijima, sec. to gen. mgr.; W. D. Townsend, agent, Chemulpo.

Inc. Sept. 29, 1897, in West Virginia, to operate mining concessions in Korea. **Cap.**, $5,000,000; outstanding $4,293,900, and the balance is owned by the company; shares $10 par. No bonded debt. Stock transferred and dividends paid at 15 Broad St., New York. Listed on London Stock Exchange.

Comparative General Balance Sheet, years ended June 30:

Assets.

	Mines & Prop.	Cash	Supplies	Misc.	Total
1919.....	$5,085,147	$431,480	$477,752	$180,711	$6,175,090
1918.....	3,569,234	531,114	453,514	233,115	4,786,977
1917.....	3,743,900	432,534	398,938	10,826	4,586,198
1916.....	3,893,900	401,490	381,922	13,774	4,691,088
1915.....	4,043,900	463,410	266,688	19,109	4,793,107
1914.....	4,043,900	512,781	356,085	69,301	4,982,067

Liabilities.

	Capital Stock	Sundry Creditors	Surplus Profit on Hand	Total
1919.....	$4,293,900	$51,570	$83,950	$6,175,090
1918.....	4,293,900	83,624	409,453	4,786,977
1917.....	4,293,900	61,615	230,684	4,586,198
1916.....	4,293,900	66,435	330,753	4,691,088
1915.....	4,293,900	52,189	447,018	4,793,107
1914.....	4,293,900	42,465	645,702	4,982,067

Comparative Income Account:

	Total Income.	Costs— Mine.	Costs— Mill.	Conc't. Exp's.	Other Exp's.	Total Exp's.	Divid's.	Surplus for year.
1919.....	$1,282,086	$496,064	$154,375	$53,813	$448,994†	$842,978	.....	$128,841
1918.....	1,528,525	555,657	153,615	63,868	361,922**	1,135,060	$214,695	393,464
1917.....	1,602,597	547,338	139,995	61,669	126,378	875,380	644,085	83,131
1916.....	1,636,299	554,535	144,670	60,082	141,831	901,118	644,085	677,820
1915.....	1,672,487	569,872	143,603	62,474	236,442	1,012,391	858,780	198,684*
1914.....	1,731,473	596,189	167,219	96,845	248,439	1,108,692	644,085	21,304*
1913.....	1,661,476	610,212	168,657	107,392	203,831	1,090,091	429,390	141,994
1912.....	1,562,110	520,136	161,825	65,500	162,122	909,583	429,390	223,137

* Deficit. ** Includes $174,666 for depreciation and depletion. † Includes $310,267 for depreciation and depletion.

Dividends: in recent years, 1903, $1.25; 1904, 1905 and 1906, $1 each; 1907, 60c.; 1908, $1.50; 1909, $1.15; 1910, $1; 1911, $1.50; 1912, $1; 1913 and 1914, $1.50; 1915, $2; 1916, $1.50; 1917, 50c.; 1918, 25c.; and 25c. in 1919-'20, making a total of $19 per share, or 190%, or $8,045,993.

Property: a concession covering 400 sq. miles, including a number of gold mines in the Unsan district in the northwestern part of Korea, described by Evans and Heofle in "Min. & Sci. Press" of March 29, 1919.

Geology: the region shows granite rocks cut by erosion into a high and rugged mountainous area. The lodes are typical fissure veins varying from 20′ to 140′ wide, and of unusual persistence downward, but are broken by intense crushing and faulting. The vein quartz contains pyrite, galena, sphalerite, gold, and a little silver. A predominance of galena is generally accompanied by an increase in gold, but free gold is rarely seen. Graphite is distributed in small quantity through the ore.

Development: the following tables summarize mining operations:

Tabowie Mine.

	1919	1918	1917
Deepest shaft, feet	.....	2,600	.....
New work, feet	10,488	11,510	13,092
General results	Discouraging	Unsatisfactory	Fairly Satisf't'y
Ore reserves, tons	441,000	485,000	550,000
Value per ton	$5.44	$5.70	$6.00
Ore mined in year, tons	127,122	122,106	132,441
Value per ton	$6.57	$6.56	$6.29
Cost of mining per ton	2.08	1.86	1.79

Taracol Mine.

	1919	1918	1917
Deepest shaft, feet	.....	1,942	1,615
New work, feet	.....	13,156	11,719
General results	Good	Encouraging	Satisfactory
Ore reserves, tons	260,000	238,000	220,000
Value per ton	$4.54	$4.54	$4.20
Ore mined in year, tons	107,401	101,617	103,097
Value per ton	$4.53	$4.73	$4.80
Cost of mining, per ton	1.70	1.67	1.46

Tongkol Mine.

Deepest shaft, feet	.....	.....	.....
New work, feet	.....	5,489	5,110
General results	Fair	Fair	Satisfactory
Ore reserves, tons	5,500	7,000	8,000
Value per ton	$10.18	$8.00	$8.00
Ore mined in year, tons	4,443	8,040	8,412
Value per ton	$16.50	$10.62	$10.34
Cost of mining per ton	$5.61	$4.00	$4.14

Chintui Mine.

Deepest shaft, feet	.....	1,085	981
New work, feet	.....	4,535	2,822
General results	.....	Satisfactory	Encouraging
Ore reserves, tons	32,500	35,000	30,000
Value per ton	$4.33	$4.17	$4.00
Ore mined in year, tons	11,902	23,881	28,140
Value per ton	$4.03	$4.63	$4.93
Cost of mining per ton	$1.96	$2.01	$1.76

Reserves in all the mines are 779,000 tons, worth $5.22 per ton.

Extensive prospecting is carried on continuously on the concession, 1,443′ of work being done in 1917; 1,226′ and 3,323′ of ditching in 1918, and 9,354′ in 1919. This cost $1.15 per foot.

Mining methods vary somewhat, but overhead stoping, with or without timber, is the general practice. Large stoping widths, soft walls, and slipping of backs along graphitic seams in the quartz requires square-sets. As waste and dike matter are mixed with the ore, sorting is necessary.

Equipment: includes 20-mile narrow-guage timber tramway, 22½-mill transmission line; sawmill and wood-working shop; 2 hydro-electric power plants of about 2,500-h. p., the second one (the Suribong), finished in October, 1919, at cost of over $400,000; mine fans, pumps, compressors, and hoists; tool-shop; machine-shop and foundry; 3 stamp mills, containing 80, 80, and 40 head, respectively, also amalgamating plates and amalgamators, vanners, classifiers, and canvas tables; concentrate treatment plant; refinery; assay-office; living quarters, medical and surgical department; and an afforestation department, which has planted 869,025 trees (mostly larch, acacia, and red pine) since 1913.

Production, years ending June 30:

Year	Tons Crushed	Per Ton — Yield	Per Ton — Costs	Year	Tons Crushed	Per Ton — Yield	Per Ton — Costs
1909.....	296,417	$4.80	$2.72	1914.....	301,162	$5.60	$3.68
1910.....	320,707	4.40	2.43	1915.....	297,889	5.45	3.40
1911.....	344,097	4.37	2.45	1916.....	309,730	6.04	2.90
1912.....	323,703	4.76	2.68	1917.....	317,601	5.94	2.76
1913.....	313,701	5.19	3.25	1918.....	303,672	5.90	3.06
				1919.....	250,868	5.84	3.36

Total production to June 30, 1919, was 5,017,138 tons of ore, valued at $30,888,065, of which $8,045,993 was distributed as dividends.

Company's operations are extensive and ably conducted. Geological conditions are carefully studied, and while one of the mines is almost exhausted, the others maintain ore reserves. The native labor problem has been solved without serious perplexities, mainly by a close study of Korean adaptability and industry. Altogether a highly profitable concern, operating on low-grade ore at low cost. Results are given with commendable detail and frankness.

SEOUL MINING CO. **KOREA**

Offices: First National Bank Bldg., Denver, Colo.; 57 Post St., San Francisco; 3 Buckingham Gate, London, S. W. 1, England; and Seoul, Korea. Corporate office: Deep River, Conn.

Officers: H. Collbran, pres.; H. R. Bostwick, v. p.; S. L. Selden, 2nd v. p. and gen. counsel; H. E. Collbran, sec.-treas., with A. Coors, F. B. Lawson, and A. H. Collbran.

Staff: A. R. Weigall, cons. eng. and gen. mgr.; B. V. Barton, acting supt. Suan mine and supt. of general development on the Concession; James Williams, Suan mine foreman; H. B. Fields, Suan mill foreman; Alex McFarlane, Tul Mi Chung mine foreman; E. L. Blackwell, Tul Mi Chung mill foreman; W. G. B. Boydell, supt. of ore estimation and surveying; J. H. Woolf, asst. to foreman; K. I. Yun, in charge of Tong Ahm; H. T. Matson, in charge of Kung Kol and Peh Jai; W. W. Barnett, chemist and assayer; C. S. Crowe, millwright and mechanical foreman; Baron H. Maki, cons. elect. eng.; S. Ishikuma, supt. of elect. power; F. A. Smith, in charge of Nau Chauri, W. H. Minford, medical officer; G. C. Cranor, accountant, F. A. Oldis, auditor.

Inc. April 27, 1908, in Connecticut. **Cap.,** $500,000; shares $25 par; issued 22,545 shares. **Notes:** coupon and supplementary note issues, $624,-625. Bankers' Trust Co. of New York, registrar. H. C. Ellis, Denver, transfer agent. Annual meeting, third Monday in October.

Balance Sheet, years ending December 31:

Assets.

Year	Property	Ore reserves	Stores	Concentrates	Cash	Total
1918.....	$1,516,658	$347,109	$241,533	$422,078	$628,458	$3,155,837
1917.....	1,571,654	717,487	297,719	149,188	876,973	3,613,021

Liabilities.

	Capital	Notes	Reserves	Profit & loss account	Surplus from ore reserves	Creditors	Total
1918.....	$563,625	$624,625	$1,154,500	$190,914	$347,109	$275,063	$3,155,837
1917.....	522,000	890,000	988,000	293,257	717,487	.....	3,613,021

Income Account.

	Sale of Products, etc.	Operating Charges	Interest, Royalties, Depreciation	Profit	Dividends
1918.....	$1,404,685	$787,436	$1,231,672	$173,013	$140,906
1917.....	1,698,418	1,029,624	338,268	330,526	255,500

Dividends: have been 25% in 1910; 50% yearly from 1911 to 1917, inclusive.

Property: a lease on the Suan concession, granted Nov. 4, 1905, to the Korean Syndicate, comprising 59,000 acres, about 55 miles E. from Pyeng Yang. The concession carries full rights to examine, develop and operate all mines and deposits contained within the area covered by the grant. Company also has permission to cut timber and to use all the water required for mining, milling and other purposes from sources within, or adjacent to, the district. These privileges are given for a royalty of 1% on the gross value of the output of the mines. There is an additional annual tax of about 30 cents per acre (50 sen for each 1,000 tsubo), on all land actually selected for mining operations, such selections being made by December, 1916.

The rights in this concession are secured to the Seoul Mining Co. by an agreement made with the Korean Syndicate which provides for the payment of 8% royalty of the actual profits derived from the concession, clear of all depreciation charges. (Royalties and taxes paid in 1918 amounted to $70,884.)

Geology: property shows both granite and limestone, the principal orebody, known as the Collbran Contact, lying between limestone and a batholith of granitoid rock. Ores carry gold, copper, tungsten and bismuth, the gold seldom being visible and rarely in coarse condition. Silver is also present, alloyed with the gold to an appreciable amount. The copper ores contain chalcopyrite, bornite and tetrahedrite, with a high gold content, a fair average probably being about 1.2% copper and $10 gold. The ore-bodies are irregular and in general parallel with the limestone-granite contact, connected more or less by generally well-defined fissures. The gangue is a highly silicious crystalline limestone, altered by contact action and containing a considerable amount of magnesia and alumina.

Development: there are 3 principal and several subsidiary mines being worked, the former being the Tong Ahm, Tul Mi Chung, and Soctarie. In 1918, 38,209′ of new work was done, and the total development is now about 200,000′.

The **Suan** mine is about exhausted. It has been an interesting mine, as the ore contained $9.20 gold, 1.15% copper, and 1.7 lb. bismuth per ton. Mining is conducted through shafts and tunnels.

Tul Mi Chung is the largest mine, and contained reserves estimated at 410,614 tons, averaging $10.12 per ton in gold, silver, and copper in 1918. The main work has been done on orebodies occurring at the junction of limestone and schist. Good ore was found at the limestone-granite contact, and possibilities in that formation are encouraging.

Tong Ahm is a new mine, and has every indication of developing into an important producer. It contains 50,424 tons of $9.02 ore.

Peh Jai is a new and promising prospect, containing 11,000 tons of $6.66 ore, which is extremely complex, containing gold, silver, copper, bismuth, and tungsten. The gangue is a heavy magnetite and garnet.

Reserves at all mines are as follows:

	Tons	Value per ton	Total Value
1918	771,575	$8.09	$6,242,833
1917	816,957	8.57	7,005,625
1916	1,206,136	....	15,014,376
1915	1,221,331	....	.....
1914	1,208,600	12.42	15,015,000
1913	633,300	12.07	7,646,000
1912	421,000	14.44	6,080,000
1911	211,400	16.55	3,499,000

The Soctarie deposit consists of an extensive band of quartzite, interbedded with limestone, of an average thickness of 25'. This band carries 0.3% tungsten as scheelite, 40 cents gold, and 0.4% copper. Reserves are estimated at 267,717 tons, worth $4.93 per ton. A great deal of experimental work has been done on this ore, locally and abroad, especially in making marketable products.

Equipment: includes steam and hydro-electric power plants, 56-mile transmission-line, complete mining machinery, 40-stamp mill at Suan mine to be enlarged to treat ore from the Soctarie mine, and 480-ton mill at the Tul Mi Chung, including regrinding, flotation, and cyanidation plants.

Production:

Year	Tons Ore	Rec'y p. t.	Cost p. t.	Profit p. t.	Total Output
1918	201,151	$9.64	$4.00	$5.64	$1,343,234
1917	215,039	7.61	3.47	4.14	1,636,923
1916	176,518	10.63	3.98	6.42	1,823,768
1915	108,078	9.35	3.94	5.11	978,383
1914	74,550	9.44	3.90	5.54	.....
1913	71,535	9.39	4.13	5.26	.....
1912	74,432	8.25	3.52	4.73	.....
1911	70,229	7.83	3.01	4.82	.....
1910	32,793	9.86	4.35	5.81	.....

This is a highly profitable company, directed by able technical men who have many problems to solve, not the least being the separation of gold, copper, and tungsten, upon which experiments have been under way for the past four years. Flotation is expected to make a good recovery. The Tul Mi Chung mill is now treating 488 tons daily of gold-copper ore and a 1,000-ton mill is planned. If 80% of the gold, copper and tungsten can be extracted from the Soctarie ore, a 1,000-ton mill will also be erected there. Company conducts extensive prospecting on its concession, following geologic examinations.

Technical operations on the Suan Concession are described by A. R. Weigall and J. F. Mitchell-Roberts in the "Min. & Sci. Press," October 11, 1919.

PHILIPPINE ISLANDS

The following is as complete a list of the metal mines in the Philippines, as can be secured. We have endeavored in vain to secure detailed information on these companies; the Benguet Cons. Mining Co. being the only company which supplied complete data on its operations.

Name	Address	Metal	Remarks
Alabat Mng. Assn., Manila	Alabat Island	Placer	Prospecting
Benguet Cons. Mng. Co.	Antamok, Mt. Province	Gold	Mining and milling.
La Riqueza Nacional.	" " "	Gold	Development.
Colorado Mng. Co...	Aroroy, Sorsogon	Gold	Mining and milling.
Syndicate Mng. Co...	" "	Gold	Mining and milling.
Keystone Mng. Co...	" "	Gold	Mill closed. Dev'g.

Name	Address	Metal	Remarks
Knight & Emberg	Aroroy, Sorsogon	Gold	Mining and milling.
Balete Mng. Co.	" "	Gold	Dev. Erecting 6-stamp mill.
Acupan Mng. Co.	Baguio, Mt. Province	Gold	Dev.
Headwaters Mine, Hagen & Reynolds.	" " "	Gold	Operating 10-stamp mill.
Camote-Clayton	" " "	Gold	Dev.
Copper King, care of Whitmarsh	" " "	Gold	Mine and 8 stamps.
Mentzer mine, G. W. Mentzer	Lubang " "	Gold	Operating 3-stamp mill.
Mambulao Dredging Co.	Mambulao, Camarines	Placer	Dredging.
San Mauricio Mng. Co.	" "	Gold	Dev. Mill idle.
Paracale Bucket Dred'g Proprietary, Ltd.	Paracale, Camarines	Gold	Dredging.
Malaquit Dred'g Co.	" "	Gold	Dredging.
Philippine Dredges Ltd.	" "	Gold	Dredging.
Binabay River Placer Co.	San Teodoro, Mindoro	Placer	Sluicing.
Cansuran Placer Co.	Surigao, Surigao	Placer	Hydraulicking.
Surigao Mng. Co.	" "	Gold	Idle.
Suyoc Mng. Co., J. Gillies	Suyoc, Mt. Province	Gold	Surface sluicing and milling.

BENGUET CONSOLIDATED MINING CO. PHILIPPINE ISLANDS

Offices: Manila, and Antamok, Benguet, P. I.

Officers: A. W. Beam, pres.; with E. A. Perkins, S. McKee, J. W. Haussermann, and J. de Ormaechea, directors.

Inc. 1901, in Philippine Islands. **Cap.**, 1,000,000 pesos; 1 pesos par; all outstanding. Shares were quoted at P2.20 ($1.10) in Manila in February, 1919.

Financial Statement, years ending December 31, in pesos (P1=50 cts.):

Assets.

Year	Mines and Property	Equipment	Supplies	Bullion in Transit	Cash, Bonds, Accounts, etc.	Total
1918..	P1,253,482	P21,170	P141,364	P124,604	P158,051	P1,682,281
1917..	1,160,346	9,077	71,692	44,106	84,986	1,370,207

Liabilities.

Year	Capital Stock	Reserve for Ore Depletion	Creditors and Taxes	Profit and Loss, Net	Total
1918.....	P1,000,000	P500,000	P24,231	P158,051	P1,682,281
1917.....	1,000,000	300,000	62,311	.....	1,370,207

Operating Account.

Year	Gold Sold	Net Profit	Dividends	Surplus
1919*.....	P418,662	P230,807	P100,000	P220,216
1918.....	895,038	542,362	250,000	158,051
1917.....	627,391	334,335	225,000	315,432

* Six months.

Dividends: initial dividend declared September, 1916, in which year 12½% was paid; 22½% in 1917; 25% in 1918, and 15% in 1919 to July 20. When construction expenses are over, larger distributions may be expected.

Property: 21 claims, 7 patented, in the Antamok valley, 7 miles from Baguio, contains a steeply dipping quartz vein containing pyrite, the ore averaging $20 per ton in gold. Orebodies are large, one reported to be 160′ wide and another one 500′ long.

Development: to depth of 475′ by tunnel, with a shaft sunk below it. Ore reserves are estimated at about 70,000 tons, equal to three years' mill supply. Each 100′ opened adds 2 years to the supply.

Equipment: includes 10-stamp cyanide mill of 100 tons daily capacity, ½-mile aerial tram and hydro-electric power. Extraction is given as 89% of the gold.

Production (1 peso = 50 cents):

Year	Ore treated, Tons	Value per ton	Extraction %	All Costs per ton
1919*.....	8,554	P51.41	92.4	P21.96
1918.....	23,539	41.32	89.0	22.78
1917.....	20,427	35.60	87.1	.....

* Six months.

So little data is obtainable from the Philippines that this report is very interesting, as it shows that the Benguet is a good mine paying a large return on the capital invested.

COLORADO MINING CO. **PHILIPPINES**

Address: Aroroy, Sorsogon, Philippine Islands.

Property: in the Aroroy district, contains 15 quartz veins, of which 7 are being developed.

The ore is in a brecciated zone, containing several quartz veins, with clay and manganese, between. No. 5 lode has been traced on surface for 1,500′. One vein is stoped for a width of 36′.

Equipment: includes mill with 20 stamps, tube mills, cyanide plant, and power plant, employing Diesel engines.

No production figures are obtainable.

KEYSTONE MINING CO. **PHILIPPINES**

Address: Aroroy, Sorsogon, P. I.

Property: in the Aroroy district, said to be closed on account of lack of ore, due to insufficient development. Mine has a stamp mill and cyanide plant.

PHILIPPINE DREDGES, LIMITED **PHILIPPINES**

Office: 31 Queen St., Melbourne, Australia; and Palmerston House, London, E. C. 2, England.

J. McWhae, chairman of board of directors; A. F. Showers, sec. in Melbourne; E. Habben, sec. in London; W. Telford, mgr.

Inc: Nov. 12, 1912, in Victoria, Australia. **Cap.,** £200,000; £1 par; 174,600 issued. **Debentures:** £46,000 at 7%, due 1919. Company controls the Paracale Bucket Dredging Co. **Dividends:** 5% in 1917; 5% in 1918.

Property: 1,103 acres of placer ground along the Paracale river, island of Luzon. The depth worked varies from 25 to 36 feet.

Equipment: includes 2 company dredges and 1 of the Paracale Company.

Production: 21,230 oz. gold from 2,027,888 cu. yd. in 1916; 17,825 oz. from 2,198,253 yd. in 1917; and 12,372 oz. from 1,832,642 yd. in 1918.

SYNDICATE MINING CO. **PHILIPPINES**

Address: Frank M. Evans, mgr., Aroroy, Masbate, P. I.

Officers: J. T. Pickett, pres.; W. J. Shaw, v. p.-treas.; Jay Parsons, sec.

Inc. in Philippines. **Cap.,** $500,000; $50 par. Annual meeting January 15.

Property. 1 mile S. of the Colorado, and 8 kilometers S. W. of Aroroy, at north end of Masbate island. Deposit is a fissure in andesite and diorite. Ore consists of quartz and calcite, and at times is charged heavily with manganese. The average value is $11 per ton in gold and silver.

Development: by 1,400 and 2,800′ tunnels, opening ground to depth of 500′, Reserves are equal to 2 years.

Equipment: includes 1,000′ gravity tram, compressor and 140-ton all-sliming cyanide mill, driven by Diesel type engines.

Production: averaged 100 tons daily during past 3 years; increased since June, 1919, to 130 tons daily.

SIAM

BANGNON VALLEY CO. **SIAM**

Address: Bangnon Valley, Renong, Siam. Controlled by Australian capital.

Property: tin-bearing land in Bangnon Valley, Renong, Siam, on which a dredge is operating. During half-year ended November 30, 1917, the boat dug 382,845 cu. yd., from which 117 tons of black tin (71% metal) was saved. The value was 18c. per yard, and cost 8c. The profit was £7,928, compared with £35,077 in year ending May 31, 1917. Regular dividends are being paid.

DEEBOOK DREDGING **SIAM**

Office: J. W. Barrett, Renong Chambers, Ringwood, Victoria, Australia.

E. T. Miles, chairman of board of directors; A. H. Miles, mgr.; H. A. Coates,, sec. at Renong, Siam; E. Habben, sec., at Palmerston House, London, E. C. 2, England.

Inc. May, 1913, in Victoria, Australia. **Cap.,** £100,000; £1 par; all issued.

During year ended May 31, 1918, profit was £18,243, plus £10,856 from previous year. After paying dividends there was a balance of £24,099 carried to 1919. Cash assets exceed liabilities by £41,172, including £24,450, value of shares in Ronpibon Extended.

Dividends: 5% in 1914; none from 1915 to 1917, and 20% in 1918.

Property: 440 acres of alluvial ground at north end of Bangnon Valley, Renong, Siam, worked by 2 dredges.

Production: 230 tons of black tin in 1917 and 235 tons in 1918.

RATRUT BASIN TIN DREDGING CO. **SIAM**

Address: G. M. Yetts, Bangnon Valley, Renong, Siam.

Property: tin-bearing ground in Siamese Malaya, worked by a dredge, which in year ended May 31, 1917, dug 492,000 yards, and saved 183 tons of black tin. Cost of working was 7.84c. per yard. Dividends are being paid.

RENONG TIN DREDGING CO., LTD. **SIAM**

Office: Guthrie & Co., 5 Whittington Ave., London, E. C. 3, England.

F. B. Lawson, chairman of board of directors; F. Nicholls, mgr.; F. W. and R. Payne, cons. engrs.

Inc. July 1, 1913, in Great Britain. **Cap.,** £135,000 in 25,000 cum. 15% pfce, (all issued), and 100,000 ord. shares (87,267 issued) of £1 par. Capital increased to £200,000 in March, 1920, 32,000 shares being given for new property.

In 1918, profit was £49,269, of which £29,930 was paid in dividends. Cash assets exceeded liabilities by £90,000. Reserves are £16,000.

Dividends: preference shares paid in full; while common received 12½% in 1915; 30% in 1916; 30% in 1917; and 10% in 1918.

Property: 460 acres of tin-bearing gravel land on the Renong and Pak Chan rivers, Siam, on which 2 dredges are working, also 1,000 acres in Selangor, Malaya, of which 650 acres contain 18 to 24′ of ground averaging 1.2 to 1.6 lb. black tin per yard. A dredge is to be erected there.

Production years ended June 30:

Year	Yardage	Black Tin	Cost per yd.
1918	2,033,357	842	10d (20c.)
1917	2,170,177	970	8d (16c.)

RONPIBON EXTENDED **SIAM**

Address: J. W. Barrett, Ringwood, Victoria, Australia.

Inc. November, 1917, in Victoria, Australia. **Cap.,** £40,000. Controlled by Deebook Dredging and Ronpibon Tin.

Property: 90 acres of tin-bearing gravel in Bangnon Valley, Renong, Siam. One dredge in operation.

RONPIBON TIN **SIAM**

Address: J. W. Barrett, Ringwood, Victoria, Australia.

Property: tin-bearing ground in Bangnon Valley, Renong, Siam. With the Deebook Dredging Co., Ronpibon is interested in Ronpibon Extended. A dredge was to be erected at last accounts.

SIAMESE TIN SYNDICATE, LTD. **SIAM**

Office: Capel House, New Broad St., London, E. C. 2, England.

W. H. P. Stevens, chairman of board of directors; C. A. Underwood, sec.; H. G. Scott, gen. mgr.; A. N. Wakefield, res. mgr.

Inc. Nov. 22, 1906, in Great Britain. **Cap.,** £200,000; £1 par; 120,000 issued.

The net profit for 1917 was £34,984, of which £30,000 was paid in dividends. Profit in 1918 was £35,652.

Dividends: 30% in 1913; 20% in 1915; 25% in 1916; 25% in 1917; and 25% in 1918.

Property: 1,730 acres of tin-bearing land at Ngow, Renong district, Siam. The new areas recently acquired contain over 30,000,000 cubic yards, carrying from 0.8 to 4 lb. of tin per yard. A cocoanut plantation is also being cultivated.

Equipment: includes 3 dredges.

Production: 798 tons of black tin in 1917, and 978 tons in 1918.

In March, 1920, a subsidiary, the Bangrin T. D. Co., was formed with capital of £170,000 to work a property 5 miles N. of Ngow, containing 16,000,000 yd. of 0.75 lb. ground.

TONGKAH HARBOUR TIN DREDGING CO. **SIAM**

Office: H. J. Wise, A. M. P. Chambers, Elizabeth St., Hobart, Tasmania.

A. H. Ashbolt, chairman of board of directors; E. T. Lewis, gen. mgr.; Alex. McEwan, sec. in Siam, with G. H. Symons.

Inc. 1906, in Tasmania. **Cap.,** £250,000; shares £1 par; 150,000 issued.

Net profit was £40,336 in 1915; £40,808 in 1916; £67,923 in 1917, and £118,920 in 1918. Current assets at end of September, 1918, totaled £98,236, and liabilities, £6,884. Profit in 1919 was £75,548.

Dividends: to September, 1919, total £550,000.

Property: 5,650 acres in Tongkah harbor, Siam, of which over 545 acres have been dredged. The dredgable material averages 1 lb. tin oxide per yard. Five boats are at work.

Production:

Years	Yardage	Tin Oxide 73% metal (tons)	Value	Cost per yard, cents
1913-'14	.....	1,126	£108,053	.....
1914-'15	2,968,600	1,262	123,260	10.19
1915-'16	3,363,750	1,077	115,000	9.27
1916-'17	3,682,550	1,188	144,845	8.80
1917-'18	3,383,250	1,314	221,651	10.04
1918-'19	3,208,350	1,149	.....	....

This is one of the most profitable mining companies in the Orient, and its annual reports give full data concerning dredging operations and costs.

SIBERIA

Under this head we have listed those companies formerly described under Russia. While several are in the Ural region, they really belong in the Asiatic section.

The following first-hand information regarding conditions that affect mining in Russia and Siberia appeared in the "Mining and Scientific Press" of October 11, 1919:

Until July 25, 1919, the plant of the Kyshtim Corporation, a notable copper and iron enterprise, was being operated by the Russian staff of the English corporation, but with the help and under the authority of the Siberian government,

i. e., the party led by the late Admiral Kolchak. For months there had been no communication with the London office, the necessary financial arrangements being provided by the Siberian government, and these operations were fairly successful, that is, they were profitable in rubles. On July 25 the Bolshevik advance made it necessary to evacuate the works, whereupon, in order to prevent the operation of the plant by the Bolsheviki, all the essential parts of machinery were removed, together with the stocks of copper, gold, and silver. Altogether 80 carloads of material was removed. At the same time 350 of the *intelligentsia*, including families, were taken to Novo Nikolaievsk, where, without food or clothing, they await the oncoming of winter. The term *intelligentsia* as used in Russia signifies the intelligent members of the community in contrast with the illiterate mob to which Bolshevism makes its appeal. Meanwhile the copper mines of the Ural region, farther west, had been abandoned likewise, as soon as the Bolshevik armies advanced from Samara to Ekaterinburg. An attempt was made, during a brief interval between one Bolshevik occupation and another, to operate the copper-gold mines of *Tanalyk*, but unsuccessfully. When these mines were evacuated, the Russian manager was able to bring with him the quicksilver and bullion on hand. Nobody was killed. Ekaterinburg was the scene of a massacre. The refugees from this old mining centre in the Ural are now scattered over Siberia and from them our informant heard that the Bolsheviki had lists prepared beforehand, by their agents in the town, of those who were unfriendly to anarchy, and upon the arrival of the Bolshevik forces more than 2,000 residents were taken from their houses and shot. Destitute and terrorized refugees from Ekaterinburg are now congregated at Barnaul, Ekibastus, and Simipalatinsk. The *Spassky* copper mine, a prominent and well established British enterprise, in the province of Akmolinsk, southeast of Kyshtim, was closed down, not by reason of Bolshevik irruption nor on account of any lack of labor, but owing to financial difficulties, the management being unable to come to an agreement with the Siberian government as to the price to be paid for the copper. No exportation, of course, was practicable; and the Government offered only 350 rubles per pood, equivalent to about 9 cents per pound of metal. The mill, for concentrating the lower-grade ore, was burnt down, accidentally, in August. Coming to the Altai country, which is southeast of Omsk, we learn that the *Ridder* mine continues to be under the protection of the Siberian government. This is true likewise of Ekibastus, where the *Irtysh Corporation* has its coal mines, as well as its lead-zinc smelter. The coal mines are being operated vigorously, 60% of the output being taken by the Siberian government for railroad use. Coal is also being supplied to the new line now being built, for military purposes, from Semipalatinsk southward to Sergiopol, near the Mongolian frontier. The remainder of the Ekibastus coal is being bartered for supplies that the management expects to find valuable later—at least, more valuable than paper rubles. The *Russian Mining Corporation* at Zmeinogorsk has been able to continue its prospecting campaign without financial assistance from the home office, in London, the revenue from trading having sufficed to meet the payroll and other necessary expenses. The *Atbasar* copper mine, which is isolated, is not being worked and probably has escaped Bolshevik sabotage. The trans-Siberian railroad was being operated successfully from Vladivostock to Omsk by the commission of American engineers under John F. Stevens. Westward from Omsk to Ekaterinburg the railroad was in the hands of a British military mission under General Jack, a man of remarkable ability as an organizer. He managed to save 95% of the rolling-stock, amounting to 25,000 cars and 500 locomotives, from Perm and Ekaterinburg at a few days' notice in July, when the Bolshevik advance was made. This advance was rapid not on account of the progress made by the revolutionary army itself but by reason of the Bolshevik propaganda, inciting riots and uprisings in the towns, in advance of military occupation.

ALTAI MINES, LTD. **SIBERIA**

Address: H. Richards, 441 Salisbury House, London, E. C. 2, England.

Inc. in Russia, in 1917, with capital of 100,000 shares of 100 rubles par,

to acquire holdings of the Russian Mining Corporation, Ltd., which now holds 20,000 of the 36,400 shares received for its property.

Property: two mining concessions in the Altai region of western Siberia, the Zmeinogorsk of 12,292 sq. miles and the Zyrianovsk of 21,195 sq. miles. Minerals have been mined here from early times and records show an output of 45,550,000 oz. silver, 30,000 tons of copper and 500,000 tons of lead up to 1866. The Zmeinogorsk mines produced silver and lead with some copper; records placing the yield at 30,000,000 oz. silver and considerable lead up to 1855. The copper district yielded 25,500 tons of copper, 7,000 tons of lead and 3,100,000 oz. silver. The Zyrianovsk property has a series of lenses of complex ores; those developed, are estimated to contain 500,000 tons, assaying 23% zinc, 11% lead, 2.6% copper, 19 oz. silver and 0.35 oz. gold per ton. The war greatly hindered exploration, but the Byelousovsk copper mine on the Zmeinogorsk concession promises well, drilling showing 3 to 6.7% copper ore for 20′ in width. Transportation is much easier than in other mining regions of Siberia.

BOGOSLOVSK MINING CO. **SIBERIA**

Address: N. T. Truschkoff, via Verknaya or Goroblagodatskaya on the Perm-Gornozavodsk railroad, Department of Perm, Russia.

Property 2 groups of copper claims, 15 by 1 mile in area, 6½ miles S. E. of Verknaya, Department of Perm, eastern slope of the Ural mountains. At last accounts, January, 1918, connection was being made with the main railway.

Geology: the mineralized belt is on the line of other deposits of copper pyrite on the eastern slope of the Urals, being a continuation of those at Kyshtim, Sissert, and Kalata. Country rock is granite and "keratophyre," a soda-felsite porphyry. The former is not productive where massive. Copper-bearing pyrite occurs as lenses in a belt of highly altered argillaceous schist, intersected by several porphyry dikes. A gossan cap, 60′ thick, is always found on top of the ore, but the outcrop is covered by 3′ to 10′ of soil and debris, the country being swampy and covered with thick forest and undergrowth. Drill holes show the depth of oxidation to be 60′. Gossan carries $3.90 to $10.28 gold per ton, and may be treated by cyanidation.

Development: by surface pits, shafts, and drill-holes, last mentioned put down from 95 to 735′. Ore reserves to a depth of 660′ amount to 3,400,000 tons, averaging 3.6% copper. At 686′ depth the lens is 50′ wide. At depth of 105′ in No. 7 Bogoslovsky shaft, ore assayed 33.5 to 43.8% sulphur, 9.2 to 26.9% silica, 27.1 to 38.0% iron, traces to 0.43% zinc, and 4.6 to 12.65% copper. A sample of 976 tons from between the 70 and 105′ levels yielded 7½% copper at the Bogoslovsky smelter, which has a capacity of 60,000 tons of pyrite ore per annum, plus other ore.

Equipment: includes hoists, 300 and 1,050 cu. ft. compressors, and reduction works to be erected.

Development commenced in 1916, but has been affected by the revolution.

IRTYSH CORPORATION, LTD. **SIBERIA**

Office: J. P. B. Webster, sec., Pinners Hall, Austin Friars, London, E. C. 2, England.

Leslie Urquhart, chairman of board of directors; H. H. Knox, cons. engr.

Inc. November 27, 1914, in England. **Cap.,** £2,000,000; shares £1 par. Debentures: £1,000,000 of 6% authorized, £500,000 issued, bonds £20 and £100 each, of which 84,140 have been converted into shares at £2 10s. each, under rights now expired, leaving a balance of £415,860 outstanding.

Company acquired the whole capital of two Russian companies the Ridder Mining and Kirgiz Mining. It was promoted by the Russo-Asiatic Corporation, which see. To January, 1918, the Irtysh had advanced £979,528 to these companies.

Property: the Ridder and other zinc-lead-copper mines in the Altai region, Western Siberia. The company also owns a coal mine producing 75,000 tons yearly.

Ore reserves: in March, 1916, reserves were estimated at 945,000 tons of sulphide ore assaying 31.2% zinc, 18.1% lead, 1.5% copper, 9.7 oz. silver and 0.47 oz. gold; also 2,229,000 tons of concentrating ore containing 6.7% zinc,

3.5% lead, 0.5% copper, 1.7 oz. silver, and 0.7 oz. gold per ton. There are 360,000 additional tons of sulphide ore carrying gold in Sokolni mine, making a total of 3,534,000 tons, containing an estimated profit-value of £13,000,000.

Equipment: first unit (50,000 tons) of a concentrating mill of 200,000 tons per annum capacity, power plant, coke plant, zinc distillation plant of 20 blocks of retorts (6 finished), lead smelter, refinery and accessories, 143-mile railway, 8 river steamers and 28 barges; also a farm to supply food to employees.

The ore is mined and treated at the Ridder property, carried 63 miles by rail, 430 miles by river, and then 80 miles by rail to the colliery and smelters.

Production: amounted to 210 tons of 99% spelter in 1916, and 333 tons in first half of 1917. A considerable tonnage of zinc and lead concentrates is on hand.

When in full operation this great property will add considerably to the world's metal output. Late in 1919, company was merged into the Russo-Asiatic Consolidated, which see.

LENA GOLDFIELDS, LTD. **SIBERIA**

Head office: H. Richards, 441 Salisbury House, London, E. C. 2, England. **Agency:** Russian Mining Corporation, Ltd., Nevsky 19, Petrograd, Russia.

Officers: Lord Harris, chairman of board of directors; C. W. Purington, cons. engr.

Inc. July 10, 1908, in England. **Cap.,** £1,405,000; shares £1 par; 1,163,297 issued. Company holds 8.85% of capital of the Lena Gold Mining Co. (Lenskoie), which see, the operating company in Russia. Ruble exchange and shareholdings make the financial situation complicated.

Financial Statement, for years ending September 30 (Sterling figured at normal exchange, £1 = 9.52 rubles):

Revenue.

	1915-'16	1916-'17	1917-'18
Cash balance on hand	£613,872	£157,983	£410,899
Lenskoie shares sold	245,635	321,722	.....
Russian 5% bonds	.....	378,731	294,118
Lenskoie dividends, 1913-'14	50,071	.....	.....
Lenskoie dividends, 1914-'15	.....	74,386	.....
Royalties, etc	16,817	.....	48,058
Interest	21,738	37,470	30,339
Premium on 246,703 Lena shares sold	.....	154,189	.....
Subscription on above shares	.....	5,000	241,703
Repayment of advances by Lenskoie	102,598	18,787	394,409
Total	£1,050,730	£1,148,268	£1,419,527

Expenditures.

	1915-'16	1916-'17	1917-'18
Advances to Lenskoie	£32,877	£396,544	.....
Dividends paid, etc	159,651	80,526	£31,092
Repayment of account loan	37,000	.....	.....
Russian 5% bonds	663,219	.....	.....
British war bonds	.....	260,300	108,000
Purchase of new Lenskoie shares	.....	.....	368,872
Sundry investments	.....	.....	49,058
Cash balance on hand	157,983	410,899	862,506
Total	£1,050,730	£1,148,268	£1,419,527

Cash assets and investments in London on September 30, 1918, were £657,195. Shares in Lenskoie were placed at 37,924,000 rubles, a tentative valuation, due to the exchange situation. Bank balance in Russia was 8,749,772 rubles. With £1 equal to 38 rubles, 46,673,772 rubles are equivalent to £1,225,624. Adding the

above cash and investments, and deducting liabilities of £83,774 net assets are £1,799,046.

Dividends: 20% in 1909-'10; 30% in 1910-'11; 20% in 1911-'12; nil in 1912-'13; 5% in 1913-'14; 1¼ rubles per share in 1914-'15, paid in April, 1916.

Property: gold placers worked since 1863, yielding over $200,000,000. There are four groups totaling 90,376 acres in the Irkutsk province of Siberia.

Development: for many years operations were on somewhat primitive lines, but modern methods are gradually being introduced, including prospecting by drilling, underground drift mining, hydraulicking, dredging and winter washing of gravel; also improved sluices, riffles, jigs, and clean-up accessories. Over 5,000 men and 800 horses are employed.

Proved reserves of gravel ore are as follows:

Class	Yards	Recoverable value per yd.	Gross profits	Years life
Drifting	711,200	39/10 ($9.46)	£456,363	1½
Dredging	58,984,000	1/7½ ($0.40)	£2,577,800	16

The calculated life of the mine is based on the old rate of extraction for drift mining, and the use of two 17 cu. ft. dredges for the other ground.

Winter washing operations were not begun until 1913; 25% of the total yardage was washed in the winter of 1914; 36½% in 1915, and 52½% in 1916.

Production, years ending September 30:

Year	Yardage	Yield per yd.	Value	Cost per yard
1916-'17	570,529	46/1 ($11.05)	£1,318,445	.....
1915-'16	788,942	39/10 ($ 9.56)	1,503,010	27/6 ($6.54)
1914-'15	974,234	38/11 ($ 9.23)	1,791,944	26/7 (6.31)
1913-'14	873,635	29/4 ($ 6.80)	1,277,609	26/10 (6.44)

This is an immense property now passing from primitive to modern methods of mining. The work has been handicapped by prejudices, complex finance, inefficient labor, a severe winter climate, and long distance from sources of supplies.

Alaskan methods are applicable in Siberia and are now being tried. As the gravel yields up to $9 per yard, there is a big margin for profit. Lena Goldfields is one of the world's greatest gold producers.

LENSKOIE COMPANY — SIBERIA

Address: H. Richards, 441 Salisbury House, London, E. C. 2, England. A. Gernet, chairman in Russia; M. Malozemoff, mine manager.

Inc. in Russia. **Cap.,** 33,000,000 rubles, increased from 11,100,000 R. in 1917 by issuing 110,000 shares of 150 R (par value) at 355 R. each. Lena Goldfields, Ltd., holds 8.85% of the Lenskoie's capital.

In 1915-'16, Lenskoie made an operating profit of £954,191. Of this, £582,479 was absorbed in writing down capital expenditures at the mines, leaving a net profit of £371,712. From this sum, £251,981 was written off for depreciation, and £78,616 for taxes, bonuses, etc., leaving £41,114 carried to special reserve.

No accounts for 1916-17 were available up to June, 1919; but for that year the gold output was valued at £1,445,014.

In November, 1917, the Bolshevik regime brought serious trouble to the Lenskoie Co. The exorbitant demands of workmen and dealers increased to 500% above pre-war prices, while labor efficiency, never satisfactory, dropped 50%. The selling price of gold was raised six times by the Government, but this was still insufficient to meet expenses. The Soviet Government then agreed to meet the loss provided the company yielded to all demands. In October, 1918, the mines were nationalized and the offices in Petrograd confiscated by the Soviet party. In June, 1918, this Government was expelled from Bodaibo, the region in which the mines are situated, and since then little news has been received. In March, 1919, only 3 drift-mines were being worked, yet these are capable of yielding 237,000 oz. of gold annually for at least 6 years. The first dredge is not expected to be operating before the spring of 1922.

For further particulars see Lena Goldfields, Ltd.

ORSK GOLDFIELDS, LTD. SIBERIA

Office: 65 Broad St. Ave., London, E. C., England. Thos. Mallinson, sec.

G. W. W. Mackinnon, chairman of board of directors; G. S. Dyer, gen. mgr.; Hooper, Speak & Co., cons. engrs.; B. K. Pavlovsky, agent at Ekaterinburg, Russia.

Inc. March 1, 1906, in Great Britain. **Cap.,** £920,000 in 531,000 ordinary £1 shares (530,907 issued), 876,000 preference shares 5s. (318,000 issued), and 170,000 priority shares, £1 (80,000 issued).

Financial Statement, years ending January 13, converted from rubles into sterling.

Year	Revenue	Expense in Siberia	Expense in London	Profit or loss	Dividends
1918	£53,010	£21,609	£37,573	—£6,171	.....
1917	55,421	31,439	37,701	—11,719	.....
1916	105,611	51,323	24,460	+26,944	£16,827

London charges include difference in exchange, a large sum.

Dividends: about £13,500 in 1915, and £16,827 in 1916; none since.

Property: 6,700 acres of alluvial ground, 50 miles N. W. of Nikolaievsk, Okotsk province, eastern Siberia. Two dredges are operated, one having 3½ and the other 7½ cu. ft. buckets. The boats work from April to November.

Production, years ended January 13:

Year	Yardage	Gold yield including tributers
1919	705,013	.....
1918	893,386	£51,426
1917	864,052	53,565
1916	784,552	97,000

The revolution in Russia has not interfered seriously with operations.

RUSSO-ASIATIC CONSOLIDATED SIBERIA

An amalgamation of the Irtysh, Kyshtim, Russo-Canadian, and Tanalyk corporations, formed late in 1919.

Office: J. P. R. Webster, sec., Pinners Hall, Austin Friars, London, England.

Inc. 1919, in England. **Cap.,** £12,000,000; £1 par. Shares to be issued in exchange for present holdings amount to £8,456,972; £3,442,838 for Irtysh; £2,520,000 for Kyshtim; £1,768,152 for Russo-Canadian, and £725,982 for Tanalyk. Shareholders in Irtysh, Kyshtim, and Tanalyk received 2 new shares for each old one held; Russo-Canadian stockholders get one new share for each preference share, and one new share for every 2 shares common held. Russo-Asiatic assumes the Irtysh and Tanalyk debentures and the Irtysh options.

RUSSO-ASIATIC CORPORATION, LTD. SIBERIA

Office: J. P. B. Webster, Pinners Hall, Austin Friars, London, E. C., England.

C. J. C. Scott, chairman of board of directors; R. G. Brown, cons. eng.; Leslie Urquhart, managing director.

Is an exploration company acquiring and developing mining properties in Russia and Siberia. In 1914 it formed the Irtysh Corporation, Ltd. (which see), to operate the Ridder Concession and Ekibastus coal field.

RUSSO-CANADIAN DEVELOPMENT CORPORATION, LTD.

Office: Basildon House, Moorgate St., London, E. C. 2, England; and Montreal, Canada.

Inc. 1917, in Canada. **Cap.,** 1,000,000 7% non-cumulative preferred, and 2,000,000 common shares; $5 par; all issued. Company organized to acquire from the Irtysh, Kyshtim, and Tanalyk Corporations all the issued capital of the Ridder, Kirgiz, Kyshtim Mining Works, and the South Urals M. & S. companies, registered in Russia; also the capital of the Mining & Metallurgical Bank, the Trading Company and the Prospecting Co. Late in 1919, company was merged with the Russo-Asiatic Consolidated, which see.

SIBERIAN PROPRIETARY MINES, LTD. SIBERIA

Office: T. Mallinson, sec., 65 Broad St. Ave., London, E. C. 2, England. E. Hooper, chairman of board of directors.

Inc. Aug. 8, 1905, in Great Britain. **Cap.**, £135,000; shares £1 par.

Company has an interest in Orsk Goldfields, Ltd., in oil companies in Europe and California, and in the Foldal Copper & Sulphur Co., Norway. Options on gold-bearing lands in Orenburg, Russia, were dropped in 1918.

SIBERIAN SYNDICATE, LTD. SIBERIA

Office: J. A. Clark, 60 London Wall, London, E. C. 2, England.

Sir A. Fell, chairman of board of directors.

Inc. June 3, 1902, in Great Britain, but reconstructed three times, last in July, 1913. **Cap.**, £100,000; shares £1 par; 52,062 issued.

Company has large interest in Russian Anthracite Collieries, Ltd.; in a copper mine in Asia Minor; copper, lead, and zinc areas in eastern Siberia, and in an oil-shale deposit.

SISSERT COMPANY, LTD. (THE) SIBERIA

Office: 1 Broad Street Place, London, E. C. 2, England.

Sir J. B. Dale, chairman of board of directors.

Inc. June 26, 1912. **Cap.**, £1,000,000; shares £1 par; issued 755,000 shares, fully paid. Shares are listed on the London Stock Exchange. An option expiring two years after peace, on 166,000 shares treasury stock has been granted. Title to property is held through the Sissert Mining District Co., Ltd., registered in Russia, which the company controls through ownership of entire share capital.

Profit in 1916 was £2,544.

Dividends: 5% in 1913 and 1914; none since.

Property: about 340,000 acres, held under a perpetual lease, in the Urals, 30 miles S. of Ekaterinburg, on the Ekaterinburg-Cheliabinsk railway. The property includes many old copper, gold, and iron mines, and extensive forests. The principal copper properties are the Degtiarsky, Polefskoy, and Gumeshevsky mines, which have been worked since 1727, and the Sysselsky, opened in 1906. There are also about 100 iron mines, yielding limonite of 40 to 53% iron content, with other mines yielding chrome and manganese. Iron ore reserves are estimated at 6,000,000 tons. The annual output of iron ore was 40,000 tons.

Development: the Sysselsky copper mine is opened by 3 shafts, deepest 245′, showing ore of about 5% copper tenor. Mine has a plant with a productive capacity of 1,500 tons per annum. Reserves are estimated at 70,000 tons of 4¼% ore.

The Gumeshevsky and Polefskoy mines, discovered in 1716 have been operated almost continuously since 1727. These mines are about 500′ deep, and up to 1870 produced a total of about 63,500,000 lb. fine copper, though only oxidized ore was mined. The orebody is a contact deposit, genetically related to augitic rocks, and lying between between limestone and augitic biotite syenites, the oxidized ore occurring in a decomposed irony and calcareous clay belt, fully 2 miles in length and about 1,000′ wide. The sulphide ores carry chalcopyrite in lenses of garnet-magnetite rock. The old ore dumps at the Gumeshevsky, consisting of clay material with fine ore that escaped hand-picking in earlier operations, were worked with excellent results. They still contain 400,000 tons. The ore has been leached at the rate of 80,000 tons yearly.

Old slag dumps at Polefskoy are also to be reworked. These dumps, estimated at 640,000 tons, are said to contain 1% copper, about 75% of which is thought to be recoverable by pyritic smelting.

Fifty drill-holes at the Degtiarsky mine showed 3,530,000 tons of 2.77% copper ore, with 3s. (72c.) gold and silver. The orebody is about 10,000′ long, 5,800′ being fully proved. Over 5,000,000 tons is ultimately expected. Two shafts to 150′, with laterals, confirm drilling results.

At the Staro Poldnefskoy and Kadnakofsky iron mines the surface is a true gossan and the underlying sulphide is certain to be copper bearing and of commercial value.

In the Krilatofsky mine, 6 miles from the Degtiarsky, are gold quartz veins

in granitic schist. Reserves to 280′ are estimated at 371,000 tons of 13s. 3d. ($3.18), and 227,000 tons of 10s. 6d. ($2.52) per ton ore. In the Blagoveshensky, near Sissert, is considerable 20s. ($4.80) gold ore. These ores will be used as a flux in reducing the copper ores.

The Degtiarsky and Sysselsky mines also contain several million tons of iron pyrite.

From the Bgorshinsky and Isyhks mines a large quantity of coal is available.

Annual production was normally 40,000 tons of iron ore, 17,500 tons of pig iron, 10,000 tons of pyrite and some coal.

In 1912 the mines produced 3,280,200 lb. of copper; 2,895,200 lb. in 1913; 2,140,600 lb. in 1914; 506,000 lb. in 1916. In the last two years operations were intermittent.

SPASSKY COPPER MINE, LTD. **SIBERIA**

Office: J. A. Clark, sec., Finsbury House, Bloomfield St., London, E. C. 2, England.

Sir A. Fell, chairman of board of directors; Ernest Carnot, v. c.; H. C. Bayldon, gen. mgr., at Spassky Zavod, Akmolinsk, Siberia; H. C. Robson, smelter supt.; D. G. Smith, supt. at Yuspenssky; C. Farmer, mine supt. of Spassky; J. R. Horsley, mgr. at Atbasar; E. T. McCarthy, cons. eng. Henry Puzely, mgr., Miasnitzskaia 17, Moscow, Russia.

Inc. July 9, 1904, in Great Britain. **Cap.**, £1,250.000; shares £1 par; 1,031,940 issued.

Statement for 1915, published November, 1916, showed a net profit of £126,-453 earned in Siberia. The remittance of funds from Russia is not permitted, so money will accumulate there. Assets included cash, £162,316; supplies, £159,-256; and metals, etc., £163,039. Creditors, etc., amounted to £100,202. No financial statement is available since.

Dividends: 15% in 1910, 17½% in 1911, 25% in 1912, 10% in 1914, declared in October, 1915. Further dividends postponed on account of revolution.

Property: in the Kirghiz Steppes, in 2 main groups, about 300 miles apart, 250 and 500 miles, respectively, from the nearest point on the Trans-Siberian railway. After the revolution the government is to construct a line that will pass near the mines.

The Spassky group, comprising about 100 sq. miles, in the Akmolinsk district, includes the Yuspenssky copper mine and the Karagandy and Saran coal mines; also lands carrying iron and limestone.

Geology: the Yuspenssky mine has a network of veins at and near the contact of slate and arcose sandstone, in sedimentaries, of Permian age. The 2 veins, known as the Annensky and Vladimir, or Yuspenssky, are about 200′ apart and substantially parallel, and it is thought they may join at depth. Principal development is on the Annensky vein, which is 10 to 60′ in width, carrying a hanging-wall paystreak of massive chalcocite, succeeded by bornite, largely massive, with silicious gangue, followed by small quantities of chalcopyrite and occasional tetrahedrite, the vein growing gradually leaner in copper toward the footwall, which is imperfectly defined and carries low-grade copper impregnations. The gangue is mainly quartz and barite, and the ore is estimated by the company to average 12 to 20% copper. The upper workings show some native copper, cuprite, azurite and malachite. The mine was gouged for rich ore by the former owners, who left a large amount of low-grade material unstoped.

Development: the Yuspenssky mine is opened by 3 shafts, the Annesky being 700′ deep. Chalcopyrite is taking the place of bornite in the enrichment zone, while the mineral contents are becoming more evenly distributed. Reserves at the end of 1915 were 10,000 tons of 19% and 429,475 tons of 7.8% ore. Considerable diamond drilling was done in 1915 and 1916, with fair results.

Equipment: includes 900-h. p. steam plant, hoists, compressors, pumps, 150-ton concentrator and smelter, 26-mile railway and quarters for employes.

The Karagandy coal mine, 24 miles by rail from the Spassky smelter, produced 90,215 tons in 1913; 80,901 in 1914, and 63,984 in 1915. It contains about 400,000,000 tons of coal.

The Atbasar group, 28½ sq. miles, 250 miles N. E. of Djousalie, the nearest

station on the Orenburg-Tashkent railway, includes the Kresto, Pokrofsky, Annensky and Nadiozhdenski mines, and a coal area of about 9 sq. miles, 65 miles from the mines.

Geology: the Atbasar shows sedimentary sandstones, shales and conglomerates, on a plateau of about 20 sq. miles, lying about 70′ above the level of the district, carrying numerous outcrops of malachite, and at depths of 50 to 70′ from surface, are found sandstone beds mainly 18″ to 8′ thick and of 3′ estimated average thickness, carrying bornite, claimed to average about 13% copper.

Development: work at Atbasar is under way and reserves were estimated at 543,900 tons of 10.7% ore.

Equipment: includes mining machinery, buildings and smelter of 6,500-ton capacity of copper per annum, this being erected between the coal and copper mines.

Production at Spassky:

Year	Ore, tons	Copper, pounds
1906	.....	1,865,690
1907	.....	3,552,570
1908	.....	3,838,235
1909	15,551	3,675,840
1910	19,647	5,540,160
1911	31,302	6,401,920
1912	28,315	8,955,520
1913 (15 months)	43,591	14,000,000
1914	20,697	10,490,000
1915	20,847	7,728,000

Operations at the Spassky have been seriously hampered by war and revolution. In April, 1918, the Bolshevik faction nationalized the property, but it was handed back within a short time, and late in 1918 operations were resumed on a reduced scale.

VERK ISETZ CORPORATION — SIBERIA

Address: Kalata, Ural district, Russia.

Property: the Kalata mines, 145 miles N. of Kyshtim, eastern Urals, Russia, opened early in the last century mainly for pyrite for acid manufacturing.

Geology: copper-bearing schists similar to those worked by the Kyshtim and Sissert companies. Ore is a heavy sulphide, with bands of magnetite in the pyrite. Silica content is only 2%, other minerals being 2.3% copper, 43.5% iron and 50% sulphur.

Development: on the 406′, 455′ and 560′ levels the main shoot is 560′ long and 84′ wide, yielding 3,000 tons of ore per foot of vertical depth. This ore is nearly solid pyrite. Timbering must be done soon after extracting ore. Slag is used for filling stopes. The deepest of the 3 shafts is 770′. Mining in 1915 cost $1.80 per ton.

Equipment: electric hoist with 3½-ton skips, coarse crushing plant, compressors and smelter designed by F. W. Draper. The latter consists of two blast-furnaces, 287″ by 56″, producing a 12.5 to 13.5% copper matte, two 12′ Great Falls type converters, turbo-blowers, refinery and 3,000 kw. power plant. In 1915 there was reduced 169,760 tons of charge, equal to 530 long tons daily. Fuel consumption was 1.66% of the charge, or 2.49% of the ore, practically pyrite smelting. Slags contained 0.33% copper. No recent figures are available owing to the war and revolution.

AUSTRALASIA

Includes the Commonwealth of Australia and Dominion of New Zealand. The mines are described alphabetically by States.

NEW SOUTH WALES

The Broken Hill district has been idle since May, 1919, on account of labor troubles.

ABERCROMBIE COPPER MINES, LTD. **N. S. W.**

Although fully equipped, property is intermittently operated, and information as to results is not obtainable. See Vol. XIII for details.

AMALGAMATED ZINC (DE BAVAY'S), LTD. **N. S. W.**

Office: E. H. Shackell, sec., Collins St., Melbourne, Australia; and C. Lloyd, 1 London Wall Bldgs., London, E. C. 2, England.

Directors: Hon. W. L. Baillieu, chairman; M. Cohen, A. J. F. de Bavay. London Board: H. W. P. Clinton, F. A. Govett, G. W. W. Mackinnon, W. S. Robinson and J. L. Wharton, A. J. F. de Bavay, cons. chemist and metallurgist; A. D. Greenlees, works mgr.

Inc. 1909, in Australia. **Cap.,** £500,000; shares £1 par; all issued and fully paid.

Accounts are submitted semi-annually. Reports for 1st half of 1918 showed assets over liabilities, £151,055, and a net operating profit of £101,668.

Dividends: 5% in 1910; 20% in 1911; 27½% in 1912; 32½% in 1913; 10% in 1914; 45% in 1916; 20% in 1917; 20% in 1918. A dividend of 1s was paid in April, 1919, making total disbursements to date £925,000.

Company acquired the entire assets of the De Bavay Treatment Co., Ltd., and the patents of the Potter's Sulphide Ore Treatment, Ltd. To avoid litigation with the Minerals Separation, Ltd., the companies were merged into the Minerals Separation and De Bavays Processes Australia Proprietary, Ltd., capitalized at £300,000, shares £1 par, of which 101,750 shares were issued the Minerals Separation Ltd., and 83,250 the Amalgamated Zinc. The Amalgamated Zinc has the right to use all the Minerals Separation patents, but must pay the usual royalties.

Company also owns the following share interests: 119,250 shares Minerals Separation & De Bavay's Processes, Australia Pty., Ltd.; 960 shares Zinc Producers' Association Pty., Ltd., and 200,000 shares in Electrolytic Zinc Co. of Australia.

Amalgamated Zinc has no mines, but buys zinc-lead-silver tailings from the Broken Hill South, Broken Hill Proprietary Block 10, and North Broken Hill mines at Broken Hill, N. S. W. Material is treated in a flotation plant capable of handling 40,000 tons per month.

During first half of 1918, 164,719 tons of tailings were treated, yielding 47,184 tons of zinc concentrate and 1,834 tons of lead concentrate. The former assays 48% zinc, 6% lead, and 9.1 oz. silver; latter 53% lead, 12% zinc, and 65 oz. silver per ton.

BRITISH BROKEN HILL PROPRIETARY CO. LTD. (THE) **N. S. W.**

Offices: T. Mullett, sec., Salisbury House, London, E. C. 2, England; F. H. Clark, Australian sec., Steamship Buildings, Adelaide, South Australia.

Directors: J. S. Smith-Winby, chairman; F. S. Saunders, A. Stewart, W. H. Woodhead, F. V. Sanderson, W. J. Magarey, J. K. Samuel (last three form the Australian board), C. J. Emery, gen. mgr.; G. C. Klug, cons. eng.; R. Beal, mill supt.

Inc. Nov. 11, 1887, in England. **Cap.**, £339,000, in 315,000 £1 ordinary shares, and 60,000 8/-privileged shares; all issued and fully paid.

Profit: for first half of 1918 was £114,783. Dividends amounted to £37,500, and £119,571 was carried forward. Liquid assets exceed liabilities by £265,825. The first half of 1919 resulted in a profit of £65,582, which was carried forward.

Dividends: since 1897 total £821,280, but have been irregular; 4/- in 1917, and 6/- in 1918.

Development: by shafts and extensive workings. Ore reserves in 1918 amounted to 1,095,015 tons, assaying 6.9 oz. silver, 13.3% lead, and 11.5% zinc. **Equipment:** complete for mining; also concentrating plant, using jigs and flotation (Minerals Separation and Lyster selective).

Production: the war caused a suspension of operations from August, 1914, to early in 1917. During 1918 the mill treated 222,662 tons of ore and produced 33,806 tons of lead concentrate assaying 27.95 oz. silver, 61.41% lead and 7.14% zinc; also 28,530 tons of zinc concentrates assaying 10 oz. silver, 9% lead, and 44% zinc. Production of 63,099 tons of ore for first half of 1919 made 9,903 tons concentrate carrying 60.7% lead, 7.3% zinc, and 26.4 oz. silver. The flotation plant made 8,040 tons of concentrate, carrying 45% zinc, 9.1% lead, and 10.1 oz. silver; 1,953 tons carbonate ore running 23.6% lead was also mined.

BROKEN HILL JUNCTION LEAD MINING CO. **N. S. W.**

Office: A. D. Young, Brookman's Bldg., Adelaide, South Australia.

Directors: J. G. North, chairman; J. Bembrick, R. T. Edwards, W. A. Freeman, and C. H. Smith, W. Quale, mgr.

Inc. 1914 in South Australia. **Cap.**, £150,000; shares 10s. par; 72,567 issued fully paid and 200,000 issued 6/5 paid.

Property: 51 acres of mining ground at Broken Hill, N. S. W., developed by shafts and extensive workings.

Equipment: includes complete mine and mill equipment with concentrating plant. An arrangement was made in 1918 with Amalgamated Zinc for the treatment of 300,000 tons of ore at the rate of 1,500 tons per week.

BROKEN HILL PROPRIETARY BLOCK 14 CO., LTD. **N. S. W.**

Office: J. Brandon, 31 Queen St., Melbourne, Victoria, Australia.

Directors. Alex. Campbell; B. A. Moulden, V. J. Saddler, Clive Bailleu, and J. L. Wharton. F. V. Smith, gen. mgr.

Inc. Feb. 19, 1887, in Victoria. **Cap.**, £155,000, in 100,000 10% cum. pfd. 6s. shares and 100,000 ord. 25s shares; all issued.

Reports are issued half-yearly, and in the period ended March 31, 1919, the profit was £7,807. Surplus of cash assets was £47,977.

Dividends: 19s. per share from 1896 to 1901, after which 34s. on pfd. and 26s. on ord. shares, the last being in March, 1919.

Property: at Broken Hill, N. S. W. Though the company has a mill, the carbonate ore is all sold to smelters and the sulphide ore is treated at the Block 10 mill. Recent exploration work developed much new ore, but the old stopes are still productive. Company also has an interest in the King Island Scheelite Co., which see.

Production, in 1918:

Class of ore	Tons	Lead per cent.	Silver, Oz.	Zinc, per cent.	Total cost per ton
Carbonate	3,817	22.32	13.62		65/- ($15.60)
Sulphide	13,447	13.58	10.13	11.2	28/6 ($ 6.78)

BROKEN HILL PROPRIETARY BLOCK 10 CO., LTD. **N. S. W.**

Office: J. Brandon, 31 Queen St., Melbourne, Victoria, Australia.

Directors: A. Campbell, chairman. Clive Bailleau, William Jardine, V. J. Saddler, and B. A. Moulden A. W. Wincey, gen. mgr.

Inc. March 14, 1888, in Victoria. **Cap.**, £1,000,000; shares £10 par; all issued and £ 9 13s paid.

Reports are issued half-yearly, and during the period ended March 31,

1919, the profit was £22,130. Dividends absorbed £15,000. Surplus of cash assets was £75,431.

Dividends: from 1890, total £14 3s. per share; including 3s. in 1918-'19.

Property: mines at Broken Hill, N. S. W., and an interest in the Block 10 Misima Gold Mines, operating on St. Aignan island, near New Guinea. The Broken Hill mine contains estimated reserves of 228,900 tons to a depth of 1840'.

Development: recent development work has been confined to the 1,615', 1,015', 715', 615', 515' and 415' levels. Mining costs are 27/4 ($6.52) per ton.

Equipment: includes concentrator with flotation plant, which also treats ore from Block 14 mine.

Production: Block 10 only; for 6 months ended March 31, 1919, was 27,762 tons of ore containing 9.65 oz. silver per ton, 11.03% lead, and 10.80% zinc ore. This output yielded 6,731 tons of concentrates assaying 63.19% lead and 40.38 oz. silver and 1,373 tons of zinc concentrate assaying 47.72% zinc and 12.7 oz. silver, per ton. Recoveries averaged 86.9% of the silver, 92.9% lead, and 84.4% zinc. Milling costs were 12/7 ($3.02) per ton, and total costs were 44/6 ($10.62) per ton. There were 333 men employed.

BROKEN HILL PROPRIETARY CO., LTD. **N. S. W.**

Head office: F. M. Dickenson, 320 Collins St., Melbourne, Victoria, Australia. **Mine office:** Broken Hill, N. S. W. **Steel works:** Newcastle, N. S. W.

Directors: Bowes Kelly, chairman; D. E. McBryde, v. c.; with R. O. Blackwood, H. G. Darling, W. Jamieson, H. V. McKay and D. W. H. Patterson. G. D. Delprat, gen. mgr.; E. J. Horwood, works mgr. at Broken Hill; R. T. Slee, mine mgr.; D. Baker, steel works mgr. at Newcastle; J. A. Lindsay, chief engr.

Inc. Aug. 13, 1885, in Victoria, Australia. **Cap.,** originally £320,000; shares £20 par; subsequently sub-divided, but increased to £600,000; shares 8s. par, in 1912; finally increased to £3,000,000 shares £1, of which 2,100,000 are issued. Debentures £1,000,000 of 6% authorized; £848,700 outstanding. Company has a large interest in Broken Hill Associated Smelters Proprietary.

Profit for half-year ended May 31, 1919, was £642,350, compared with £359,706 for same period of 1918.

Dividends: total about £12,000,000, inclusive of shares in other companies distributed. From 1886 to 1889, each £2 share received 153s; in 1890 each £2 share received 10s. and each 8s share 22s; from 1891 to 1913 each 8s share (960,000) received 55s; and from 1913 to 1916 each 8s (1,181,006) received 15s 6d; 3s. each in 1917 and 1918; and 1s. in 1919, up to February.

Property: the Broken Hill, one of the world's largest and most famous silver-lead-zinc mines now past the zenith of its career. Company also owns iron mines at Iron Knob, S. Australia.

Development: by shafts down to 1,300', huge open-cuts and many miles of workings. The mine still has fairly large ore reserves which contain 14% lead, 8 oz. silver, and 12% zinc. Tailings on hand are also in large quantity.

Equipment: at Broken Hill; power plant, hoists, compressors, tramways, crushing plants, 1,000-ton ore concentrator, flotation plant, etc. At Port Pirie, S. Australia, up to June, 1915, company operated a large smelter with roasters, Huntington-Herberlein and Dwight-Lloyd sintering machines, briquetting plant, blast-furnaces and complete lead-silver refinery. This plant was transferred to the Broken Hill Associated Smelters Proprietary (which see) in June, 1915. At Iron Knob, Spencer's Gulf, S. Australia, company has mining plant for extraction of twenty-one million tons of 68% iron ore, which is shipped by boat to Newcastle, N. S. W.; at Bellambi, N. S. W., coke ovens, and at Port Waratah, near Newcastle, N. S. W., iron and steel works with an annual capacity of over 170,000 tons. The last mentioned includes blast-furnaces and rolling mills.

Production: has lately been irregular at Broken Hill on account of labor troubles. During first half of 1918, the mill treated 70,843 tons of ore yielding 11,958 tons of 65% lead concentrate, 117,133 tons of tailing gave 2,723 tons of lead concentrates; while the flotation plants yielded 8,161 tons of lead and 55,833 tons of 50% zinc concentrates.

Company's metal output to end of 1914, returned at £37,421,721. Since then, the figures include coal and iron.

At Newcastle the production was 67,803 tons of pig iron, 89,011 tons of steel, ingots, 74,025 tons of coke, 1,120 tons of ammonium sulphate, and 777,324 gallons of tar.

BROKEN HILL SOUTH, LTD. N. S. W.

Head office: J. R. Edwards, sec., Collins House, 360 Collins St., Melbourne, Victoria, Australia. R. N. Kirk, agent in Sydney; A. W. Lewis, sec. in Adelaide; E. E. Garner, sec. in London.

Directors: B. A. Moulden, chairman; W. M. Hyndman, Colin Fraser, L. K. S. MacKinnon, and Hon. D. J. Gordon, G. W. W. MacKinnon, director in London. W. E. Wainwright, gen. mgr.

Inc. Oct. 11, 1893, in Victoria. **Cap.,** £800,000; shares £1 par; all issued and paid up otherwise than in money; increased from £200,000 in September, 1918. Debentures: £200,000 of 6%, issued in bonds of £100; £176,600 outstanding at June 30, 1919.

The company owns an interest in the following companies: Broken Hill Associated Smelters Pty., Ltd., 200,000 £1 shares; Zinc Producers Association Pty., Ltd., 720 £1 shares; Barrier Roaster Co. Pty., Ltd., 10,000 £1 shares; and Electrolytic Zinc Co. of Australasia Pty., Ltd., 80,000 £1 shares, a total of £290,720 at cost.

Statement for the year ended June 30, 1919, shows that the value of the production was £709,392, of which £384,999 was operating profit, less £40,886 for general charges, interest, taxes, and depreciation. Dividends paid amounted to £120,000. The appropriation for income taxes, new plant, development, etc., was £160,000 and £64,113 was carried forward. Investments, supplies, metals and concentrates, cash on hand and on deposit, totaled £984,325; while current liabilities, exclusive of debentures, were £31,386.

Dividends: since 1902 total £12 1s. per share, including 21s. in 1918 (18s by old company). Last distribution in March, 1919, of 1/6 per share.

Property: 69 acres of mineral ground at Broken Hill, N. S. W.

Development: to 1,500′ depth by six shafts and extensive workings. On the lowest stoping level, 1,270′ below the surface the ore averages 15.2% lead, 8.4 oz. silver, and 14.7% zinc. In 1918-'19, company did 3,349′ of diamond-drilling, and 3,595′ of new underground work. All underground work is by contract, and during 1918-19 miners averaged 21/3 ($5.07) and truckers 18/11 ($4.43) per 8-hour shift. There are 639 men employed in the mine. Reserves total 3,500,000 tons.

Equipment: includes a modern steam power-plant, ventilating fans, electric hoists, compressors, crushing plant, an 1,100-ton concentrating mill, and 300-ton selective flotation plant, etc. In July, 1919, fire destroyed machinery, etc., in the crushing plant valued at £70,000 and a years time is lost before it is replaced. Zinc tailing is treated by the Amalgamated Zinc (DeBavay's) Ltd., on joint account, at the rate of 200,000 tons per annum. The old tailing dumps are sold to the Zinc Corporation, Ltd., at the rate of 80,000 tons per annum. Sand on hand totals 700,580 tons, and slime, 406,787 tons. All the lead concentrate produced is sent to the B. H. Associated Smelters Pty., Ltd., Port Pirie, South Australia, for smelting. About 555 men are employed on surface work.

Production, years ending June 30:

Year	Ore treated tons	Old slime, tons	Concentrates, tons	Lead saved, %	Lead tons	Metals in products Silver, Oz.	Zinc tons
1919	164,560	36,145	36,074	83.6	22,671	1,031,440	3,272
1918	197,790	.....	32,717	83.3	.....	.....	....
1917	279,700	24,867	.....	....	38,695	1,880,792	.....
1916	244,990	.....	44,635	....	.....	.....	.....

Costs have risen from 20/9 ($4.89) in 1915 to 31/4 ($7.48) in 1918, and to 37/6 ($8.94) in 1919. Broken Hill South is not only the premier lead-silver-zinc mine of Australia, but one of the greatest in the world.

BROKEN HILL SOUTH SILVER MINING CO. **N. S. W.**

Reorganized in 1818 as Broken Hill South Ltd., which see.

BUTLER'S TIN MINE **N. S. W.**

Address: C. Lonsdale Smith, mgr., Torrington, N. S. W.; or James Mackay, legal mgr., Melbourne, Victoria.

Property: 7 miles from Torrington, N. S. W. Lode is in granite, and ore carries tin, wolfram, and lead.

Development: by 920′ adit, shaft, and workings reaching a depth of over 300′.

Equipment: includes steam power, engines, and mill with 10 stamps, jigs, tables, vanners, flotation unit, and magnetic separator. The first section of the mill makes a recovery of 80% tin, 68% tungsten, and 66% lead; while the final treatment takes out 98% of the lead, making the zinc concentrates saleable. No production figures are obtainable.

COBAR-GLADSTONE MINING CO. **N. S. W.**

Mine office: Wrightville, Robinson county, N. S. W., Australia. Mine is opened by a 400′ vertical shaft, and in 1917 was making weekly shipments of 35 tons of concentrates to the E. R. & S. Co. smelter at Port Kembla, assaying from 20 to 23% copper.

Equipment: includes rolls, jig and concentrating tables.

No recent returns received; probably idle.

ELECTROLYTIC REF. & SM. CO. OF AUSTRALIA, LTD. THE

Office: 118 Pitt St., Sydney. **Works office:** Port Kembla (50 miles south of Sydney), County of Camden, New South Wales, Australia.

Directors: R. G. Casey, chairman; Kelso King, P. V. McCulloch, J. M. Niall, W. L. Baillieu, and J. L. Wharton. S. W. Thornton, sec.; E. A. White, mgr.

The plant covers an area of approximately 53 acres and contains a sampling mill, blast furnaces and converter plant, anode furnaces, electrolytic tank house, refining furnace, etc., etc. 33,950 tons ore were treated in 1918, and 24,700 tons blister copper handled.

Production: 21,300 tons of electrolytic copper (registered brand "E S A"); 8,969 tons of fire-refined copper, (registered brand "ESA F. R."); and 371 tons of bluestone (registered brand "ESA Bluestone").

These works are an important adjunct to the copper industry of Australia.

GREAT COBAR, LIMITED **N. S. W.**

Head office: 4b Fredericks Place, Old Jewry, London, E. C., England. **Mine office:** Cobar, N. S. W., Australia.

Officers: Sir John Taverner, chairman; C. H. Wayte, Sir E. V. Evans, directors; E. Hogan Taylor, mgr.

Inc. May 22, 1906, in England. **Cap.,** £1,000,000, in 200,000 shares of £5 each; 186,542 issued. Also 6% first mortgage debentures totaling £750,000, of which £667,300 are outstanding.

Property: copper mines, smelters, coal mines, coke works and refining plant, at Cobar and other parts of New South Wales. The price paid the Great Cobar Copper Mining Syndicate, which had operated profitably for years, was £800,000 cash, £55,000 in paid-up shares, and £151,000 in cash, shares, or debentures. Several well-known engineers examined the Cobar mine, including C. M. Rolker, J. D. Kendall, W. J. Barnett, and Pellew-Harvey.

A new shaft was sunk to 1,540′, and new 1,200-ton smelter erected. In 1913 reserves were estimated at 2,705,161 tons, 2,081,735 tons of which contained 2.5% copper. In that year, the yield was 13,016,640 lb. copper, 27,136 oz. gold, and 127,542 oz. silver. No returns since.

Many troubles arose in the mine and plant, and in April, 1914, operations ceased and receivers (A. F. Whinney in England and W. H. Fletcher in Australia) were appointed. An independent report was made, which gave 3 years ore opened. At £65 per ton for copper, the profit would be £88,800, and if no more ore were found, the plant might realize £63,700. The total profit of £152,500 would yield debenture-holders 23%. To enable the new scheme to be worked out, £62,000 was borrowed from debenture-holders, and £40,000 from

the New South Wales Government. Net proceeds in 1916, 1917, and 1918 went to certificate-holders on certain terms.

Mining and smelting were resumed during 1917 under the new arrangement.

Production: from 1876 to 1906, inclusive, the Great Cobar mine yielded 1,592,895 long tons of ore, returning 138,593,280 lb. fine copper. Production, under the former ownership, was 7,000,000 to 9,000,000 lb. copper yearly, having been 9,027,200 lb. fine copper in 1906; and production by present company was about 10,000,000 lb. in 1907; 10,586,240 lb. copper, 64,949 oz. silver, and 13,002 oz. gold in 1908; 12, 762,080 lb. copper, 83,208 oz. silver, and 14,452 oz. gold in 1909; 13,847,680 lb. copper, 107,932 oz. silver and 21,524 oz. gold in 1910. Production for the year ending June 30, 1912, was 339,494 tons of ore from the company's own mines and 88,924 tons of custom ore, producing 15,089,760 lb. copper, 178,760 oz. silver and 37,696 oz. gold. 1913 returns are given above.

From the results it is evident an error was made in original estimates of the mine, the new smelter was unsuitable, and the capitalization was too heavy.

In November, 1918, debenture-holders decided to continue operations until the end of 1920. In April, 1919, shares had dropped to 1/ each.

JUNCTION NORTH BROKEN HILL MINE N. S. W.

Office: E. V. Nixon, 360 Collins St., Melbourne, Victoria, Australia.

Directors: J. S. Palmer, chairman; K. G. Brooks, F. H. Reynolds, W. Clarke, H. B. Ludlow, and A. Rigby. J. F. Stephen, gen. mgr.

Inc. August, 1912, in Victoria. **Cap.,** $375,000; shares £1 10/- par; 225,000 issued.

Accounts are presented half-yearly, and for the period March 31, 1918, there was a profit of £ 36,669. Dividends amounted to £31,500. Current assets exceed liabilities by £170,899.

Dividends: 1/- in 1917; 3/6 in 1918.

Property: 45 acres at Broken Hill, N. S. W. The mine which is fully developed and equipped, contains 192,000 tons of ore that averages 12.3% lead, 8.9 oz. silver, and 6% zinc.

Production: 8,989 tons of 60% lead and 10,435 tons of 50% zinc concentrates, in 1917-18.

MAMMOTH MOLYBDENITE CO., LTD. N. S. W.

Address: Yetholme, New South Wales, Australia.

Property: company operates a molybdenite mine and mills the ore which assays 1.3%, making a concentrate of 85% MoS_2. No details are available, but mine was being worked at last accounts.

MINERALS SEPARATION & DE BAVAY'S PROCESSES AUSTRALIA PROPRIETARY, LTD. N. S. W.

Office: E. H. Shackell, Collins House, Melbourne, Victoria, Australia.

Directors: W. L. Baillieu, chairman; A. E. Bright, M. Cohen, H. H. Greenway, and J. L. Wharton.

Inc. June 27, 1912, in Victoria, to acquire the Australia and New Zealand rights to the Minerals Separation, Ltd., De Bavay's Sulphide Process Co., Ltd., Potter's Sulphide Ore Treatment, Ltd., and Amalgamated Zinc (De Bavay's), Ltd., patents. The foreign patents of these various companies were taken over by Minerals Separation, Ltd., which is the parent of Minerals Separation North American Corporation (United States).

Cap., £300,000; shares £1 par; 265,000 issued.

Profit in 1917 was £24,511, of which all but £11 was distributed.

Dividends: 10% in 1912; 13¾% in 1913; 5% in 1914; 7½% in 1915; 10% in 1916.

Company grants licenses to use its processes, and starts suits against other systems of flotation.

MT. BOORALONG MOLYBDENITE MINES N. S. W.

Address: James Rankin, 97 Elizabeth St., Melbourne, Victoria, Australia, H. T. Wardle, supt.

Inc. May 31, 1916, in Victoria. **Cap.,** £150,000.

Property: 110 acres in New England district of N. S. W., containing

a deposit of molydenite ore in pegmatite granite; the ore averages 1.9% molybdenum sulphide. Ore is mined by open-cut.

Equipment: includes an elevator, aerial tram, and 160-ton mill using flotation (the Rankin System). Concentrates carries 96% MoS_2.

MT. BOPPY GOLD MINING CO. **N. S. W.**

Office: W. F. Garland, sec., 5 and 6 Queen St. Place, London, E. C. 4, England. Mine office: J. Negus, supt., Boppy Mount, N. S. W., Australia.

Officers: S. F. Hoffnung-Goldsmid, chairman; with B. J. Leverson, V. H. Smith, E. Taylor, and R. Taylor, directors. John Taylor & Sons, cons. engrs.

Inc. Nov. 24, 1899, in England. **Cap.**, £151,000, in 30,000 pfd. and 121,000 ord. shares at £1 par, all issued. Preferred shares are entitled to first cumulative dividend of 10% per annum, plus share in ordinary profits; after 100% has been paid they rank as common.

In 1917 there was a deficit of £27,310. By transferring £12,500 from reserve fund (now £2,500) debit balance was reduced to £16,880.

Dividends: were 5% in 1901, 6¼% in 1902, 35% in 1903, 40% in 1904, 47½% in 1905; 45% in 1906; 47½% in 1907; 47½% in 1908; 27½% in 1909; 35% in 1910; 20% in 1911; nil in 1912 and 1913; 7½% in 1914; 5% in 1915; none since.

Property: 344 acres in Cobar district of New South Wales. Company also has an option on the Occidental mine, which is nearby.

Development: by shafts. Ore reserves estimated at 215,956 tons, of $8.50 gold ore in 1915; besides 100,000 tons in shaft-pillars and 300,000 tons of residue. At end of 1917 the total was 249,000 tons.

Equipment: includes mill with sixty stamps 4 tube-mills, and cyanide plants.

Production: in 1918, 61,176 tons, yielding 15,511 oz. gold compared with 79,526 tons yielding £119,508 in 1916. Operators have been intermittent since 1917, owing to shaft sinking, remodelling the mill, and a shortage of water. Normally the mine is a steady and profitable producer.

NORTH BROKEN HILL, LTD. **N. S. W.**

Offices: G. Weir, gen. mgr., 360 Collins House, Melbourne, Victoria; Broken Hill, New South Wales; and E. Habben, Palmerston House, London, E. C. 2, England.

Directors: W. M. Hyndman, chairman; M. H. Baillieu, W. L. Baillieu, T. B. Birbeck, A. Campbell and H. Sheppard.

Inc. Dec. 4, 1912, in Victoria, Australia. **Cap.**, £600,000; shares £1 par; all issued. Debentures: £250,000 of 6% authorized; £179,400 outstanding.

Company has interests in Broken Hill Associated Smelters, Zinc Producers Association, Barrier Roasters, and Zinc Investigation.

Accounts are issued half-yearly, and for the period ended June 30, 1918, the profit was £167,415; £120,000 was distributed, and £60,236 carried forward. Reserves totalled £557,025. Assets showed an excess of £599,851 above liabilities. Profit for first half of 1919 was £111,337, of which £60,000 was distributed.

Dividends: 30% in 1913; 25% in 1914; 25% in 1915; 40% in 1916, 1917, and 1918, and 10% in 1919, to March.

Property: 452 acres at Broken Hill, New South Wales, developed by 3 shafts, deepest 1,770′, and extensive underground work which has blocked out 2,750,000 tons of ore mostly above the 950′, 1,100′, 1,250′, and 1,400′ levels.

Equipment: includes a concentrating plant whose tailings are sold to Amalgamated Zinc (De Bavay's) for treatment by flotation.

Production. half-yearly periods:

Period	Ore treated, tons	Lead, %	Silver, Oz.	Zinc, %	Concentrates, tons	Lead %	Silver Oz.	Zinc, %
1919 (June 30)....	53,894	15.1	8.1	12.4	10,890	63.6	27.4	7.5
1918 (June 30)....	109,200	15.3	7.5	13.4	20,605	65.2	24.1	7.7
1917 (Dec. 31)....	64,030	....	...	....	11,459	....	....	...

Costs total 24/8 ($5.84).

This is one of Australia's greatest and most profitable lead mines.

SULPHIDE CORPORATION, LTD. **N. S. W.**

Office: C. R. Fisher, sec., Finsbury House, London, E. C. 2, England. **Mine office:** Broken Hill, N. S. W., Australia.

Officers: Earl of Kintore, chairman; Hon. V. Gibbs, F. A. Keating, G. M. Reid and A. Williamson, directors. C. F. Courtney, gen. mgr.; J. Hebbard, mine mgr.; F. H. Evans, mgr. of smelter at Cockle Creek, N. S. W.; J. C. Moulden, mgr of zinc works at Seaton Carew, Durham, England.

Inc. Oct. 29, 1895, in England. **Cap.,** £1,050,000; 600,000 pfd. shares at £1 par, and 600,000 ordinary at 15s. par, all issued.

Accounts are issued yearly, and for period ended June 30, 1918, the profit was £326,400. Of this, £ 262,500 was distributed. Reserve fund was £200,000, and accumulated profit account £362,082.

Sales in 1918-'19 were £1,973,708 of which £308,508 was profit and £157,500 was distributed.

Dividends: since 1898 total 297% on pfd. and 240% on ord. shares; in 1917-'18, 25% was paid on each class of shares and in 1918-'19, 15%.

Property: a large lead-silver-zinc mine at Broken Hill, N. S. W.

Development: by shafts and extensive openings. Reserves amount to 1,608,500 tons.

Equipment: complete mining and 1,000-ton milling plants employing flotation at the mine, lead smelter at Cockle Creek, N. S. W., and zinc works at Seaton Carew, Durham, England. Company is a pioneer in flotation processes, and is said to have developed the frothing process prior to or simultaneously with Minerals Separation.

Production: for year ending June 30, 1918, the mill output was 29,989 tons of galena concentrate averaging 63.7% lead; 42.3 oz. silver, and 9.3% zinc; also 42,761 tons of zinc blende concentrate assaying 47% zinc, 12 oz. silver, and 5.9% lead.

In 1918-'19 the mill treated 115,401 tons of ore assaying 14.8% lead, 16.5% zinc, and 12.9 oz. silver, yielding 25,446 tons of concentrate carrying 63.7% lead, 9.8% zinc, and 43.4 oz. silver; also 36,650 tons assaying 47.6% zinc, 6.2% lead, and 12.5 oz. silver. The smelter reduced 85,324 tons, yielding 22,935 tons of lead, 359 tons of antimonial lead, 2,484 tons spelter, 77 tons zinc dust, 17,599 oz. gold; and 2,127,082 oz. silver.

Y—WATER (EMMAVILLE) TIN CO. **N. S. W.**

Office: E. H. Shackell, 360 Collins St., Melbourne, Victoria, Australia.

Directors: J. L. Wharton, chairman Clive Baillieu, C. G. Lyon, and W. H. Hyndman. F. G. Wilson, gen. mgr.

Inc. in Victoria. **Cap.,** £90,000; shares £1 10/- par; £76,088 issued.

The half-year ended January 31, 1919, resulted in a loss of £3,046, compared with profits of £5,325, £2,776, and £1,272 in the previous periods. Current assets exceed liabilities by £1,626. For the period ended July 31, 1919, there was a profit of £2,282. Cash assets were £3,858 net.

Property: alluvial tin areas at Emmaville, N. S. W., equipped with hydraulicking apparatus.

Production, for half-years:

Year	Yardage	Yield per yard, lb. black tin	Total yield, tons
1919	295,800	0.983	130
1918-'19	284,700	0.701	89
1918	296,300	0.663	88
1917-'18	346,875	0.681	105
1917	261,825	0.837	98

This "Black tin" carries 71.8% metallic tin.

ZINC CORPORATION, LTD. **N. S. W.**

Office: T. E. Smith, 20 Copthall Ave., London, E. C. 2, England; Collins House, Melbourne, Victoria, Australia. Broken Hill, N. S. W., Australia. Bewick, Moreing & Co., gen. mgrs.; C. G. Hylton, supt.

Directors: F. A. Govett, chairman and managing director; J. A. Agnew, H. W. P. Clinton, W. C. C. Romaine, R. W. Skipwith, T. White, P. L. Gell, T. B. Birkbeck, and W. M. Hyndman.

Inc. July 8, 1911, in Great Britain. **Cap.,** £575,000, in 245,792 pfd. £1, and 658,616 com. 10s. shares, all issued. Company is interested in the Broken Hill Associated Smelters Proprietary, Zinc Producers Association Proprietary, Electrolytic Zinc Co., and Barrier South, Ltd.

Profit for 1917 was £225,154, plus balance of £25,971 from previous year. Dividends amounted to £228,905. Current assets exceed £500,000.

Dividends: 15% on pfd. and 10% on ord. in 1911; 37½% and 35% in 1912; 35% and 30% in 1913; 20% and nil in 1914; 25% and 10% in 1915; 37½% and 35% in 1916; 40% on each in 1917; 27½% and 15% in 1918.

Property: the South Blocks mine and claims, a total of 160 acres at Broken Hill.

Development: to depth of 1,590′ by two vertical shafts (one 1,210′ deep), and extensive underground workings. Reserves given as 1,887,000 tons, containing 14.3% lead, 2.6 oz. silver and 9.2% zinc.

Equipment: includes a complete and modern mill using rolls, tables and flotation plant with Minerals Separation, and the Lyster and Horwood selective processes, described in Mining Magazine (London), of November, 1918.

Company buys tailings from other Broken Hill mines besides treating its own ores.

Summary of operations:

Year	Zinc plant tailings, tons	Lead plant, ore, tons	Zinc concentrate, tons	Lead concentrate, tons
1918	257,300	135,580	61,470	33,581
1917	257,590	134,618	63,700	31,993
1916	200,510	136,901	45,464	37,376

Galena concentrate carries 66% lead, and blende concentrate 48% zinc. Costs are about 33/– ($7.92) per ton.

ZINC PRODUCERS' ASSOCIATION PROPRIETARY, LTD.. N. S. W

Offices: E. H. Shackell, Collins House, Melbourne, Victoria, Australia; and A. J. M. Sharpe, Pinners Hall, London, E, C. 2, England.

Directors: W. L. Baillieu, chairman; A. Campbell, M. Cohen, J. G. North, J. S. Palmer, F. A. Govett, F. C. Howard, W. M. Hyndman, F. A. Keating, Bowes Kelly, D. E. McBryde, B. G. Moulden, J. L. Wharton, and W. H. Woodhead. Sir J. M. Higgins represents the Federal Government.

Inc. May 20, 1916, in Victoria, to market all the zinc concentrate or ore produced in Australia, the various companies contracting to deliver their output to the Association for a period of 50 years. An agreement was also made with the British Government to handle these products.

Cap., £100,000; shares £1 par; all held by the Broken Hill companies, the Broken Hill Associated Smelters, and the Mt. Lyell companies.

PAPUA (New Guinea)

BLOCK IO MISIMA GOLD MINES

Controlled by Broken Hill Proprietary Block 10 Co.

Office: 31 Queen St., Melbourne, Australia.

Officers: J. Brandon, sec.; R. Williamson, mgr.

Inc. December, 1916, in Victoria, Australia. **Cap.,** £250,000; shares 25 shillings par; 150,000 issued.

Profit of £1,146 was made in second half of 1917; loss of £340 in first half of 1918, and a loss of £4,300 in first half of 1919.

Property: a group of gold-bearing claims on the island of St. Aignan, Papua, estimated in 1918 to contain over 125,250 tons of 38s. ($9.12) ore. Mine is equipped with a stamp-mill and cyanide plant of 50 tons daily capacity, which is to be enlarged to treat 170 tons daily. The first six months' run produced

7,045 tons of 30/10 ($7.40) ore. Extraction by cyanidation was 88.7% in the 6 months of 1919; 5,580 tons of 26/1 ($6.25) ore were mined, and the ore reserve increased.

LALOKI (PAPUA) COPPER MINES

Address: C. R. Baldwin, Port Moresby, Papua.

Property: a copper mine of considerable promise 18 miles from Port Moresby, once owned by the Great Fitzroy Copper Company of Queensland. Country is rough, and transportation expensive, though costs have recently been reduced from £6 ($28.80) to 15s. ($3.60) per ton by constructing a new road and using steam tractors.

A shoot of 8% ore has been opened, which experiments show can be cheaply roasted, the calcined material leached, and the copper and zinc extracted by electrolytic methods, with a high extraction of the metal.

QUEENSLAND

CHILLAGOE, LIMITED **QUEENSLAND**

Property sold to the Queensland Government. Fully described in Copper Handbook, Volume XI.

CORELLA COPPER CO. **QUEENSLAND**

Operations ceased in 1917. Stock valueless. See Vol. XIII.

GREAT FITZROY MINES, LTD. **QUEENSLAND**

A dormant corporation. See Vol. XIII for organization and former operations.

HAMPDEN-CLONCURRY COPPER MINES, LTD. **QUEENSLAND**

Offices: E. H. Shackell, Collins House, Melbourne, Australia; and E. Habben, sec., Palmerston House, London, E. C. 2, England.

Directors: J. L. Wharton, chairman; W. L. Baillieu, F. G. Hughes, W. Orr, H. H. Schlapp, and B. M. Turner. London directors: W. D. Reid, G. W. W. Mackinnon, and G. W. Staples. Earle Huntley, gen. mgr., Friezland, via Cloncurry, North Queensland. D. Wentworth, metallurgist.

Inc. July 31, 1909, in Australia, as a reorganization of a company of same name. **Cap.**, £400,000; shares £1 par; 350,000 issued.

Profit for half-year ended August 31, 1918, was £61,016, against £67,550 in the previous period. Balance forward was £38,593. Current assets exceed liabilities by £215,948.

Dividends: in 1913, 40%; 1914, nil; 1915, 20% 1916, 40%; 1917, 15%; 1918, 10%.

Company owns 4,000 shares of the Electrolytic Ref. & Sm. Co. of Australia, Ltd., and 18,750 shares of Metal Manufacturers stock; both having works at Port Kembla, New South Wales; and 1,000 shares in the Copper Producers' Association.

Property: about a dozen mines, with 450 acres mineral claims, in the Cloncurry mining district, North Queensland. Mines are connected by 2′ gauge railway with the Cloncurry Copper Mines, Ltd. The mines contain auriferous copper ores, the combined reserves being 133,000 tons of smelting ore averaging 9.4%, and 231,000 tons of 6.8% concentrating ore, plus over 60,000 tons of mixed ores in the McGregor and other mines.

Equipment: includes railways, complete mining plant, mill and flotation plant, and 375-ton smelter with converters.

Production, half-years to August, 1919:

Period	Ore smelted, tons	Copper, Lb.	Silver, Oz.	Gold, Oz.
1918	56,603	7,616,000	9,716	2,302
1918	49,565	7,176,960	21,854	1,202
1917	.....	.....	.....	.....
1917	46,443	6,948,480	23,418	1,028
1916 (year)	104,476	16,856,000	59,119	2,234

Custom ore is smelted, but the product is not included in the above figures.

IRVINEBANK MINING CO., LTD. **QUEENSLAND**

Office: J. H. Reid, managing director, 18 Bridge St., Sydney, N. S. W. **Works office:** Irvinebank, Queensland.

Property: company owns tin mines and tin concentrating works at Irvinebank, Koorboora and Watsonville; copper mines at Watsonville and wolfram mines and mill at Mt. Carbine, all in North Queensland. The tin smelter includes a reverberatory furnace and is the only tin works in the State.

MANY PEAKS COPPER MINING CO., LTD. **QUEENSLAND**

Office: J. D. Murray, sec., East St., Mt. Morgan, Queensland. James Hill, mgr.

Inc. 1906, in Queensland. **Cap.,** 81,640 shares, 6d. (12c) par, originally 2,041 shares £1 par, changed in 1911 to present amount.

Company owns a cupriferous pyrite deposit from which the Mt. Morgan G. M. Co. drew its supply of fluxing material at a royalty of 2s. 6d. (60c.) per ton. The lease called for not less than 25,000 tons annually. In August, 1918, the Mt. Morgan company terminated the lease.

Receipts for year ending June 30, 1917, amounted to £6,222, plus credits of £2,535, making £8,757. Of this £6,803 was distributed in dividends. Cash on hand was £1,165. For 1918, revenue was £4,156, of which £3,742 was distributed.

Dividends: total £56,383 or 13/6 ($3.18) per share to June, 1918.

Property: 320 acres, well timbered, on terminus of Boyne Valley railway. The property shows promising vein up to 90′ in width, having no secondary sulphides, the zone of oxidation being succeeded by chalcopyrite ore of about 3.5% copper tenor. Development is exclusively by tunnels, the main tunnel being on the 470′ level, with 3 levels above, at 100′ intervals. A winze opens the deposit to 570′ depth. The ore is very pyritic and was all used by the Mt. Morgan company as a flux. Its copper content is about 1½%. Reserves are about 1,000,000 tons.

Production: 33,245 tons in the year ended June 30, 1918, making 497,927 tons to date, on which royalties totalled £62,241.

MOUNT CUTHBERT, N. L. **QUEENSLAND**

Offices: W. B. Arnold, sec., 39 Queen St., Melbourne, Australia; Edwin Habben, sec., Palmerston House, London, E. C. 2, England; and Mount Cuthbert, Queensland.

Officers: P. Pigott, chairman; Robert Philp, T. P. Power, F. E. Power, John G. Robertson and J. Forsyth, directors. Stephen Harris, gen. mgr.

Inc. Feb. 21, 1907, in Victoria, Australia. **Cap.,** £240,000; shares £1 par. Reorganized October, 1909, and August, 1916, in Victoria. Capital increased to £419,394; shares £1 10s. par. Original 7% debentures outstanding, £55,500. At the reconstruction in August, 1916, £50,000 7% prior lien debentures were created to secure creditors; these debentures expired in September, 1917.

Profit for half-year ended August 31, 1917 was £29,173. Of this £15,000 was put into reserve. Accumulated deficit was £87,131. Liabilities exceeded assets by £36,556.

The year ended August 31, 1919, resulted in a loss of £12,308.

Property: 575 acres at Mount Cuthbert in the Cloncurry district, 70 miles from Cloncurry, Queensland.

Geology: the orebodies occur in veins cutting a schistose formation, and as intimately disseminated sulphides in the schists. In some places the veins cut dolomitic limestone and carry good ore. The vein outcrops are distinctly traceable through the various claims. Reserves amount to 130,000 tons of 9.50% ore.

The ores contain glance, chalcopyrite, pyrite, and bornite at depth. Deepest workings are 484′. Considerable chalcotrichite (a hair-like form of cuprite) occurs in places.

In 1919 company had opened an orebody in the Kalkadoon mine, varying from 15 to 40′ wide.

Equipment: includes 200-ton smelter, started in March, 1917. The Cuthbert and Kalkadoon mines have equipment to mine at a depth of 2,000′. The Government railway from Cloncurry runs to Mount Cuthbert, and sidings

have been built to connect with several of company's mines. The mines were fully described in "Chem. Eng. & Min. Review" of Melbourne, for November 5, 1917.

Production: to Feb. 28, 1919, a total of 91,855 tons of ore had been smelted, yielding 5,026 tons (11,258,250 lb.) of blister copper. Of this, 13,099 tons were treated at Mount Elliott, the remainder at Mount Cuthbert.

MOUNT ELLIOTT, LTD. **QUEENSLAND**

Offices: E. Habben, Palmerton House, Old Broad St., London, E. C. 2, England; F. G. Hughes, Collins House, Melbourne, Victoria, and Mt. Elliott, Selwyn, via Townsville, Queensland, Australia.

H. J. Hill, chairman of board in London. W. L. Baillieu, general representative in Australia, and W. H. Corbould, cons. eng.

Inc. June 14, 1907, in Great Britain. **Cap.,** £1,250,000; shares £5 par; 237,518 issued.

Operations for the year ended June 30, 1918, showed a loss of £56,890. Liabilities exceeded assets by £37,000. In 1918-'19, loss was £41,034.

Dividends: 10% in 1910-'11; 15% in 1911-'12; 27½% in 1912-'13; and 5% in 1913-'14; none since; a total of £425,000.

Property: a group of copper mines situated in the Cloncurry copper district of Queensland, covering approximately 4,600 acres, about half of which can be classed as good and probable copper area. The holdings include those of the Dobbin and Cloncurry Mines, Ltd., transferred to Mount Elliott, the undertakings of the two companies now being operated as a unit. The vendors of the original Dobbin & Cloncurry Mines, Ltd., receive a proportion of profits equal to about £200,000, which makes approximately £1,450,000 on which the company must pay dividends.

Development: is not deep nor very extensive, including shafts of various depths, at the different mines whose reserves are given in the table below:

Mine	Reserves in tons	Copper, %
Mount Elliott	600,000	3.0
Mount Elliott	10,000	10.0
Consols	450,000	4.0
Great Australia (limestone)	110,000	2.5
Great Australia (silicious)	93,000	4.0
Dobbin	70,000	5.0
Mount Oxide	300,000	10.0
Argylla	200,000	4.0
Lady leases	28,000	5.0
Total and average content	1,861,000	4.6

In this estimate, no allowance is made for possible ore below 600′ in Mount Elliott, 480′ in Consols., 300′ in Great Australia, 305′ in Dobbin, 300′ in Mount Oxide, 100′ in Argylla, and 200′ in Lady leases. If the developed ore of the smaller mines be included, the total reserve would aggregate 2,500,000 tons; underground conditions indicate that the downward limit of the orebodies have not been reached.

The **Mount Oxide** property has steeply dipping shales containing an interbedded lode 60′ thick, overlaid by 70′ of hematite. Next to this iron ore there is 18′ of 4% copper ore, with 50,000 tons of 20% ore and a total of 200,000 tons of 12½% copper ore.

Equipment: a 300-ton plant treating 5% ore and actually recovering 4½%. Company needs a large modern plant to place the project on a profitable basis.

Production: to date 327,175 tons of ore yielding 28,264 tons or 63,311,360 lb. copper. The output for 1917-'18 was 5,201,280 lb. copper recovered from 51,952 tons of ore. In 1918-'19 (7½ months) the yield was 6,460,160 lb. from 61,975 tons of ore.

Management states the 10% ore treated in former years gave good profits, but

the grade of present reserves is too low to warrant operations, as the output is too small to carry the overhead charges.

MOUNT MORGAN GOLD MINING CO., LTD. QUEENSLAND

Offices: E. W. Moran, sec., Mt. Morgan, Queensland; S. W. Thornton, sec., 118 Pitt St., Sydney, New South Wales; T. H. Williams, sec., 125 William St., Melbourne, Victoria; E. Habben, sec., Palmerston House, Old Broad St., London, E. C. 2, England.

Directors: (Australia) R. G. Casey, chairman; Kelso King, J. L. Wharton, J. M. Niall, John Sanderson, W. L. Baillieu, K. deL. Cudmore, R. S. Archer, W. G. Thompson. (England): E. V. Reid and A. J. Pugh, W. G. Thompson. A. A. Boyd, gen. mgr.; J. Horsburgh, asst. gen. mgr.

Inc. Oct. 1, 1886, in Queensland. **Cap.**, £1,000,000; shares £1 par; fully issued and fully paid.

Financial Statement:

Period	Revenue	Profit	Dividends	Balance	Excess of current assets
1918 (½ year, Dec. 1)....	£548,486	£86,485	£50,000	£135.221	£507,233
1918 (Year, June 2).....	1,233,983	252,749	250,000	98,736	465,179
1917 (Year, May 27).....	1,301,377	309,205	250,000	95,986	522,108

Dividends: paid quarterly, have ranged from a minimum of 8d., at the beginning, 1886, to a maximum of £1 2s., in 1889. To end of 1916 the company had paid about 825% in dividends, which were 6s. yearly, 1892-97; 6s. 6d. in 1898; 7 s. yearly 1899-1900; 5s. 10d. in 1901; 5s. 9d. in 1902; 3s. yearly 1903-06; 4s. 3d. yearly 1907-08; 4s. yearly 1909-13; 3s. in 1914; 4s. in 1915; 5s. in 1916; 5s. in 1917; 3s in 1918, and 1s. in January, 1919. The total is £9,229,166.

Property: 90 acres perpetual leasehold, and 640 acres freehold; also flux quarries, coal beds, and magnesite deposits. Lease on the pyrite deposit at Many Peaks was given up late in 1918.

Company has a large interest in the Electrolytic Refining & Smelting Co. of Australia, Ltd., which refines Mt. Morgan and custom copper and in the recently organized Metal Manufacturers, Ltd., which is to make copper products from Australian metal. Mt. Morgan is about 25 miles west of Rockhampton, and the mine has been, since 1890, one of the greatest gold producers of the world.

Geology: the Mount Morgan gold deposit proved to be the silicious gossan of a great copper deposit. As the ore showed increased copper content at depth the company wisely began extensive diamond-drilling, which proved an immense tonnage of copper ore. The mine has been operated as 2 connected mines, the upper section being worked open-cut. The oxidized ores were exhausted in 1910, and only sulphide ores are now mined. The sulphide gold ore is known locally as "mundic," being an auriferous and slightly cupriferous pyrite.

Development: is done through 2 principal shafts, known as the Main of 1,050′ depth, and the Lynda incline, about 1,500′ deep. Underground ore extraction is from the 360′ to 950′ levels. Depleted stopes are filled with waste, on the pigstye system, some of the stopes being of great size. New openings only amount to a thousand feet or so per annum, which does not seem extensive, yet when the character of the deposit is considered such footage is considerable.

Ore reserves have been estimated as follows:

Date	Tons	Copper, %	Gold, dwt.
June, 1918.....	3,622,892	2.58	6.13
December, 1918.....	3,706,964	2.58	6.15
June, 1918.....	3,825,685	2.58	6.15
June, 1917.....	4,176,795	2.59	6.17

This includes concentrating and smelting ore.

Equipment: is very complete and up-to-date, having undergone great changes during the past 5 years. It includes a concentration plant, smelter, and large power plant. The smelter has blast furnaces.

Experiments are being made in leaching some of the ore.

The district being arid, extensive dams have been built for water storage,

there being 7 dams, of which 5, in commission, have an aggregate capacity of 387,000,000 gal., No. 7 holding 270,000,000 gal.

Production: the total from 1883 to October, 1918, was 4,637,421 oz. of gold and 86,678 tons (194,158,720 lb.) of copper. Recent returns were:

		Ore concentrated, tons	Ore smelted, tons	Copper, tons	Gold, Oz.
1919	(½ yr. June 1)....	75,138	90,687	2,688	50,042
1918	(½ yr. Dec. 1)....	115,466	105,264	3,580	42,942
1918	(½ yr. June 1)....	123,854	102,872	3,505	38,138
1917	(year May 27)....	141,430	278,380	8,042	98,950

During the last 12 years, product of the mine realized £12,153,362. The income was absorbed in the following proportions: wages, 46.36%; Government, 11.14%; royalties, etc., 7.29%; stores, etc., 14.45%; dividends, 10.65%; and balance, 1.11%.

Mount Morgan is one of the great mines of the world, but it has passed the zenith of its production. The decreased amount of ore treated in the past few years is, however, said to be due to scarcity of labor, and not to scarcity of ore.

MUNGANA MINING CO., LTD. **QUEENSLAND**

Company now out of existence. See Vol. XIII.

SCOTTISH GYMPIE GOLD MINES, LTD. **QUEENSLAND**

Head office: Dunlop & Murray, secs., 188 St. Vincent St., Glasgow, Scotland. **Mine office:** Mary St., Gympie, Queensland, Australia.

Officers: G. B. Hoggan, chairman; R. G. Campbell, J. B. Hilliard, and W. Walker, directors. D. E. Reid, gen. mgr.; T. Jobling, mine mgr.; H. Walker, surveyor.

Inc. June 11, 1902, in Scotland. **Cap.,** £700,000; shares £1 par; 600,000 issued.

The year ended May 31, 1918, resulted in a loss of £2,074. A debit balance of £4,448 was carried forward.

Dividends: since 1898, total about £6 2s. per share; £5 8s. to 1902, since when profits have been small. The total to July, 1917, was £597,742.

Property: 126 acres, at Gympie, Queensland.

Equipment: complete for treatment of about 9,000 tons per month.

Production: in year 1915-'16, 83,800 tons of ore and 27,950 tons of tailing cyanided for $6.44 per ton. In 1917-'18, 72,300 tons of ore and 29,100 tons of tailing yielded 20,285 oz. of gold, at a cost of 22/– ($5.28) per ton. In July, 1919, 1,500 tons yielded 635 oz. of gold.

Property has been a large producer, but now makes little profit, and is near its end.

SILVER SPUR, LIMITED **QUEENSLAND**

Office: Parburg House, Eagle St., Brisbane, Queensland, Australia.

Alexander Corrie, chairman of board of directors; Edgar Hall (mgr.), M. A. Corrie, sec.; H. I. Stey, supt.

Inc. November, 1917, in Queensland, as reorganization of the Silver Spur Mining Co., **Cap.,** £75,000; shares 10s. par. **Dividends:** paid by old company totaled £25,000.

Property: 49 acres at Silverspur, 6½ miles from the border of New South Wales. A 44-mile railroad to the mine has been authorized by the Government. Examined by Lionel C. Ball, Government Geologist, in 1918. Ore contains galena, sphalerite, and chalcopyrite, averaging 12% lead, 25% zinc, 1% copper, $1 gold, and 26 oz. of silver per ton.

Development: by 520′ shaft and extensive workings. Dumps are reported to have a recoverable value of £500,000.

Equipment: includes hoist, compressor, crushing plant, roasters, and reverberatory furnaces.

Production: by old company £310,000. Late in 1918 a few hundred tons of ore was being smelted each month, and the resulting matte shipped to Cockle Creek, N. S. W., for refining.

WONBAH MOLYBDENITE MINING CO., LTD. QUEENSLAND

Address: Mt. Perry, Queensland, Australia.

Property: a molybdenite mine equipped with a concentrating plant which had made 5,000 lb. of concentrate from 400 tons of ore up to January, 1918.

SOUTH AUSTRALIA

BROKEN HILL ASSOCIATED SMELTERS PROP., LTD. S. A.

Office: H. L. Shackell, sec., 360 Collins St., Melbourne, Victoria, Australia.

Directors: W. L. Baillieu, chairman. C. Fraser, Bowes Kelly, F. A. Govett. Gilbert Riggs, chief met. eng.; H. St. J. Somerset, plant supt.; D. E. McBryde, Victoria, and W. S. Robinson. W. Robertson, gen. mgr.

Inc. May 7, 1915, in Victoria. **Cap.,** £1,000,000; shares £1 par; 730,000 issued and held by the Broken Hill Proprietary (£200,000), Broken Hill South (£200,000), North Broken Hill (£200,000), Zinc Corporation (£100,000); and British Broken Hill (£30,000).

Works: the largest lead smelting plant in the world, formerly owned by the Broken Hill Proprietary Co. at Port Pirie, S. Australia. The plant includes railroads, blast-furnaces of 6,000-ton per week capacity on 60% lead concentrate, roasting furnaces, Dwight-Lloyd and H. H. sintering machines, a 3,000-ton per week lead refinery, and 200-ton per week spelter works, limestone quarries in S. Australia and coke works at Bellambi, N. S. W. The ore supply for these works comes from 9 Broken Hill companies, also from outside sources. The smelter can produce 165,000 tons of lead, 5,000 tons spelter, and 6,500,000 oz. silver per year. The coke plant makes 100,000 tons yearly. Antimonial lead, assay lead, litharge, zinc dust, lino metal, and bar and granulated silver are made. The brand is B H A S in a diamond.

MT. LYELL CONSOLS WALLAROO COPPER MINES, N. L. S. A.

Reorganized as New Lyell Consols. Copper Mine, which see.

NEW LYELL CONSOLS. COPPER MINE S. A.

(Formerly Mt. Lyell Consols. Wallaroo Copper Mines).

Offices: T. Rollason, sec., 31 Queen St., Melbourne, Australia; 17 Coleman St., London, E. C. 2, England. **Mine office:** Kadina, Daly county, S. Australia. John Woolcock, gen. mgr.

Directors: T. C. Dunster, chairman; S. Cherry, George Dunham and Cecil Bain.

Inc. November 20, 1911. **Cap.,** £250,000; shares 10s. par; 350,000 issued.

Operations were suspended on account of the War, but in September, 1918, a head-frame, hoist and pump had been installed, and operations resumed on termination of a coal miners' strike.

Property: 150 acres, leasehold, including the Wallaroo Central mine, 70 acres, adjacent to the Wallaroo mine, shows schists and slates carrying numerous parallel veins including the famous Wallaroo Blue lode.

Development: by a 260′ shaft, showing 2 lodes of 18′ and 7′ average width, carrying ore with about 6% copper and $8 gold per ton. Shaft is being sunk to 350′.

Equipment: includes 250-h. p. steam plant with hoist, compressor, mine pump, and necessary mine buildings.

WALLAROO & MOONTA MINING & SMELTING CO. S. A.

Head office: Steamship Bldg., Currie St., Adelaide, S. A. **Mine offices:** Wallaroo mines and Moonta mines, S. A. **Works office:** Port Wallaroo, South Australia.

Sir J. L. Stirling, chairman of board of directors; F. G. Murdock, sec.; H. Lipson Hancock, gen. mgr.

Inc. 1889, in South Australia. **Cap.,** £400,000; shares £2 par; 160,000 issued.

Financial Statement, years ending December 31:

Year	Revenue	Net profit	Dividends	Surplus cash assets
1919*	.....	£53,265**	.....	£330,218
1918	£755,918	69,907	£80,000	381,144
1917	857,000	126,736	80,000	421,945
1916	852,670	231,505	120,000	250,851

* Half year. ** Loss after paying £29,083 for taxes.

Dividends: to end of 1918 totaled £2,614,254, of which £996,000 have been paid by the present company, the remainder by the old Moonta and Wallaroo companies.

Property: the famous Wallaroo mines at Kadina and the Moonta mines, at Moonta, S. A., which have yielded 723,172,800 lb. copper valued at £19,590,192 up to June 30, 1919.

R. L. Jack states that the Wallaroo lodes traverse schistose rocks of sedimentary origin, while the Moonta lodes are found in a mass of hard and brittle feldspar-porphyry. Minerals at Wallaroo are chalcopyrite, pyrite, pyrrhotite, with a little galena, blende, and gold; at Moonta, chalcopyrite, bornite, chalcocite, pyrite, a little gold and silver, etc. During the past 11 years copper content averaged 3.8%.

Development: at Wallaroo the main lode has been opened for a length of over 3,400′ and a depth of nearly 3,000′; at Moonta the main lode is opened for 3,840′ and to a depth of 2,500′. During 1918 new openings, including 464′ of diamond-drilling, totaled 4,455′, less than half of that in 1916. Total openings in the Wallaroo mines amount to over 39 miles, and in the Moonta mines to 40 miles. At Wallaroo, there are 2 main and 3 ventilating shafts. Owing to swelling ground, part of shafts is lined with concrete, which is also used in underground storage-bins.

Equipment: includes electric power plant, steam plants, complete mining and pumping plants, ore sorting and concentrating works, tailing leaching plant, smelter, sulphuric acid works, electrolytic refinery, etc.

Production: 1,758,038 tons of 15% ore (sorted) up to 1909, after which, to 1918, 599,825 tons of dressed ore, yielding a total of 723,172,800 lb. copper.

Year	Ore mined, tons	Dressed ore Smelted, tons	Copper, lb.	Gold, oz.	Silver, oz.	Sulphuric acid, tons	Price received per lb. copper	Cost per ton, copper
1919*....	.....	30,567	3,295,040	.....	.....	.....	.....	.....
1918.....	219,873	63,283	15,957,760	2,992	1,608	6,745	23.236 cts.	£93 (20.09c.)
1917.....	194,907	57,731	16,988,480	2,970	1,675	6,190	24.90 cts.	.....
1916.....	251,078	67,754	19,248,320	3,100	3,014	6,930	24.24 cts.	80 (17.22c.)

* Half year.

Costs from 1909 to 1915 varied between 11 and 12 cents per lb., rising from 17 to 20 cents in 1916-'18, due to high cost of wages, material, and fuel. About 2,000 men are employed.

TASMANIA

BRISEIS TIN & GENERAL MINING CO., LTD. TASMANIA

Office: T. P. Husband, Royal Bank Chambers, Collins St., Melbourne, Victoria, Australia.

Directors: (in London) F. S. E. Drury, chairman; W. Clarke, D. Currie, cons. eng., and H. W. Lake (in Melbourne; Sir A. J. Peacock and F. G. Hughes. L. C. Clark, gen. mgr.

Inc. Nov. 25, 1899, in England. **Cap.,** £600,000; shares £1 par; all issued.

Profit in 1917 was £28,966, plus balance of £10,420 from 1916. Dividends absorbed £30,000. Excess of assets was £40,000.

Dividends: 16/9 per share, or £502,500, from 1906 to 1918, inclusive, 1s. being paid in 1918.

Property: 180 acres alluvial tin claims at Derby, Dorset county, Tasmania; also 2,112 acres alluvial gold claims in N. E. Victoria.

Equipment: includes ditch lines and full hydraulic plants at the tin mine and 4 gold dredges at the Victoria property.

Production:

Year	Tin, Lbs.	Gold, Oz.
1914	311,160	6,015
1915	611,520	5,125
1916	1,046,080	5,538
1917	539,840	3,650
1918	672,000	1,054

In 1917 total reserves in the Tasmania tract amounted to 6,557,000 cu. yd. of gravel containing 4,405 tons of black tin; the Victorian area is nearly exhausted, but new properties have been acquired in New South Wales.

ELECTROLYTIC ZINC CO. OF AUSTRALASIA PROP., LTD.

Controlled by Amalgamated Zinc (De Bavay's), Ltd.; Broken Hill South Limited has a 20% interest.

Office: E. H. Shackell, 360 Collins St., Melbourne, Victoria.

H. W. Gepp, gen. mgr.; D. Meredith, asst. mgr.; Gilbert Rigg, cons. engineer.

Inc. May 16, 1916, in Victoria. **Cap.,** £1,000,000; shares £1 par; £250,000 issued.

Works have been erected at Risdon, near Hobart, in Tasmania, for the electrolytic treatment of zinc concentrate from Broken Hill, and production of high-grade spelter. The first unit producing 15 tons daily is at work, but is being enlarged to 100 tons. Hydro-electric power is used at the plant. During 1918 the plant treated 20,979 tons of concentrate from Broken Hill, yielding 3,822 tons of spelter, valued at £152,880.

KING ISLAND SCHEELITE CO. **TASMANIA**

Office: John Brandon, sec., 31 Queen St., Melbourne, Victoria, Australia. Alex. Campbell, chairman of board of directors. J. V. Brown, mgr.

Inc. March, 1917, in Victoria. **Cap.,** £50,000; shares 6/- par; all issued.

The half-year ended March 31, 1919, resulted in a profit of £11,280. A dividend absorbed £5,000, and £7,347 was carried forward. Assets exceed liabilities by £12,201.

Property: 153 acres at Grassy, King island, Bass Strait, between Victoria and Tasmania, Australia. The orebody consists of scheelite with garnet in a metamorphosed limestone and schist, and is somewhat similar to that near Bishop, Inyo county, Calif. The ore as mined averages from 0.8 to 1.1% tungstic acid.

Development: by 300′ tunnel, with a 190′ back at the face. Mining is by open-cut work, using a 2½-yard steam-shovel. Reserves are estimated at 78,000 tons. Overburden is moved at cost of 1/11 (46c) per cubic yard.

Equipment: includes a 100-ton gravity concentrating plant, cottages, school, etc.

Production: for half-year ended March 31, 1919, was 12,602 tons of ore averaging 0.79% WO_3, yielding 111 tons of 69.96% concentrate. Recovery was 77.2%. Total output, 347 tons of concentrate. Costs total 13/6 ($3.18) per ton.

MAGNET SILVER MINING CO. **TASMANIA**

Address: Magnet, Tasmania.

Property: a large silver-lead mine in northwestern part of Tasmania.

Geology: the Magnet lode is the hanging-wall portion of a dike of ultra-basic igneous rock which is known as websterite-porphyry. The dike runs N. E.-S. W. and dips N. W. The lode is made up of a number of parallel bands of galena, alternating with siderite and dolomite, forming a lode or belt that averages 40′ in width with a maximum width of 100′.

The mine workings have three parallel drifts on each level, in order to mine the three paystreaks or veins. The galena contains some blende. The precious metal content was high in the upper part of the lode—averaging $2 gold per ton, and 4 oz. of silver for each unit of lead. This zone of enrichment persisted downward to considerable depth, fading into leaner primary ore, with an increased amount of blende. Siderite, dolomite, and calcite compose the gangue, quartz being absent. The ore carries some of the rarer lead and antimony minerals.

Development. by 1,000′ main shaft with 14 levels. Shaft sinking was continued during 1919.

Equipment: 650-h. p. hydro-electric power plant, two 75-h. p. motor-driven centrifugal pumps of 12,500 gal. per hour capacity on No. 13 level, one 155-h. p. hoist, and concentrator. Over 150 men are employed.

Production: in 1918 mine produced 10,455 tons of ore yielding 2,099 tons of concentrate containing 1,686,726 lb. of lead, and 136,166 oz. silver, worth £49,436 gross, or £31,942 net.

MT. BISCHOFF EXTENDED TIN MINING CO. **TASMANIA**

Offices: John Ditchburn, sec., 17 Queen St., Melbourne, Victoria, Australia; and Box 4, Waratah, Tasmania.

Directors: H. W. C. Smith, chairman; A. T. Robb, D. McRorie, M. J. Sheehan, and J. H. Gillies. C. W. Gudgeon, supt.

Inc. April 20, 1905, in Tasmania and Victoria. **Cap.,** £16,000; shares 10/- par; all issued. Revenue in 1918 was £33,499, and profit £8,114.

Dividends: total 4/- per share, equal to £6,400.

Property: 433 acres at Waratah, Tasmania, containing a tin-bearing fissure vein cutting through slate, quartzite, and porphyry. Ore carries 1% of tin, and occurs in a 12″ streak.

Development: by 3 crosscut tunnels, 1,600, 1,200 and 720′ long, the lowest with a 1,000′ back. Total work aggregates 26,978′. Reserves total 31,000 tons of ore blocked out, plus 24,000 tons probable ore, assaying 0.96% tin.

Equipment: includes steam power plant, two 450 cu. ft. compressors, 3 centrifugal pumps, 1,900′ incline haulage tram, a 20-stamp mill, with 4 concentrating tables treating 100 tons of ore daily, with a recovery of 69-72% of the tin content.

Production:

Year	Ore, tons	Tin oxide,* ton
1918	14,690	165
1917	13,723	182
Total to date	145,458	1,807

* The oxide contains 70.76% tin.

MT. BISCHOFF TIN MINING CO. **TASMANIA**

Offices: H. Ritchie, sec., 51 George St., Launceston; and Waratah, Tasmania.

Officers. L. G. Thompson, chairman; A. Evans, F. P. Hart, E. M. King, J. B. Waldron, Jr., directors. C. W. Gudgeon, gen. mine mgr.; F. B. Jackson, smelter mgr.

Inc. 1872, in Tasmania. **Cap.,** £60,000; shares £5 par; all issued; 4,400 fully paid, and £7,600 £1 paid-up, making paid-up capital £29,600.

Profit for half-year ended June 30, 1919, was £5,108, plus previous balance, etc., making £83,909 available. Dividends absorbed £7,500, and £74,202 was carried forward. Profit for second half was £12,114. Net balance forward was £75,022.

Dividends: to Dec., 1919, total £210/4/6 ($1,009) per share.

Property: a tract of tin-bearing lands at Waratah, West Coast region of Tasmania, which shows an orebody surrounded by a semi-circular dike of barren eruptive rock cutting through pyritized slate.

Ore reserves: 1,066,000 tons of ore, averaging 0.28% metallic tin. Mining in this wet region, in which the rainfall is 80 inches a year, is by open-cut work.

Equipment: includes a complete mining plant, aerial trams, electric

railway, power-plant, concentrating mill, shops, sawmill, and reverberatory smelter at Launceston, which treats both company and custom ore.

Production: during the first half of 1919 the smelter handled 216 tons of concentrate yielding 291,200 lb. of tin; also 1,168 tons of custom ore yielding 1,814,400 lb. tin. Second half yielded 284,480 lb. metal. At the end of 1918 (48 years of operation) the total output was 75,553 tons of metallic tin, valued at £5,149,916.

Mt. Bischoff is one of the great tin mines of the world and its operations very profitable to its shareholders.

MOUNT LYELL MINING & RAILWAY CO., LTD. TASMANIA

Head office: Collins House, Melbourne, Australia. **London office:** Palmerston House, Old Broad St., London, E. C. 2, England. **Operating and works office:** Queenstown, Tasmania. **Mine office:** Gormanston, Tasmania. **Chemical works:** Melbourne, Victoria; Fremantle, Western Australia.

Bowes Kelly, chairman of board of directors; A. Williamson, chairman of London board; D. G. Lumsden, sec.; W. G. Moss, asst. sec., Melbourne office. Edwin Habben, London, sec. **Staff:** Robt. C. Sticht, gen. mgr.; Basil Sawyer, local supt.; Robt. P. Roberts, chief metallurgist; R. M. Murray, mine supt.; G. F. Jakins, asst, mine engr.; G. W. Wright, mech. engr.; H. J. Clarke, engr. for supplies; Thos. W. Haynes, business mgr. of chemical works.

Inc. August 11, 1903, in Victoria, as a merger of a former company of the same name, with the North Mount Lyell Copper Co., Ltd. **Cap.**, £1,300,000; shares £1 par; 1,289,195 issued. Annual meeting in December.

Financial Statement, years ending September 30:

Year	Revenue	Net profit	Dividends	Current assets	Current liabilities
1919	£678,305	£130,233	£80,575	£1,070,553	£367,673
1918	916,086	247,229	161,149	1,066,545	442,660
1917	1,003,938	268,611	209,494	1,176,182	633,186
1916	943,706	239,002	209,494	.....	.....

Dividends: began in 1904. In recent years were: £64,460 in 1914; £145,034 in 1915; £209,494 in 1916; £209,494 in 1917; £161,149 in 1918. Total, £2,640,055. The old company paid dividends of $996,574, making total dividends, to end of 1918, £3,636,629.

Operations of the company include mining and smelting copper ore in Tasmania, mining pyrite in Tasmania, with the manufacture of acid and superphosphates in the States of Victoria and Western Australia, and the manufacture of coke in New South Wales. The operations of the company are of a high technical order.

Mt. Lyell controls the Mt. Read & Rosebery Company, which see.

Property: 2,124 acres, inclusive of 5 consolidated claims, leased for 21 and 30-year periods, and 565 acres of mill and smelter sites, in the Mt. Lyell district, with mineral lands in other parts of Tasmania, where prospecting and mining work is in progress. The principal mining operations at Gormanston, in the Mt. Lyell district, on the west coast of Tasmania, 14 miles in an air line from the post of Strahan, on Macquarie harbor.

The Mt. Lyell pyritic orebody was discovered 1883, but its value for copper was not then recognized. Other mines in the same district were unsuccessful, though the value of the North Mt. Lyell mine was recognized in 1897, but it was not profitable until it was merged in the present company in 1903. Owing to the silicious nature of the North Lyell ore, neither concentration nor smelting was successful and the undertaking was a failure financially after the expenditure of about £800,000. The amalgamation of the 2 mines, effected 1903, gave a single magnificent property, the pyritic ore of the Mt. Lyell and the silicious ore of the North Mt. Lyell being natural smelting complements.

Geology: rocks of the Mt. Lyell mine are hydro-mica schist conglomerate quartzite and sandstone, with mineralization occurring along a schist-conglomerate contact that is a crush-zone formed by an overthrust fault.

The orebody is a huge lenticular mass, measuring 270′ wide by 660′ long, on the 4th level, a vertical depth of 750′. This lens originally contained 6,500,000 long tons of ore, but about two-thirds of it has been extracted. The ore as now mined averages 0.54% copper, 1.96 oz. silver and 0.04 oz. gold per ton; it is a very clean pyrite, carrying but 6% silica, 2% alumina, and 2.5% barium sulphate, with a very little zinc and a trace of lead.

The copper content occurs as chalcopyrite and tetrahedrite, disseminated through the pyrite. On the southern end of the orebody there was an enrichment, consisting of chalcopyrite and bornite, with some chalcocite, in a silicious gangue, which commenced 350′ below the surface and persisted to within 150′ of the bottom of the lens. In about the center of the footwall side a second enrichment was found, commencing 100′ below the surface, and extending downward for 75′. In 1894 this high-grade ore streak yielded 850 tons of this ore, which was enriched by stromeyerite, and ran 21% copper, 1,010 oz. silver and 0.1 oz. gold per long ton. This bonanza oreshoot netted the old company £105.000.

Development: the orebody is opened by shafts with 9 levels, in which crosscuts and contour drifts encircle it. The upper levels are obliterated by an enormous open-cut, from which the ore is extracted in a series of benches with simultaneous removal of overlying or underlying country rock, the ultimate bottom of the quarry being the fifth level, 450′ below the surface. Only underground extraction is feasible below the fifth level. A vertical 400′ shaft sunk underground from the fifth level and an incline shaft open up the lower levels. The daily output from the mine is about 1,000 long tons of ore. Depleted stopes are filled with waste from the schist and conglomerate overburden. The removal of 2,000,000 cu. yd. of capping has exposed 1,200,000 cu. yd. of ore.

The South Lyell orebody, though much smaller and without outcrop, is similar to that of Mt. Lyell. Its top is 350′ below the surface and it is proven for 500′ downward, or 150′ below the lowest level in the Mt. Lyell mine; its further extension has not been explored. The orebody has been developed from the Mt. Lyell workings on each of the 5 lower levels, and it is now worked as a part of that mine. South Lyell reserves total 400,000 tons.

Combined reserves in the Mt. Lyell and South Lyell mines are:

Year	Tons	Copper, %	Silver, oz.	Gold, oz.
1919	1,910,388	0.50	1.50	0.04
1918	2,028,747	0.49	1.48	0.04
1917	2,013,439	0.50	1.60	0.04
1916	1,815,505	0.53	1.96	0.04

The daily production during 1918 was 400 tons, compared with 700 tons in previous years; South Lyell contributed 120 tons.

During the year ended Sept. 30, 1919, the mines produced 118,358 tons of ore, principally from underground workings, the lower benches of the open-cut supplying only a minor amount.

Equipment: all machinery is electrically operated, with current from the company's Lake Margaret hydro-electric power station, 7 miles distant. The incline shaft raises all ore from the mine by an electric hoist geared to a 200-h. p. induction motor, current 550 volts, having capacity of 600 tons in 8 hours. Self-dumping skips containing 3 tons of ore are used. Compressed air is supplied by 3 high-speed compressors with an aggregate capacity of 3,600 cu. ft. of air per minute at 90-lb. pressure, direct coupled to 300-h. p. synchroneous motors taking current at 3,000 volts. The air supply is diverted, when required, to the North Lyell mine by means of a 6,000′ pipe-line. Mine water is lifted by 3-throw electrically-driven pumps, capacity 100 g. p. m. There are 2 units in the station, though one is sufficient to handle the normal flow of water. The drill shop is equipped with machine sharpeners.

North Mt. Lyell Mine.

Geology: the North Lyell ore occurs as large nuclei in pyritic disseminations in quartzite and to some extent in schist. Copper occurs as bornite and chalcopyrite with some chalcocite and occasional tetrahedrite, all associated with a small amount of pyrite. The ore is found at the contact between schist and conglomerate, these rocks being intensely silicified and pyritized on each side of the rather indistinct contact plane. This alteration usually ends abruptly against normal schist, but fades out into normal conglomerate. Very rich ore, carrying up to 60% copper, as bornite and chalcocite frequently occurs. Only one of many closely-associated orebodies—more properly called enrichments in the mineralized contact zone—outcropped at surface. This was a vertical pipe-like deposit, now worked out, which was 1,100′ long and of very irregular cross section. The other and more important bodies, are first seen on the 500′ level, where the dip of the conglomerate is reversed from west to east. The oreshoots follow the hanging wall, lengthening rapidly with depth, until at the 1,000′ level, they form an almost continuous orebody some 1,500′ long, and varying in width up to 100′. The character remains unchanged down to 1,200′, the present lowest level, except perhaps that the amount of chalcocite is increasing. The North Lyell ore as broken, averages 6% copper and 1.33 oz. silver per long ton, with a trace of gold. The gangue averages 66% silica, 7% iron, and 7.5 to 11% alumina.

Development: the mine is worked by tunnels and shafts. The upper tunnel, or 200′ level, is the main entry. The lower tunnel is the 300′ level. There are 9 other levels, opened from the shaft at intervals of 75, 100, and 150′, the lowest being at the 1,200′ horizon. Filling for depleted stopes is brought from surface by means of 3 main waste pass systems, each comprising a trunk pass, and numerous branches.

Ore reserves:

Year	Tons	Copper, %	Silver, oz.	Gold, oz.
1919	960,242	6.0	1.33	0.005
1918	1,036,300	6.0	1.33	0.005
1917	997,900	6.0	1.33	0.005
1916	1,140,340	6.0	1.33	0.005

The North Lyell has excellent prospects of further orebodies, and the ore is not only persistent to the greatest depth yet reached, but is high in copper, and although too silicious for straight smelting, blends with the pyritic ore of the Mt. Lyell to make an ideal smelter charge. Part of the output is treated in a flotation plant, erected in 1916.

Equipment: the main North Lyell shaft has a 400-h. p. electric hoist, good for 1,500′ depth; the other shafts have air-driven hoists, at 90-lb. pressure. The mine water is very corrosive, and is lifted by 3-throw plunger pumps of 100 g. p. m. capacity, in 2 lifts of 400′ each.

Output during the year ended Sept. 30, 1919, North Lyell produced 76,058 tons of ore averaging 7.55% copper, 1.94 oz. silver, and 0.01 oz. gold. This was much below the normal quantity.

The Lyell Tharsis mine acquired when supposedly worked out, contains a large quantity of low-grade chloritic schist, carrying disseminated chalcopyrite and pyrite; this ore lies on the hanging-wall side of the old silicious orebody.

The South Tharsis and Royal Tharsis mines are idle. These properties carry chalcopyrite and pyrite, disseminated sparingly in schist, the ore, though of low average grade and not amenable to ordinary wet concentration, can be profitably mined and concentrated by flotation. The Mt. Lyell Comstock property, 339 acres, is contiguous to the North Lyell, and contains the northern extension of its orebodies. The mine is worked to supply a flotation plant. The ore is chalcopyrite in schist, the mine producing 50 tons daily, averaging 2.17% copper.

Reduction Works and Accessories.

A 1½-mile aerial tram can transport 750 tons ore daily from the Mt. Lyell mine to the smelter. There also is a 4,500′ incline surface tram, connecting with a ¾-mile 2′ gage steam railway to the smelter, also serving for the delivery of North Lyell ore, and for general traffic.

The company owns a 22-mile railway that connects the Queenstown reduction works with the seaport of Strahan, giving rail connections with all parts of the State. A second line connects Gormanston with Kelly basin, near the head of Macquarie harbor, 25 miles from Strahan.

Power-plant: a model hydro-electric station at Lake Margaret is connected with the reduction work by 6 miles of 2′ tramway.

Smelter: the reduction works are at Queenstown on the Queen river, 1½ and 2½ miles from the Mt. Lyell and North Lyell mines, respectively. The first permanently successful pyrite smelting ever accomplished was done here in 1896, under the direction of Robert Sticht.

The smelter has four 54 and 210″ blast-furnaces, 29¾′ high from tapping floor to feed floor, with box type cast-iron water-jackets, and of solid construction, suitable for pyrite smelting. The furnaces have special mechanical feeders and lifts, hydraulically operated.

The charge, averaging 2.5% copper, is brought to a matte containing 42% in one operation. Slags average 0.40% copper, 35 to 38% silica, 42 to 48% iron protoxide, 6.5 to 7.5% alumina, 1.5 to 2% barium oxide, and 4% calcium oxide.

The amount of coke used was as low as 1% or less, but is now from 3 to 5% as the charge contains less sulphur than formerly.

Flotation concentrate and flue-dust are either sintered or treated in a nodulizing plant.

The furnaces have a stationary oval, sheet steel, chrome-brick lined forehearth, 19′ long, cooled by water sprays. This is followed by the older rectangular, uncooled cast-iron forehearths, from the last of which the slag flows into a stream of water for granulation.

A new converter plant, erected in 1918, contains Great Falls upright type vessels, 10′ in diameter and 11′ 7″ high, electrically operated.

The final product, blister copper carrying 98.86% copper, 42.89 oz. silver, and 1.11 oz. gold per long ton, is refined by the Electrolytic Smelting & Refining Co. at Port Kembla, New South Wales.

The flotation plant is treating about 100 tons daily of 3.43% copper ore, recovering 90.41% of this metal and making a 10% concentrate.

Company owns acid and fertilizer plants, all having Herreshoff calciners, sulphur burners, and the ordinary chamber process for making sulphuric acid. Crude phosphate rock is secured from Ocean and Christmas Islands. The products of these plants include a variety of superphosphates and commercial fertilizers, the demand for which is rapidly increasing in Australia. The raw material for acid is furnished by the Tasmanian mine, Spanish pyrite, and sulphur from Japan and Italy. Unfortunately, it is commercially impracticable to utilize the sulphurous acid fumes from the Mt. Lyell smelter, because of the high freight rates, either in carrying the acid away from Mt. Lyell, or bringing in the crude phosphate rock, but experiments are under way with a view of recovering sulphur from pyrite. Coal-dust firing is used in the rotary distillation furnace. The superphosphate works are in Victoria and Western Australia.

The company employs about 1,700 men in Tasmania; about 850 men at the mines, 150 on the railways, and 700 at the reduction works.

Costs: average cost of mining, smelting, and converting, from 1896 to 1903, was 22/10 ($5.48) per ton, and by this company for 6 years ending 1909 the total mining and smelting cost per ton was 14/10 ($3.56), a figure that reflects great credit upon an efficient staff.

The past few years show the following cost per ton of ore:

Year	Mining	Smelting	Converting	Total
1919	16/4 ($3.88)	17/3 ($4.10)	1/8 ($0.40)	35/3 ($8.39)
1918	13/1 (3.14)	14/1 (3.38)	2/– (0.48)	29/2 (7.00)
1917	12/3 (2.94)	12/3 (2.94)	2/– (0.48)	26/6 (6.36)
1916	10/5 (2.50)	11/6 (2.76)	1/7 (0.38)	23/6 (5.64)

Recent advances are due to increased underground work and cost of supplies.

Production: the present output is less than the 408,000 tons normally treated. The total production from 1896 to September, 1919, was 7,168,348 tons of ore, yielding 162,600 tons of copper, 12,574,276 oz. silver and 365,298 oz. of gold. Of this ore tonnage, Mt. Lyell contributed 5,081,000; North Lyell, 1,713,000; Lyell Comstock, 29,000; concentrates, 21,600; purchased ores, 169,829, and metal-bearing fluxes, 170,476 tons.

Recent returns are as under:

	Ore Smelted, tons	Copper, tons	Silver, oz.	Gold, oz.
1919	185,177	5,314	266,864	5,538
1918	240,947	5,705	320,344	7,042
1917	239,940	5,766	295,126	7,455
1916	158,663	6,505	371,170	8,865

The Mt. Lyell enterprise has had to contend with a series of grave financial, mining and metallurgical problems, all solved with skill and success. A serious handicap is the heavy rainfall, averaging 110″ yearly, hampering a mine worked by open cuts. Furthermore, two-thirds of the ore averages even lower in copper-contents than the leanest of the successful native copper mines of the Lake Superior district, which, for 2 generations, treated the lowest grade copper ore in the world until this unenviable, but highly creditable record passed to the Mt. Lyell. The management is excellent, in all departments, and the success of the company is due to an effective combination of financial ability with high technical skill.

MT. READ & ROSEBERRY MINES, LTD. **TASMANIA**

Subsidiary of Mt. Lyell M. & R. Co.

Offices: D. G. Lumsden, sec.; W. G. Moss, asst. sec., Collins House, Melbourne, Victoria, Australia; and E. Habben, sec., Palmerston House, London, E. C. 2, England.

Bowes Kelly, chairman of board of directors; R. C. Sticht, gen. mgr.; E. R. Crucher, metallurgist.

Inc. Sept. 21, 1916, in Victoria. **Cap.,** £1,000,000; shares £1 par; 156,503 issued. Debentures of £240,000 are to be issued at an early date. Meanwhile, Mt. Lyell is advancing money for operations, the amount to October, 1919, being £167,987.

Property: 2,066 acres, being a consolidation of the leaseholds held by the Hercules Gold & Silver Mining Co., Tasmanian Copper Co., and Primrose Mining Co., near the town of Rosebery, in West Coast region of Tasmania. The Hercules North Blocks were acquired in 1919 for 6,500 fully-paid shares.

Development: in recent years consisted of diamond-drilling, while the old workings were retimbered. The mines are now said to be ready to supply a mill. Openings are entirely by adits.

Ore reserves:

Mine	Tons	Zinc, %	Lead, %	Silver, oz.	Gold, oz.
Hercules	411,836	30.26	7.25	8.12	0.143
Rosebery	652,351	25.60	7.34	10.48	0.118
Total	1,064,187	27.40	7.30	9.57	0.127

The ore is complex, being a dense intimate mixture of blende, galena, and iron pyrite, and the former owners had great difficulty in treating and in marketing it. Trial lots were sent to Broken Hill for flotation, and to Great Falls, Montana, for electrolytic treatment.

Electric power will be obtained from the Mt. Lyell plant, and from a 15,000-h. p. plant to be erected at Lake Rolleston, near Zeehan. Late in 1919 it was propesed to erect electrolytic works at Zeehan, with an initial capacity of 50 tons of zinc daily.

Production: total prior to 1916 was 280,000 tons of ore for £354,000.

PIONEER TIN MINING CO. **TASMANIA**

Address: C. G. Ryan, Bradshaw's Creek, Tasmania.

Property: the Argonaut and Pioneer mines, working alluvial tin ground by blasting and hydraulicking. Company has an hydro-electric plant, which generates power at 0.05 pence (0.1 cent) per unit.

Profit for year ended June 30, 1917, was £44,893, of which £44,342 was distributed.

Pioneer Mine.

Production:

Year ended June 30—	Yardage	Cost per yard	Stream tin recovered tons	Per yard
1917	894,700	4,487d.	471	1.179 lb.
1916	996,000	3.846d.	444	0.999 lb.
1900-1917	8,676,900	5.930d.	6,446	1.664 lb.

Argonaut Mine.

1917	142,000	6.074d.	51.998	0.893 lb.
1916	101,000	8.061d.	47.748	1.051 lb.
1913-1917	531,400	5.850d.	213,300	0.899 lb.

TASMAN & CROWN LYELL EXTENDED MINES **TASMANIA**

Office: W. B. Arnold, sec., 39 Queen St., Melbourne, Victoria, Australia.

F. S. Fitchett, chairman of board of directors; D. W. Welch, supt.

Inc. in Victoria. **Cap.**, £150,000; shares 10/- par; all issued.

Revenue from ore sales for 9 months, ending June 1, 1919, was £1,334, and expenses £3,690.

Property: in Mt. Lyell district, Tasmania, contains lenticular contact deposit in schist, the ore being a sulphide that assays 30% lead, 20 oz. silver, 20% zinc, with some iron.

Development: by 1,800′ of tunnels, reaching depth of 240′. Reserves are 30,000 tons.

Equipment: includes a concentrating plant, to which flotation is to be added.

TASMANIA GOLD MINE, LTD. **TASMANIA**

After producing gold of a total value of £3,607,807 this property at Beaconsfield, near Launceston, is being cleaned up and the company liquidated.

VICTORIA

BENDIGO AMALGAMATED GOLDFIELDS **VICTORIA**

Office: Bendigo, Victoria, Australia. A. H. P. Moline, gen. mgr.

Financial Statement: during the year ended July 2, 1918, receipts were £161,907 ($777,000) from gold, other items making a total of £165,789 ($797,000). Wages absorbed £108,032 ($518,000). Including the previous balance of £58,841 ($283,000) expenditures used up the total revenue. In the first half of the 1918-'19 year there was a loss of £10,718, but the second half yielded a profit of £2,934.

Property: this company was organized in 1917 to consolidate about 40 old producers in the center of the Bendigo Goldfield (which has yielded

over 18,000,000 oz. since 1850), explore them systematically by new openings and diamond-drilling, and equip them, if warranted, with modern plant. Operations are concentrated at a number of central points. Eight lines of "reef" are included in the area, ranging from 4,500 to 22,000 ft. in length, totaling 93,900 ft. Most of the shafts are over 2,000 ft. deep, some being over 3,000 ft.

Development: 22,555′ of prospecting and development, and 3,737′ of drilling (shot and diamond). Fifty faces were being followed. Continuous geologic examination is made, as the structure of the field is complex. A number of minor discoveries were made, but no high-grade shoots of any extent were found. Tributors are at work in certain parts of the mines.

Equipment: includes 30 hoists, 3 compressor stations capable of generating enough air for 150 to 180 drills, and stamp-mills of 566 tons daily capacity.

Production: in 1917-'18 the mills crushed a total of 132,351 tons for the company, yielding, with concentrates, gold worth £134,390 ($643,000); and for tributors 14,418 tons for £27,517 ($136,000). In 1918-'19 the mills treated 112,977 tons yielding 41,022 oz. gold. Ore treatment—stamps, amalgamation, and concentration—is not difficult, and tailings assay only from 24 to 56 cents per ton. Report gives considerable details of underground work and drilling. In August, 1919, the output was 5,097 oz. of gold from 8,554 tons of ore. The Constellation contributed 1,295 tons of 1.7 oz. ore.

This is a bold and probably final attempt to resuscitate the Bendigo field.

BRISEIS TIN & GENERAL MINING CO., LTD. VICTORIA

See same title under Tasmania for office, etc.

Property: 2,112 acres of alluvial ground on Yackandandah and Sandy Creeks, N. E. Victoria. Four dredges were operated, but the area is nearly worked out.

Production: 6,015 oz. gold in 1914; 5,125 oz. in 1915; 5,538 oz. in 1916; 3,650 oz. in 1917, and 1,054 oz. in 1918.

COCK'S PIONEER GOLD & TIN MINES VICTORIA

Office: E. H. Shackell, Collins House, Melbourne, Victoria, Australia.

J. L. Wharton, chairman of board of directors. H. Falconer, mgr.; A. H. P. Moline, cons. eng.

Inc. May 14, 1913, in Victoria. **Cap.**, £150,000; shares £1 par; 100,000 issued.

Profit for half-year ended May 31, 1919, was £6,674. Current assets exceeded liabilities by £19,466.

Dividends: 5% in 1915; nil in 1916; 15% in 1917, 1918 and 1919. Total to date is £45,000.

Property: 752 acres of alluvial ground on Eldorado creek, 13 miles from Wangaratta, Victoria. Equipped with hydraulicking plant.

Production, in recent half-years:

Period	Yardage	Gold, oz.	Tin, tons
1919 (May 31)	462,000	3,786	52
1918 (Nov. 30)	389,000	3,981	53
1918 (May 31)	371,000	4,056	56
1917 (Nov. 30)	364,000	4,064	61

Costs are 8.7 pence (17.4 cents) per yard.

SOUTH NEW MOON GOLD MINING CO. VICTORIA

Office: G. H. Green, High St., Eaglehawk, Bendigo, Victoria, Auctralia.

H. R. Williams, chairman board of directors. Wm. Westhead, supt.

Inc. in Victoria. **Cap.**, £32,000; shares £1 par; all issued.

Property: a gold mine in Bendigo field.

Development: by vertical shaft 2,010′ deep, and extensive workings.

Equipment: steam power, hoist, 20-drill compressor, and 40 stamp-mill.

Production: totals 439,684 tons, yielding 242,529 oz. gold.

WESTERN AUSTRALIA

ASSOCIATED GOLD MINES OF WESTERN AUSTRALIA, LTD.

Office: R. Davidson, sec., 20 Copthall Ave., London, E. C., England. **Mine office:** Kalgoorlie, W. A.

Directors: E. Hooper, chairman; D. F. McAulay, gen. mgr.

Inc. Dec. 19, 1894, in England. **Cap.,** £500,000; shares £1 par; 495,364 issued. Company is largely interested in the Porcupine V. N. T. Gold Mines, Ltd., and owns the Keeley mine in Ontario.

Revenue for the year ended March 31, 1918, was £103,660, but there was an operating loss of £746, and debit balance is now £8,577. In 1919 the loss was £9,991.

Dividends: from 1898 to 1909 totaled 150%. In 1913 and 1914 2½% each; nothing since. The total is £703,833.

Property: 54 acres on the "Golden Mile," Kalgoorlie, W. A. It has produced a large amount of gold, especially from 1898 to 1904.

Development: by vertical shaft 2,200′ and extensive workings. Reserves are difficult to estimate. Ore is a sulpho-telluride.

Equipment: complete mining, hoists, compressors, electric power, also 350-ton plant using crushers, ball-mills, roasters, pans, cyaniding equipment and filter-presses.

Production: for the year ended March 31, 1917, was £124,611 from 93,430 tons, compared with £103,579 from 81,528 tons in 1918; £101,510 from 71,603 tons in 1919. The total gold produced to September, 1919, was £4,167,752 from 2,035,121 tons of ore. Costs were $6.56 per ton.

BULLFINCH PROPRIETARY (1919), LTD. WESTERN AUSTRALIA

A reorganization of Bullfinch Proprietary (W. A.), Ltd.

Office: C. Hay, Worcester House, Walbrook, London, E. C. 4, England.

Sir G. P. Doolette, chairman of board of directors. A. L. Hay, mgr.

Inc. December, 1919, in Great Britain, as a reorganization of company formed in November, 1910.

Profit of old company in 1917 was £3,468, out of an income of £61,177. £3,000 was transferred to reserve for income tax. Assets exceeded liabilities by £11,000.

Dividends: 5% in 1913; 8¾% in 1914; 5% in 1915; 2½% in 1916; nothing since.

Property: 162 acres in the Bullfinch field, near Southern Cross; and 4 leases at Wombola on Hampton Plains, 10 miles S. E. of the Celebration Lease on Block 50, acquired late in 1919.

Development: at Bullfinch by shaft to 510′. Reserves were estimated to be 80,000 tons, averaging 21/- ($5.04) per ton.

Equipment: hoist, compressor, shops, 20 stamps, 2 tube-mills, cyanide plant.

Production, years ended December 31:

Year	Tonnage	Gold yield	Profit	Cost per ton
1918	58,609	£60,412	£4,638	.....
1917	62,004	61,266	3,468	17/– ($4.08)
1916	71,360	76,863	8,300	16/5 (3.94)
1915	76,886	100,035	40,000	15/7 (3.67)
1914	74,398	109,478	49,000	16/2 (3.81)
1913	52,679	143,809	94,700	18/8 (4.40)

The above table indicates the end of a short and profitable career of the mine at Bullfinch. Directors are optimistic concerning the new property.

BULLFINCH PROPRIETARY (W. A.), LTD.

Reorganized December, 1919, as the Bullfinch Proprietary (1919), Ltd., which see.

CELEBRATION SYNDICATE **WESTERN AUSTRALIA**

Address: Richard Hamilton, Great Boulder Proprietary Mine, Kalgoorlie, W. A.

The Syndicate is composed of P. Fitzgerald, A. Francis, Richard Hamilton, John McDermott and J. W. Sutherland, mining engineers of Kalgoorlie.

Property: an option for £25,000 on a new mine on Block 50 of Hampton Properties, Ltd., which see for full description. Gold deposit was discovered about mid-1919, and by November the reserve was estimated at £1,000,000. The lease was acquired by Lionel Robinson, Clark & Co., who floated a company in London called Hampton Celebration (W. A.), Ltd., which see. The purchase price was £50,000 cash and £100,000 in shares.

EDNA MAY GOLD MINING CO. **WESTERN AUSTRALIA**

Address: M. T. Williams, gen. mgr., Westonia, near Southern Cross, Western Australia.

Inc. in Victoria. **Cap.,** 42,850 shares of 10s. each.

Dividends: regular of 1/- (25 cents) per month are paid, the total to April, 1919, being £325,660, equal to £7 12/- per share.

Property: a gold mine at Westonia, in the Southern Cross district, Western Australia.

Development: by vertical shaft to depth of 480'. Water has been very troublesome, and up to 60,000 gal. per hour has been pumped.

Equipment: steam power, pumps, hoist, compressor, shops, 10 stamps and cyanide plant.

Production: to September, 1919, was £728.003 from 191,493 tons of ore. The monthly tonnage was around 2,100 of 56/- ($13.40) value. Costs were 36/- ($8.64) per ton, mining being 24/- ($5.75).

In October, 1919, operations ceased, owing to exhaustion of reserves.

FREMANTLE TRADING CO., LTD. **WESTERN AUSTRALIA**

Office: E. H. Woolcott, Salisbury House, London, E. C. 2, England.

Directors: E. P. Jones, chairman; A. E. Lund, and J. A. Morris. W. G. Sutherland, mgr.

Inc. July 28, 1909, in Great Britain. **Cap.,** £75,000 in 45,000 pfce. and 30,000 ord. shares, £1 par, of which 26,100 pfd. and all ord. shares are issued and fully paid.

Profit for first half of 1918 was £26,821, less £21,220 for depreciation. £5,610 was distributed. Current liabilities exceed assets by £28,419.

Dividends: from 1909 to 1918, a total of 108% on pfce. and 48% on ord.; 10% on each in 1917-'18.

Property: 1,020 acres, near Northampton, W. A., including the Baddera, Narra Tarra, and Wheal Ellen lead mines.

Development: by 460' shaft at the Narra Tarra, with over 1,000' of work along the lode. Ore is from 5 to 20' wide. Mine output is about 25,000 tons of ore per year. At the Baddera, the 455' main shaft opens up a lode from 4 to 16' wide that averages 10.5% lead, but recent development is reported to be disappointing. The annual output is 21,000 tons of ore. The Wheal Ellen shaft, 135' deep, is sunk on a lode 5' thick.

Equipment: includes a concentrator at the mines, and a smelter at Fremantle, which when operating also handles custom ores. Output was about 400 tons of lead monthly in 1918. Smelter was originally erected to treat the rich gold ore from the Kalgoorlie mines.

GOLDEN HORSE SHOE ESTATES CO., LTD. **W. A.**

Office: A. Swanne, Salisbury House, London, E. C. 2, England.

Sir J. S. Purcell, chairman of board of directors. J. W. Sutherland, gen. mgr.; V. H. R. Murray, mine supt.; C. E. Blackett, metallurgist.

Inc. Feb. 28, 1899, in England. **Cap.,** £1,500,000; shares £5 par; all issued. **Debentures:** £5,400 of 6% outstanding.

Profit in 1917 was £100,797, of which dividends absorbed £82,500. £6,494 was carried forward. Current assets exceeded liabilities by £20,000. In 1918 the revenue was £332,620 and dividends £37,500.

Dividends: since 1899 total £10 15/- per share.

Property: 24 acres of producing ground and 85 acres of other areas on the Golden Mile, Kalgoorlie, W. A.

Development: by 2,242 and 3,140′ vertical shafts and extensive workings. Reserves at end of 1918 were 733,102 tons of 9¼ dwt. ore.

Equipment: is complete and modern, including compressors, hoists, crushing plants, a 170-stamp mill with 5 tube-mills, concentrators and cyanide plants.

Production: total to September, 1919, was £11,033,686 from 4,594,698 tons of ore. The past 3 years results were as under:

Year	Tons	Gold
1918	146,664	£332,620
1917	176,028	411,546
1916	162,316	345,529

Costs total $11 per ton.

GREAT BOULDER PERSEVERANCE G. MNG. CO., LTD. W. A.

Mine being worked by tributers. Output to date is £6,737,614 from 3,466,930 tons, and £1,531,250 paid in dividends. Company is being liquidated. See Vol. XIII.

GREAT BOULDER PROPRIETARY GOLD MINES, LTD. W. A.

Office: J. Gregory, 80 Bishopsgate, London, E. C. 2, England.

Sir G. P. Doolette, chairman of board of directors. Richard Hamilton, gen. mgr.

Inc. June 20, 1894, in England. **Cap.,** £175,000; shares 2s par; all issued.

Revenue during the year 1917 was £529,718, of which £257,641 was profit. Dividends amounted to £262,500. Balance forward was £2,839, compared with £5,488 brought forward from 1916. Net cash assets total about £125,000. In 1918 the profit was £220,731, of which £196,875 was paid in dividends.

Dividends: total 1,770% from 1895 to April, 1919, a total sum of £5,531,800.

Property: 85 acres on the "Golden Mile," Kalgoorlie, W. A.

Development: by vertical shafts, 2,844, 2,879, and 2,000′ deep, with extensive workings. Ore is a sulpho-telluride. Reserves at end of 1918 were placed at 345,719 tons, of 14½ dwt. ore. Deep exploration was not successful, as the main lode passed into the adjacent Golden Horseshoe mine at about 1,800′ in depth.

Equipment: complete and modern, with 600-ton dry crushing and roasting plant.

Production: to September, 1919, totals £11,904,695 from 3,518,805 tons of ore.

Year	Ore, tons	Gold yield
1918	152,196	£484,270
1917	182,265	529,718
1916	176,787	525,168
1915	195,524	583,367
1914	190,117	563,959

Costs are around 32/- ($7.68) per ton.

This is one of the most regular gold producers and dividend-payers known, and is ably directed.

HAMPTON CELEBRATION (W. A.), LTD. W. A.

Office: Lionel Robinson, Pinners Hall, Austin Friars, E. C. 2, London, England.

Inc. December, 1919, in Great Britain. **Cap.,** £250,000. Company acquired the Celebration lease from the Celebration Syndicate (which see), for £50,000 cash and £100,000 in shares. The promoters got £25,000 in shares, and £75,000 is available for working capital.

Property: the Celebration lease on Block 50 of the Hampton Properties, Ltd., 20 miles south of Kalgoorlie.

By a new system of prospecting, called 'loaming', by which the gold in the soil and surficial material is traced to its source a gold vein was uncovered in June, 1919, which proved to be 20′ wide. Samples for a length of 200′, averaged £5 ($24) per ton. A shaft 100′ deep in November, proved that the value persisted downward. The lode is traceable for 1,400′ on the surface, and estimates based on a length of 1,400′, a width of 20′, a depth of 100′, and value of £5 per ton, at 20 cu. ft. per ton for this class of ore, give a total value of £700,000.

Geologic conditions at the Celebration are said to prove it to be a continuation of "The Golden Mile" of Kalgoorlie, which has yielded over $360,000,000 in gold. If the lode is in quartz-dolerite it should prove persistently rich, but if it is encased in calc-schist the outlook is not so good, judged by past experience at Kalgoorlie. This new mine and its geologic features have excited much interest in Australian mining circles; and the general feeling is that a big mine is likely to be developed.

HAMPTON GOLD MINING AREAS, LTD. WESTERN AUSTRALIA

Office: 4 London Wall Bldgs., London, E. C. 2, England.

Inc. March, 1920, in England. **Cap.**, £500,000; £1 par; all issued.

Property: 189,122 acres on Hampton Plains, 29 miles S. of Kalgoorlie, W. A. Block 48 adjoins Block 50 of Hampton Celebration, in which a good mine has recently been developed. Ground is considered promising.

HAMPTON PROPERTIES, LIMITED WESTERN AUSTRALIA

Offices: C. P. A. Williams, sec., 2 Tokenhouse Bldgs., London, E. C., England; and A. Francis, Macdonald St., Kalgoorlie, Western Australia.

W. A. Bevan, chairman of board of directors. E. H. B. Macartney surveyor.

Inc. Dec. 31, 1898, in Great Britain. **Cap.**, £500,000; £1 par; increased from £400,000 in October, 1919. Shares rose quickly from a few pence to over £2 11/- ($12.24 normal exchange), late in 1919.

Property: 27,000 acres (freehold) on Hampton plains, 20 miles south of Kalgoorlie, Western Australia.

Gold mining has been done from time to time on this tract, there having been several small stamp-mills operated at scattered points. In mid-1919, the deposit described under Hampton Celebration, was found, attracting considerable attention and causing a rush to the area.

HAMPTON URUGUAY, LIMITED WESTERN AUSTRALIA

Succeeded in 1920 by Hampton Gold Mining Areas, Ltd., which see.

IVANHOE GOLD CORPORATION, LTD. WESTERN AUSTRALIA

Head office: C. Lloyd, London Wall Bldgs., London, E. C. 2, England. J. McDermott, gen. mgr.; G. D. Murray, met.; James Drage, mech, eng.

Registered: Oct. 14, 1897, in London. **Cap.**, £1,000,000; shares £5 par.

Profit in 1917 was £106,092. Dividends amounted to £105,000. £7,858 was carried forward. Reserve fund is £140,000. In 1918 the profit was £79,418, of which £75,000 was distributed.

Dividends: from 1898 to March, 1919, a total of £3,733,750. Highest year was 1899 with 25/- per share; in 1918, 7/6 per share was paid.

Property: 95 acres in the "Golden Mile," Kalgoorlie, W. A., includes the best producing mine of the district. Ore is silicious sulphide, 4 to 25′ wide, 4 veins averaging 12′ being worked.

Development: by a 3,620′ main vertical shaft with levels opened to this depth. Exploration by drilling and sinking is kept well ahead of ore extraction. Ore reserves are estimated at 1,000,200 tons, averaging 34/- ($8.16) per ton.

Equipment: includes steam and electric power, hoists, compressors, drills, shops, foundry, a 100-stamp concentrator with sand, slime, and concentrate cyanidation plants, capable of treating 700 tons daily.

Production: to September, 1919, totaled £9,678,514 derived from 4,100,041 tons of ore. Recent yields have been:

Year	Tons	Gold	Cost per ton
1918	208,428	£345,586	.....
1917	233,719	391,429	22/10 ($5.38)
1916	238,514	381,984	21/ 9 (5.22)

Property has a profitable future for several years, and is managed with excellent technical ability.

KALGURLI GOLD MINES, LTD. **WESTERN AUSTRALIA**

Office: F. H. Carlton, 7 Crosby Square, London, E. C. 3, England.

C. S. Stafford, chairman of board of directors. F. G. Brinsden, gen. mgr. R. Black, cons. eng.

Inc. June 14, 1895, in England. **Cap.,** £120,000; shares £1 par; all issued.

Profit for year ended July 31, 1918, was £7,505, against £41,224 in 1917, and £45,947 in 1916. Dividends absorbed £12,000, reducing the reserve fund by £4,500. Cash assets exceed liabilities by £90,000.

Dividends: total £1,639,500 to April, 1919.

Property: 18 acres on the "Golden Mile," Kalgoorlie, W. A.

Development: by 1,900′ shaft. The lode is of peculiar shape, being a "chimney" which is wider than it is long, and has no defined walls, as values fade out; below the 1,800′ level the vein passed from quartz-diorite into calc-schist in which the ore became low-grade. Diamond drilling has thus far failed to reveal any other shoots of sulpho-telluride ore.

Equipment: complete with 350-ton dry crushing and a roasting plant.

Production to September, 1919, totaled £4,414,747 from 1,815,706 tons of ore. Recent yields have been:

	1918	1917	1916	1915
Ore, tons	73,022	103,210	119,180	125,990
Gold yield	£107,333	£179,837	£194,795	£249,878

Costs are around $6 a ton.

In company's last report it was stated that future operations would be unprofitable unless custom ore was received for treatment.

LAKE VIEW & OROYA EXPLORATION, LTD. **W. A.**

Office: C. Lloyd and G. G. Hay, secs., 1 London Wall Bldgs., London, E. C. 2, England.

F. A. Govett, chairman and managing director.

Inc. June 9, 1911, as the Lake View Consols., Ltd., and is a reconstruction of company of same name. **Cap.,** £450,000; shares 10s. par; 721,909 issued. Company announces its business to be the exploration and financing of mines; it holds large interests in Babilonia Gold Mines in Nicaragua; the Burma Corporation in Burma; General Petroleum in California; Granville Mining in the Yukon; Lake View & Star in Western Australia; Leonesa mine in Nicaragua; Mt. Morgan in Queensland; Natomas Co. in California; Nechi Mines in Colombia; Yuanmi Gold Mines in Western Australia; and Zinc Corporation in New South Wales.

Profit for year ended June 30, 1918, was £20,960. Property is valued at £424,740, and reserve is £100,000.

Dividends: 5% in 1912; 10% in 1913, 1914, and 1915; 5% in 1916; nothing since.

SONS OF GWALIA, LTD. **WESTERN AUSTRALIA**

Office: E. Pears, sec., 20 Copthall Ave., London, E. C. 2, England. **Mine office:** Leonora, Western Australia.

D. Richards, chairman and managing director. Bewick, Moreing & Co., gen. mgrs. J. Adam, supt.

Inc. Jan. 7, 1898, in England. **Cap.,** £350,000; shares £1 par; 325,000 issued.

In 1916 the net profit was £39,890, of which £40,625 was paid in dividends; £740 was carried forward. In 1917 the profit was £27,433. Divi-

dends absorbed £32,500, and £4,252 was carried forward. Assets exceed liabilities by £170,000. Profit in 1918 was only £71.

Dividends: since 1900 total 65s. per share; 2s. being paid in 1917, none since.

Property: 863 acres, near Leonora, Western Australia, 500 miles by rail from Perth. Lenticular orebodies, averaging 9′ wide consist of free milling ore, mined by rill stopes.

Development: by incline shaft 3,900′ deep with extensive workings. Ore reserves approximate 600,000 tons. Recent prospecting has not been as successful as formerly, and the grade of ore has fallen off.

Equipment: includes complete mining and milling plants. Mill has 50 stamps, concentrators, pans, tube-mills and cyanide plant.

Production, years ending December 31:

Year	Ore, tons	Gold yield
1918	148,394	£190,100
1917	159,397	232,550
1916	158,956	232,924

The total output to September, 1919, was £5,037,185 from 2,805,147 tons of ore. Costs are around 22/6 ($5.40) per ton.

SOUTH KALGURLI CONSOLIDATED, LTD. **W. A.**

Office: W. Bramall, sec., 529 Salisbury House, London, E. C. 2, England. **Mine office:** Kalgoorlie, Western Australia. J. M. Embleton, gen. manager.

Inc. March 11, 1913, in England, as a consolidation of the South Kalgurli Gold Mines and Hainault Gold Mine companies. **Cap.,** £150,000; shares 10s. par; 250,007 issued.

For year ended March 31, 1916, the net profit was £16,335, plus £706 brought forward. Dividends absorbed £12,500. The sum of £4,541 was carried forward. Cash assets amounted to £38,700. In 1916-'17 the profit was only £4,050, yielding a dividend of £3,125 and in 1918 there was a loss of £956;; current assets exceeded liabilities by £42,000. In 1919 there was a profit of £10,205.

Dividends: 5% in 1913-'14; 7½% in 1914-'15; 10% in 1915-'16; 2½% in 1916-'17, and 7½% in 1918-'19. The total, including the Hainault, is £234,375.

Property: 36 acres in the "Golden Mile," of Kalgoorlie, Western Australia, productive since 1896, contains the Perseverance, Nos. 1 and 2 East, Middle and Lake View lodes, each averaging 5′ to 6′ in width, and opened to 1,800′ level.

Development: by vertical shafts 1,000′ and 1,800′ deep. Reserves, March 31, 1916, totaled 157,617 tons of 6.14 dwt. ore and 89,095 of 5.90 dwt. probable ore. A year later the reserve was 133,221 tons of 5.75 dwt. ore, while in 1918 there were 159,212 tons of 7.5 dwt. and 126,437 tons of 6 dwt. ore.

Equipment: complete mining and milling plants electrically driven, the latter including crushers, 4 ball-mills, 10 roasting furnaces, grinding pans, cyaniding apparatus and filter-presses, also 40-stamp mill and cyanide plant.

Production: during 21 months ended Dec. 21, 1916, 199,640 tons of ore yielded gold worth £243,710. In 12 months ended March 31, 1918, returns were £119,736 from 108,236 tons in year ended March 31, 1919, £128,556 from 96,239 tons. The total to September, 1919 (including the Hainault), was £3,000,000 from 1,900,000 tons ore.

WHITE HOPE SYNDICATE **WESTERN AUSTRALIA**

Property: has one of the most promising gold deposits in the new Hampton Plains district, which includes the Celebration mine.

YUANMI GOLD MINES, LTD. **WESTERN AUSTRALIA**

Office: G. G. Hay, 1 London Wall Bldgs., London, E. C. 2, England. **Mine office:** L. B. Williams, mgr., Yuanmi, Western Australia.

Inc. April 27, 1911, in England. **Cap.,** £350,000; shares £1 par; all issued; reduced to 17/6 in March, 1920; and 500,000 pfce. shares of 2/- each offered to shareholders.

Earnings for year ended June 30, 1917, were £72,429; and mine expenditures, £65,596; compared with £77,865 and £70,143 in 1915-16. The year 1917-'18 ended with a loss of £7,518, increasing debit balance to £37,937.

Dividends: were 12½% in 1912-'13; 5% in 1913-'14; and none since.

Property: 218 acres in the East Murchison goldfield, W. A. Ore is a sulphide and reserves are estimated at 20,980 tons averaging 58s. 2d. ($13.94) per ton. Vein is 4′ to 5′ wide.

Development: by 680′ incline shaft, and extensive drift and crosscut work. In 1920, 5′ of 102s. ($24.48) ore was cut by a drill, and new development work said to show good ore.

Equipment: 80-ton per day plant, including ball-mill, roasters and cyanide plant. To treat the oxide ore, company originally had a 20-stamp mill and cyanide plant.

Production: totalled £1,692,042 from 674,636 tons to September, 1919. In August, 1,523 tons yielded 912 oz. of gold. Costs were 56/- ($13.44) per ton.

NEW ZEALAND

BLACKWATER MINES, LTD. NEW ZEALAND

For offices and directorate, see Consolidated Gold Fields of New Zealand.

Inc. Dec. 19, 1906, in Great Britain. **Cap.,** £250,000; shares £1 par; 249,992 issued.

Profit in 1917 was £14,309, after writing off £23,000 for taxes, depreciation, and development. Balance forward was £17,323.

Dividends: 70% from 1909 to 1918, inclusive; 5% in 1918.

Property: a gold mine with 299 acres of mineral ground, water and timber rights near Reefton, South Island, N. Z.

Development: by main shaft 1,316′ deep. Reserves are given as 92,236 tons of 10.9 dwt. ore in 1918, and 82,704 tons of 11 dwt. ore in 1917.

Equipment: complete with stamp-mill and cyanide plant.

Production, years ending December 31:

Year	Tons	Gold yield	Operating profit
1918	31,528	£63,993	£26,355
1917	34,417	67,206	28,000
1916	40,247	80,565	35,528

Costs are around $5.50 per ton.

CONSOLIDATED GOLD FIELDS OF NEW ZEALAND, LTD. N. Z.

Office: M. Marr, act. sec., 20 Copthall Ave., London, E. C. 2, England. Sir W. B. Perceval, chairman of board of directors. V. Hartog, acting gen. mgr.; R. Burley, mine supt.; F. Campbell, adviser in New Zealand.

Inc. Feb. 22, 1896, in England. **Cap.,** £300,000; shares £1 par; 250,000 issued. Company holds 91,325 shares in the Blackwater Mines and 169,143 in the Progress Mines companies, which see.

Profit in 1917 was £245, compared with £23,722 in 1915. Balance forward was £19,658. Financial position at beginning of 1918 reported as "satisfactory."

Dividends: totalled 18/6 per share to 1911, since when none have been paid.

Property: the Wealth of Nations mine at Reefton, South Island, N. Z., in the same district as the Blackwater and Progress mines. Mine shut down 1918, owing to financial conditions.

PROGRESS MINES OF NEW ZEALAND, LTD. N. Z.

For office and directorate see Consolidated Gold Fields of New Zealand. F. W. Robinson, sec. in N. Z.; H. A. B. Leipner, metallurgist.

Inc. Dec. 8, 1896, in Great Britain. **Cap.,** £275,000; shares £1 par; all issued. Debentures outstanding, £7,200 of 5%.

Operations for the year 1917 resulted in a loss of £2,242, which increased deficit to £38,547.

Dividends: 23/9 per share from 1899 to 1910; nothing since.

Property: 816 acres near Refton, South Island, N. Z., including two alluvial areas and 48 acres of coal land. Ore reserves are reported to be 60,000 tons.

Equipment: complete with 65-stamp mill and cyanide plant.

Production, years ending December 31:

Year	Tons	Gold yield	Operating profit
1918	16,230	£22,175	£1,069
1917	19,840	31,480	6,000
1916	26,780	31,405	4,605

TALISMAN CONSOLIDATED, LTD. N. Z.

Head office: W. Wright, 116 Victoria Parade, Auckland, New Zealand.

M. Casey, chairman of board of directors. Bewick, Moreing & Co., gen. mgrs.; H. Stansfield, mgr.

Inc. Sept. 14, 1916, in New Zealand, to acquire the holdings of an English company of similar name. **Cap.,** £345,000; shares £1 par; all issued.

Profit in 1917 was £57,821, of which £34,500 was distributed; £10,835 was carried forward. Current assets exceeded liabilities by £120,000. Profit in 1918 was £67,000.

Dividends: since 1905 total 71s. per share, to March, 1919.

Property: 668 acres at Karangahake, N. Z., in a mountainous country.

Development: by tunnels and shafts. Reserves are now almost exhausted.

Equipment: complete mining plant, aerial trams, 50 stamps, 3 tube-mills and cyanide plant.

Production: in 1916 the mine yielded 16,935 tons silver-gold ore to the value of £83,227, with a profit of £22,260; in 1917, 27,010 tons ore yielded £117,719, and in 1918, 13,865 tons gave £115,300. Reports in 1919 state that mine is practically worked out.

WAIHI GOLD MINING CO., LTD. N. Z.

Offices: H. Akers, Coronation House, 4 Lloyds Ave., London, E. C. 2, England; and Waihi, N. Z.

A. M. Mitchison, chairman of board of directors. Staff: E. G. Banks, supt.; W. P. Gauvin, asst. supt.; J. L. Gilmour, mine mgr.; R. E. Williams, cons. engr.

Inc. Dec. 7, 1887, in England. **Cap.,** £500,000; shares £1 par; 495,907 issued.

Financial Statement, years ending December 31:

Year	Revenue	Profit	Deductions	Dividends	Investments	Cash, bullion, stores
1918	£414,838	£215,564	£59,575	£99,181	£538,125	£135,602
1917	391,111	193,901	67,636	99,181	504,971	104,525

Dividends: 1893 to March, 1919, total £11 15s. per £1 share, or £4,999,241, the highest being 18s. in 1909, the last five years paying 4s. each.

Property: 518 acres of mining claims containing 17 gold-bearing veins; 3 large millsites, extensive timber lands, power sites, etc., at Waihi and adjacent areas in New Zealand. Mine has had an interesting history, being one of the first in the world to use the cyanide process for gold extraction. It has produced over £12,500,000 in gold and silver.

The quartz veins vary up to 50′ in width, and ore averages about 45s. per ton.

Development: by 4 shafts, deepest over 1,300′; two of them equipped with large electric and Cornish pumping plants, lifting over 1,100,000 gal. daily. Reserves are estimated at 610,000 tons. Eighty-five rock-drills are employed. Seventeen lodes contribute to the ore supply.

Equipment: extensive mining plant, 6-mile railway, 50-mile transmission-line from power plant on Waikato river, 200-stamp mill driven by water and electricity; also sand, slime, and concentrate cyanide plants. The power-plant was sold for £212,500, to the New Zealand Government in 1919, under a working agreement.

Recent production:

Year	Tonnage	Bullion yield	Year	Tonnage	Bullion yield
1918.....	188,998	£387,065	1913.....	184,768	£336,652
1917.....	191,742	370,567	1912.....	147,828	332,886
1916.....	194,232	371,520	1911.....	350,699	679,116
1915.....	192,333	349,581	1910.....	442,020	926,100
1914.....	183,405	332,165	1909.....	416,813	959,594

WAIHI GRAND JUNCTION GOLD CO., LTD. **NEW ZEALAND**

Office: A. Stewart, 10 Throgmorton St., London, E. C. 2, England. H. D. Bishopp, chairman of board of directors. S. Leah, gen. mgr.; P. R. Allen, cons. engr.

Inc. Dec. 29, 1897, in England. **Cap.,** £400,000; shares £1 par; 384,375 issued.

Financial Statement, years ending December 31:

Year	Profit	Dividends	Current assets	Current liabilities
1917.....	£54,901	£38,437	£239,184	£22,938
1915.....	39,344	38,437	103,611	12,807

Dividends: total 70% from 1910 to 1918, 5% being paid in 1918; the grand total is £269,000.

Property: 280 acres of mining land, and a timber area, at Waihi, New Zealand. The Waihi Extended mine was acquired in 1919, and exploration started.

Development: has been carried on since 1893 in order to cut an extension of the Waihi company's lodes, which were found at a depth of over 500′. The main shaft is 1,357′ deep.

Reserves: 131,600 tons.

Equipment: complete power and mining plants, with 60-stamp mill, 10 tube-mills, and cyanide plant.

Production: in 1916 about 115,000 tons of ore yielded gold and silver valued at £194,461; 116,130 tons giving £220,090 in 1917; and 72,880 tons returning £115,613 in 1918.

NEW CALEDONIA

CHROME CO., LTD. **NEW CALEDONIA**

Office: H. W. C. Dermer, 19 St. Swithin's Lane, London, E. C. 4, England.

Directors: E. Davis, chairman; F. J. Burt, J. Kitchin, F. E. Lander, and F. M. Singer.

Inc. Feb. 1, 1911, in England. **Cap.,** £190,000; shares £1 par; all issued. **Debentures:** £70,660, 5% outstanding.

In 1915 the profit was £18,809, less £9,500 for dividends; £11,395 was carried forward. In 1917-18 the profit was £9,806.

Dividends: 5% in 1913; 10% in 1914; 5% in 1915; 24¼% in 1916; 5% in 1917.

Property: chrome mines, near Port Pagoumène, New Caledonia.

Production: 61,416 tons in 1914; 62,585 tons in 1915; 35,303 tons in 1916; 42,437 tons in 1917 and 28,560 tons in 1918.

AFRICA

Mines are arranged alphabetically under the name of each State or Country.

CAPE COLONY

CAPE COPPER CO., LTD. — CAPE COLONY

Office: 9 Queen St. Place, London, E. C. 4, England, P. J. Franks, sec. **Mine office:** O'okiep, Little Namaqualand, Cape Province; James Crozier, gen. supt. **Works office:** Briton Ferry, Glamorganshire, Wales. T. Blair Reynolds, chairman of the board of directors; John Taylor & Sons, general managers; J. Crozier, supt, Cape Colony mine and Chas. Olden, supt., Rakha Hill mine; P. G. Timms, chief engr.; N. E. Moffatt, traffic mgr.; H. Phillips, smelter supt.; Dr. A. de W. Allan, chief surgeon.

Inc. April 30, 1888, as a reconstruction of Cape Copper Mining Co., Ltd., under the laws of Great Britain, capitalization £950,000, in 75,000 cumulative 6% preferred shares, of which 45,000 are issued and fully paid, and 400,000 ordinary shares, par £2; issued 360,000. Annual accounts are made up to April 30, at the Cape, and to August 31 in London and India, and are submitted in December.

Profits have been as follows, years ending August 31:

Year	Amount	Year	Amount
1919	£171,007*	1912	£80,494
1918	641,146*	1911	60,862
1917	147,842	1910	124,659
1916	131,248	1909	90,223
1915	33,212	1908	144,366
1914	17,244	1907	379,910
1913	83,500		

* Loss.

Profits since the beginning of operations amount to £4,057,356. Current assets at August 31, 1919, were £547,275, and liabilities £339,222, including £290,000 for loans. Reserve and sinking funds amount to £281,869.

Dividends: from 1864 to 1888 total £67 13s. 9d. per share paid by the old company: from 1888 to 1914, the preference shares received £8 5s. 11d.; 6% in 1914; 6% in 1915; 6% in 1916; 7% in 1917; and 6% in 1918; while the ordinary shares received £10 5s. 3d. to January 1, 1918. The grand total of dividends is £4,512,175.

Property: principal mines of the company are in Little Namaqualand, Cape Colony, lands including about 280 acres of freehold and a few lease-hold tracts. The first mines were opened, 1856, by Phillips & King, and were taken over, 1860, by the predecessor of this company. Principal mines are the O'okiep, Nababeep South, Nababeep North and Narrap mines in Cape Colony; and the Rakha Hill mines in India, with a number of idle mines and prospects.

Cape Colony Mines.

The Nababeep mine, 5 to 6 miles W. of O'okiep, opened 1890, includes the Nababeep South, now the principal producer. The mine is developed by tunnels and a shaft.

The Narrap mine, about a mile E. of the O'okiep East, with somewhat similar ore, has an aerial tram, electric hoist, and crusher. The Narrap South Mine, opened to a depth of 120', is without important developments.

The Spektakel mine, 28 miles W. of O'okiep, is an old mine now idle, whose orebodies were in both the granite and the basic intrusive rocks.

The Carolsberg mine, 6 miles S. E. of O'okiep, opened by tunnel, and the Carolsberg East mine, about 2 miles E. of the Carolsberg, are both idle.

Other idle properties include the Flat mine, 4 miles N. of Nababeep, which was reopened, 1907; the Kopperberg mine, near the Carolsberg, 5 miles S. E. of O'okiep; and the Coetzee mine, which was abandoned and plant removed several years ago.

Recent operations are summarized below:

	Nababeep.				O'okiep.		
	Ore mined,		Reserves		Ore mined,		Reserves
Year	tons	Copper, %	tons	Year	tons	Copper, %	tons
1919..	19,931	4.64	90,000	1919..	5,599	12.37	....
1918..	19,914	4.05	90,000	1918..	7,472	11.70	....
1917..	51,591	3.68	90,000	1917..	12,845	8.85	....
1916..	70,677	3.70	120,000	1916..	13,496	11.22	6,000

Equipment: electric power has been substituted for steam throughout the principal works, the central power station at the O'okiep mine having 2 suction gas engines, with the old steam plant held in reserve for emergencies.

Both the O'okiep and Nababeep properties have smelters and mills, though the O'okiep plant has been idle since 1912, the ore from both mines being treated in the Nababeep plant. The smelter turns out 48 to 50% matte, which is shipped to the Briton Ferry works for re-smelting and refining.

Production:

Year	Charge smelted, tons	Year	Charge smelted, tons
1919.....	28,079	1917.....	68,224
1918.....	27,862	1916.....	91,207

The company owns a 99-mile railway, with 16 miles of sidings, running from O'okiep to Port Nolloth, where there are docks, wharves, cranes, tugs and lighters for handling freight.

Company also owns 4 tugs at Port Nolloth. A tram line connects the principal mines with the smelters. There have been as many as 1,500 men employed at mines, smelters, docks, etc.

All operations in Africa, save prospecting, were suspended in May, 1919.

In addition to its mines in South Africa, company had a lease on the Terra Nova mine in Newfoundland, which produced a 2.4% copper and 37% sulphur ore of 2 to 6% tenor. Development aggregates 15,000', including the main shaft erties in the United States, formerly held under option, were surrendered, 1910, but the company secured title to some claims in Alaska, which will be developed when a railway reaches the district. Two other properties were being exploited in Asia Minor, but work there has been suspended.

Rakha Hills Mine, India.

The company owns the Rakha Hills, or Rajaoka property, at Surda, India. This tract shows an extensive belt of cupriferous schist, with seams of copper ore of 2 to 6% tenor. Development aggregates 15,000', including the main shaft which is 1,440' deep. During 1910-12, a number of boreholes were drilled with a total of 9,700', proving the copper belt for nearly 1¼ miles. Reserves in August, 1919, were 384,294 tons compared with 453,876 tons in 1918, carrying 3.69% copper. The average width of the lode is 42".

Equipment: electric power, steel head-frame, hoists, compressors, shops, 300-ton flotation plant employing Minerals Separation units, blast-furnace, converter, refinery, assay office, and dwellings for staff and employees.

Production: the new works yielded 98.8% blister copper at the rate of 224,000 lb. per month during the first four months of 1919.

Briton Ferry Smelter.

The Briton Ferry smelter, which is the largest in Wales, in addition to treating the company's own ores, does a general custom business, smelting the

ores of the Namaqua Copper Co., Ltd., under contract. The Briton Ferry works are on the Great Western and Rhondda railways, also having canal connection with Swansea, receiving ores mainly by rail. The works have revolving cylindrical calciners up to 80′ in length, heated by gas, and four 70-ton blast furnaces, making matte. Ores are smelted, without calcining, in reverberatories, to a 76% white metal, which is refined by the Nichols direct method, by which some of the white metal is calcined and mixed with uncalcined white metal, the consequent reaction eliminating the remaining sulphur. Tilt Cove sulphide ores are burned in kilns for their sulphur contents, fumes going to an acid plant, which makes 30,000 tons of chamber acid yearly. The works include an electrolytic refinery, constructed in 1912.

Production: of the African mines has been as follows: 8,960,000 lb. fine copper in 1901; 6,061,000 lb. in 1902; 10,371,200 lb. in 1903; 12,264,000 lb. in 1904; 11,256,000 lb. in 1905; 8,825,600 lb. in 1906; 9,475,200 lb. in 1907; 10,035,200 lb. in 1908; 10,404,800 lb. in 1909; 9,867,200 lb. in 1910. Later metal figures are not available.

The management has been criticised occasionally for not adopting the latest methods and machinery, but the circumstances have precluded as rapid advances in this direction as would be warranted were the company mining enormous orebodies. The record of the Cape Copper Co., Ltd., as a steady dividend payer, for 40 years past, is perhaps the best answer to such criticisms, founded upon part misconception of the facts. The company issues full monthly reports to stockholders that are models, and could be imitated by other companies to the advantage of the investor.

Analyzing conditions in 1919 it would seem that the African property is nearing its end, while the one in India is keeping up the production and promises to continue dividends.

DE BEERS CONSOLIDATED MINES, LTD. CAPE COLONY

Offices: E. F. Rayham, sec., Kimberley, Cape Colony; and 15 St. Swithin's Lane, London, E. C. 4, England. Sir C. Meyer, deputy chairman of board of directors.

Officers: A. F. Williams, gen. mgr.; H. T. Dickinson, I. R. Grimmer, and J. Harbottle, asst. gen. mgrs.; J. Liddell, mech. eng.; R. W. H. Smith, elec. eng.; and A. Brink, diamond valuer and broker.

Inc. March 13, 1888, in Cape Colony, with capital of £100,000 to consolidate all of the diamond properties in the district.

Cap., £4,500,000; in 800,000; pfd. and 1,000,000 defd. shares of £2 10s. par; all issued. Listed on New York Curb in January, 1920.

Debentures: £1,750,000 at 4½%, redeemable, January, 1930; £1,612,395 outstanding.

Financial statement for year ended June 30, 1918, showed a revenue of £4,679,550, of which £2,771,515 was profit. Reserves consists of £1,605,686 general, £498,944 for debenture redemption, £1,295,433 for blue ground, and £1,576,527 for stabilization of the diamond trade. Revenue in 1919 was £5,849,552, less £2,335,881 expenses, £382,379 for taxes, and £698,798 to reserve.

Dividends: total many millions sterling, the amount in 1917-'18 being £1,990,000 and £2,740,000 in 1918-'19, or at the rate of 40% on preference and 80% on deferred shares.

Property: 5 diamond mines at Kimberley, Cape Colony; the Cape Explosives Works at Somerset West (output of 430,000 cases of dynamite in 1917-18); controlling interest in the Premier (Transvaal) Diamond Mining Co., and Koffyfontein Mines, Ltd., also the pre-emptive right to any diamond deposits discovered in the territories of the British South Africa Co. (Rhodesia) and South-West Africa Co., recently German territory.

The five mines are near together in an area of about 5 miles square. The diamonds occur as separate crystals in a rock altered to blue clay, from which they are separated by washing.

Development: by 10 main shafts, deepest being 3,600′ at the Kimberley mine. Reserves total 74,000,000 loads of 1,600 lb. each. Stocks of "blue

ground" on surface amount to over 9,000,000 loads. Mud outbursts, or rushes and heavy flows of water are troublesome.

Equipment: complete and far too extensive to enumerate, but sufficient for extraction, hoisting, tramming, and treatment of 6,000,000 loads per annum, or 22,000 loads per day for a 300-day year.

Production: 5,843,099 loads were washed during the year 1917-'18, yielding from 0.19 to 0.35 carat per load. Diamonds sold realized £4,327,649. Costs varied, the highest being 4/11 ($1.18) per load. A 442½ carat stone was found on the Dutoitspan dump in September, 1917, the most valuable ever found at the mines. In 1919 the quantity washed was 4,252,809 loads.

NAMAQUA COPPER CO., LTD. **CAPE COLONY**

Head office: A. W. Outram, sec., 3 Fenchurch St., London, E. C. 3, England. **Mine office:** James Garland, Concordia, Cape Colony, South Africa.

Officers: William Rich, managing director; Thomas V. Anthony, H. V. Berg, F. J. King, H. Loeffler, directors; J. Garland, supt.

Inc. April 23, 1888, in England. **Cap.,** £200,000; £2 par; 94,331 issued.

Financial Statement, years ending December 31:

Year	Revenue	Profit	Previous Balance	Dividends	Balance Forward
1917	£173,242	£13,055	£16,241	.....	£6,882
1916	249,111	78,407	.....	£61,314	16,241

Dividends: since 1888 total 426%, including 25% for 1916; none since.

Property: 680 acres, at Concordia, Little Namaqualand, Cape Colony, South Africa, known asthe Tweefontein, Wheal Julia, Henderson's Jubilee, and Hester Maria mines in which copper occurs as bornite and chalcopyrite in a fine-grained, dark quartz gangue.

Development: in 1917 totaled 1,374', compared with 1,769' in 1917. Exploration at the Tweefontein mine has been rather disappointing, for while the eastern section showed much mineralized ground it was of no commercial value. Results in the Wheal Julia and Henderson's are not very encouraging, but a fair amount of ore was opened in the Jubilee mine.

Reserves are as follows:

Year	Ore, tons	Copper content, lb.	Tailings, tons	Copper, %
1917	40,563	5,304,320	49,500	3 to 5.5
1916	51,264	6,630,000	59,000	3 to 5.0

Equipment: includes complete mining and sorting plants, concentrator with flotation unit, briquetting plant, precipitating tanks, a smelter, and power-plant.

Production:

Year	Charge smelted, tons	Copper, lb.
1917	21,355	3,064,320
1916	32,958	3,763,200

Operations were suspended in May, 1918, owing to abnormal conditions, but the precipitating plant was kept going.

CONGO

TANGANYIKA CONCESSIONS, LTD. **CONGO**

Office: L. Scotland, Friars House, New Broad St., London, E. C. 2, England. **Mine offices:** Kambove, Katanga, Belgian Congo; and Kansanshi, Northwestern Rhodesia.

Tyndale White, chairman of board; Robt. Williams & Co., mgrs.; and F. E. Sudt, A. A. Thomson, and R. W. Yule, engrs.; T. S. Carnahan, mining engineer.

Inc. Jan. 20, 1899, in Great Britain. **Cap.**, £2,200,000. Original capitalization was £100,000, successively increased December, 1901, to £184,000, in 1902 to £194,000, in 1903 to £264,600, in April, 1905, to £450,000, in July, 1905, to £525,000, in November, 1906, to £1,000,000, and in December, 1919, to £2,200,000. Shares £1 par; 1,980,098 issued, of which 1,000,000 were sold at £3 each in December, 1919.

Debentures: £2,000,000 authorized, at 6% in denominations of £8; £2,176,624 outstanding Dec. 31, 1918, with interest accrued £450,428; Col. Sir Howard Melliss, and Hon. Arthur Stanley, trustees for the debenture-holders. The debentures, redeemable Jan. 1, 1917, were extended as provided by Royal Proclamation until after the war, company to pay interest. Coupons up to and including No. 20 have however been paid. Also £42,250 of 5½% second debentures.

The property consists (Jan. 1, 1919) of a 39.2% share interest in the Union Miniere du Haut Katanga (amounting to 50,000 shares of 100 francs par and 48,000 dividend shares); 70% of the issued stock of the Rhodesia-Katanga Junction Railway & Mineral Co., Ltd. (amounting to 494,814 ordinary £1 shares, 64,450 B 1s. shares), the Kansanshi copper mine having been sold to this company; 1,600 shares of 250 francs par in the Compagnie du Chemin de Fer du Katanga; £2,700,000 stock of Companhia do Caminho de Ferro de Benguella; 2,297 shares of £4 each of the Intertropical Anglo-Belgian Trading Co., and £5,000 of the 3% debentures of the Rhodesia Railways, Ltd.

The Tanganyika Concessions, Ltd., has an arrangement with the Zambesia Exploring Co., Ltd., by which the latter is ready to finance the former until the company is independent. The Zambesia Co. has practically the same officers as the Tanganyika, and floated the latter, the former having a capitalization of £870,000, shares £1 par, with 687,860 issued, fully paid, and an authorized debenture issue of £250,000, of which £213,009 are outstanding, secured by 100,000 shares of Tanganyika and £200,000 5% debentures of Benguella Railway Co. The Zambesia Exploring Co., Ltd., paid a 100% dividend Feb. 7, 1896, and for the year ending June 30, 1917, showed a profit of £43,648.

The 1917 revenue was £361,846, of which £188,271 was profit, plus £15,945 share premium account. A total of £204,216 was carried forward. Value of shares and debentures in subsidiaries is £3,467,855.

During 1918, revenue was £538,978, including £521,354 received as dividend paid by Union Miniére du Haut Katanga. Of this amount £352,800 was credited to profit and loss in 1917, so that 1918 is only credited with £168,554. After paying interest, etc., balance forward to 1919 was £10,683, making a surplus of £214,898.

Property: Tanganyika was formed to acquire from the British South Africa Co. a 2,000 sq. mile concession in Northern Rhodesia for a terminal and town-site of the Cape to Cairo railway at the S. end of Lake Tanganyika; a 2-year exclusive right to prospect and locate for minerals in an area of 2,000 sq. miles N. of the Zambesia, and to locate 1,000 claims in British South African territory. For these concessions the company gave £60,000 in fully paid shares, besides which the B. S. A. Co. retains a 35% interest in all mines. Having made important discoveries and located various mines in the borderland of the Belgian Congo, the Tanganyika sought and obtained another mineral concession, covering 60,000 sq. miles of the Belgian Congo region, known as the Katanga, and adjacent to the Rhodesian properties of the company. The Special Committee of Katanga reserved 60% of the net profits, and received £30,000 in fully paid shares. An extension of this concession and an interest in the Benguella railway later increased to 90%, was acquired in July, 1902, for £10,000 in fully paid shares.

The mineral discoveries in the Belgian Congo cover a copper belt 200 miles long with over 100 known copper deposits; also a tin belt, 100 miles

long, with workable deposits, also gold and iron mines and diamondiferous areas.

The Tanganyika Co. has sold its holdings to subsidiary companies controlled by it, and thus becomes a parent holding company only. In the Belgian Congo, 72 large mining concessions were located, the company engineers estimating in 1908, that 5 of these claims showed 9,500,000 tons of 6.3 to 14% copper ore, most of which could be extracted by open-cut; while on another group the company estimated 1,500,000 tons of 13% copper tenor.

The copper interests of the Tanganyika Concessions, Ltd., consist at present of the holdings mentioned above in the Union Miniére du Haut Katanga (which see), the Rhodesia-Katanga Junction Railway & Mineral Co., Ltd. (Kansanshi), and the Benguella Railway.

UNION MINIERE DU HAUT KATANGA **CONGO**

Office: 3 Rue de La Chancellerie, Brussels, Belgium. Works at Elizabethville, Katanga, Belgian Congo, Africa.

Officers: Jean Jadot, pres.; Robt. Williams, v. p.; Baron de Moor, managing director; Geo. Velge, sec.; P. K. Horner, gen. mgr.; A. E. Wheeler, cons. engr.; Edgar Sengier, technical mgr.

Inc. Oct. 28, 1906, in Congo Free State. **Cap.**, £400,000; shares £4 par; increased May 10, 1912, to £500,000 by issue of 25,000 new shares, fully paid. There are also 125,000 divided shares without par value. Debentures: £800,000 at 4½%. Company is controlled by Tanganyika Concessions, Ltd. (39.2% holding), and Société Générale de Belgique. Annual meeting, second Monday in July.

Dividends: an initial one of 150 francs per share was paid Dec. 31, 1918. This is equal to 30% on the capital, a total sum of F37,500,000 (£1,500,000, or $7,350,000), representing the accumulated profits of 5 years.

Property: company has a mining concession covering a copper belt of about 200 miles long, containing upwards of 100 copper outcrops; and a tin belt nearly 100 miles long. Both concessions are situated in the southern part of the district of Katanga, Belgian Congo, bonded on the south and east by northern Rhodesia, and on the west by Portuguese West Africa, over 1,500 miles from a seaport. The mines are widely separated, the Kambove and Star being 100 miles apart. Company also owns valuable water-power rights and other mineral rights, including iron.

The copper deposits and mines owned by the Union Minière were discovered by prospectors employed by Tanganyika Co., under terms of the concession from the Comité Special du Katanga. These deposits are scattered through a practically uninterrupted belt of country extending from the Rhodesian border in the S. E. corner of the Katanga region to the W. bank of the Lualaba river, a distance of 180 miles in a N. W. and S.-W direction.

Geology: the copper belt consists of a region of rounded hills and steep sided valleys, 4,000 to 5,000′ above sea level, the copper areas being bare, due to copper salts. The copper ores occur in sandstones and in schists, slates, and limestone, the beds running W.-NW., and dipping steeply. The ores are oxidized, malachite being the most abundant mineral associated with chrysocolla and azurite, while melaconite is found mixed with wad. The orebodies are lenses that vary from small deposits up to mammoth ones such as Kambove No. 2, said to be 3,000′ long, 240 to 400′ wide and to hold 10,000,000 tons of 15% copper ore to a depth of 100′.

Development: the principal mines, in the order of their ore production, are the Kambove, Likasi, Star and Chituru. The Kambove mine is the largest and most important copper mine owned by the Union Minière. It is 100 miles N. W. of the Star of the Congo and is reached by the railway, shipping its ores to the Lubumbashi smelter. A 2-compartment haulage tunnel has been driven from the surface through the deposit for 1,500′, half through pay ore. The tunnel is equipped with rope haulage and a double track. Ore is quarried and milled through the shafts, and hauled out through the tunnel. Management estimates 3,000,000 tons of 13.4% copper ore in sight above the tunnel-level and

a similar quantity of probable ore 100′ below. The Kambove is situated 1,720 miles from the seaport of Beira, by rail.

The Star was the first to be developed. The deposit is mined by open-cuts, the broken ore being milled through winzes to levels below and hauled through the main tunnel to the surface.

The Luiswichi and Luusha mines, 30 miles from the Star, have been developed and supply ore to the Lubumbashi smelter.

On all the other deposits forming the copper belt varying amounts of prospecting and development have formed the basis of estimates, some of which are as high as 300,000,000 tons of copper ore in sight over the whole copper belt.

The Union Minière company estimates 40,000,000 tons of 8% ore above water-level in all the Katanga mines.

The Bukama tin belt of the Minière is an area in the Katanga containing tin deposits on which development work was commenced in 1913. The belt is near Bukama, on the navigable Lualaba-Congo route from the West Coast, and 210 miles from Kambove, with which place it is being connected by rail, and first shipments of tin were expected to be made in 1919.

The Kansanshi mine, transferred in 1909 to the company's subsidiary, the Rhodesia-Katanga Junction Railway & Mineral Co., Ltd., lies at an elevation of 5,000′, 12 miles S. of the Congo-Zambesia divide, which forms the boundary between Rhodesia and the Belgian Congo. This property shows extensive remains of ancient open-cut workings, there being trenches and pits for a distance of 6,000′, which form 6 chains or lines of workings, in which the pits vary from 1 to 30′ in width, 5 to 30′ in depth and 300 to 1,300′ in length.

The Kansanshi copper deposits consist of beds, 1 to 10′ thick, of sandstone impregnated with copper and resting on limestone and schist. The sandstone is micaceous and fissile in places and more or less charged with malachite particles and flakes, the upper beds carrying malachite and chrysocolla, with occasional occurrences of azurite and melaconite, and some cuprite, with silicious gangue, and some manganese dioxide in the superficial portions. The gangue carries a little limonite, usually ochrous. Surface ores are said by John R. Farrell of San Francisco to show no evidence of having resulted from alteration of sulphides in place, the facts leading him to the opinion that the malachite was deposited from hot solutions, coursing in fissures. The ore is highly silicious.

The main ore bed, known as D reef, averages 8 to 10′ thick, with 5 to 10′ of sandstone impregnated with malachite on each wall of the vein; the ore as mined is said to average 18.7% copper with $2 gold per long ton. Sulphide ores, with bornite and chalcopyrite associated with pyrite, show in the deeper workings, but the depth of the oxidized zone has not as yet been determined.

Equipment: includes 7 blast furnaces of 1,000 tons daily charge capacity at the Star mine. A leaching plant to produce 110,000,000 lb. of copper annually is being erected, also a 60,000-h. p. hydro-electric plant, which will cost up to 25,000,000 francs. The mill will employ ball granulators. Coke is supplied by the Wankie Colliery in Rhodesia, 725 miles distant by rail. There is a battery of 44 ovens capable of making 2,400 tons of coke monthly.

Production, years ending December 31:

Year	Copper, Long Tons	Year	Copper, Long Tons
1919 (estimated)	23,000	1914	10,722
1918	20,237	1913	7,407
1917	27,463	1912	2,492
1916	22,149	1911	997
1915	14,054		

The January, 1920, output was 4,519,430 lb.

The ultimate output anticipated is 40,000 tons (89,600,000 lbs.) per annum. Costs are about 1,100 francs ($216) per long ton of copper. General charges and depreciation are not included.

Like the other big copper properties in South America, the Union Minière is in the transition stage, erecting enormous plants, saddled with a large debt, and producing a lot of copper, but with this difference that it is now paying dividends.

EGYPT

SINAI MINING CO., LTD. **EGYPT**

Office: T. H. Bradley, Dashwood House, 9 New Broad St., London, E. C. 2, England.

C. Hopkinson, chairman of board of directors.

Inc. April 13, 1913, in Great Britain. **Cap.,** £310,000 in 60,000 pfd. (all issued), and 250,000 ordinary shares (107,000 issued) £1 par.

Property: 510 acres of manganiferous-iron land, 15 miles S. E. of Abu Zenima, and 80 miles S. E. of Suez on Gulf of Suez. Examined by J. F. Allan, H. H. Knox, and Dr. E. Esch. Reserves were estimated at 12,042,000 tons averaging 32.3% Mn. and 25% Fe.

Equipment: suitable for open-cut operations, aerial tram, railway, and accessories capable of handling 300,000 tons per annum. Shipments have been made, but production figures are not obtainable.

To September 30, 1917, about £235,000 had been spent on development equipment, and general charges. The property contains a desirable ore.

SUDAN GOLD FIELD CO., LTD. **EGYPT**

Office: 6 Queen St., Place, London, E. C. 4, England.

Lord Vaux of Harroden, chairman of board of directors; J. Taylor, v. p.; H. B. Williams, supt.; John Taylor & Sons, mgrs.

Inc. Dec. 2, 1908, in Great Britain. **Cap.,** £150,000; 10s. par; 127,749 issued. Profit in 1917 was £11,194, but there was a loss of £1,566 in 1918.

Dividends: 10% in 1914, 1915 and 1916; nothing since.

Property: a concession covering a tract of gold-bearing ground in the Sudan, between 21 and 20° latitude and 33 and 34° longitude. Reserves in 1917 were 45,000 tons of ore, a decrease of 15,000 tons.

Equipment: 30 miles of railway, 20 stamps, and cyanide plant.

Production: 33,300 tons, yielding 15,598 oz. gold in 1917, and 20,880 tons, giving 12,419 oz. in 1918.

Operations were curtailed during the war.

NIGERIA

BISICHI TIN CO. (NIGERIA), LTD., THE **NIGERIA**

Office: H. J. Barlow, sec., 33 Cornhill, London, E. C. 3, England.

J. Gardiner, chairman of board of directors; A. W. Hooke, mgr.

Inc. Oct. 13, 1910, in Great Britain. **Cap.,** £200,000; £1 par.

Profit in 1917 was £25,251, of which £25,000 was distributed. Balance forward was £6,342. Current assets exceeded liabilities by £62,000. **Dividends:** totaled 46% to January, 1919.

Property: 2,520 acres of tin-bearing country in Bauchi province, Northern Nigeria. Equipped with pipe-lines, 7 monitors and 4 elevators.

In the Bukuru district company also owns 3¾ sq. miles jointly with the Forum Company.

Production: 278 tons of 71% tin ore in 1917, and 275 tons in 1918.

FORUM RIVER (NIGERIA) TIN CO., LTD. **NIGERIA**

Office: W. H. Stentiford, 1 Broad St. Place, London, E. C. 2, England.

J. Gardiner, chairman of board of directors; A. W. Hooke, min. eng.

Inc. March 1, 1912, in Great Britain. **Cap.,** £75,000; £1 par; 72,500 issued.

In year ended March 31, 1918, the profit was £28,204, of which £14,500 was distributed. Balance forward was £14,130. Profit in 1919 was £10,062, though £10,875 was paid in dividends.

Dividends: 67½% to January, 1919.

Property: 13½ sq. miles of tin-bearing land in Bauchi province, Northern Nigeria, equipped with hydraulic plant.

Production: 325 tons of black tin in 1917, 328 tons in 1918, and 220 tons in 1919. Costs were £126 and average price received was £213 per ton.

JOS TIN AREA (NIGERIA), LTD. NIGERIA

Office: W. S. Griffin, 1 Giltspur St., London, E. C. 1, England.

J. G. M. Brounjohn, chairman of board of directors; A. S. Williams, mgr.

Inc. May 3, 1910, in Great Britain. **Cap.,** £110,000; 5s. par; 300,000 issued. Profit was £12,978 in 1917. A dividend absorbed £7,500. In 1918 the profit was £15,268, of which £9,375 was distributed.

Dividends: 50% from 1912 to 1918.

Property: 1,412 acres of tin lands in the Jos and Ropp districts, Northern Nigeria, equipped with a bucket-dredge.

Production: 322 tons of black tin in 1917, and 267 tons in 1918.

LOWER BISICHI (NIGERIA) TIN MINES, LTD. NIGERIA

Office: W. S. Griffin, sec., 1 Giltspur St., London, E. C. 1, England.

H. T. Miller, chairman of board of directors; A. S. Williams, gen. mgr.; M. A. Bruce, mine mgr.

Inc. April 29, 1912, in Great Britain. **Cap.,** £40,000; 5s. par; 81,667 issued.

In 1917 the profit was £1,142, and £5,014 in 1918.

Dividends: 12½% for 1917, paid in November, 1918.

Property: 759 acres in Bauchi province, Northern Nigeria, equipped with hydraulic plant.

Production: 72 tons of black tin in 1916; 64 tons in 1917; and 87 tons in 1918.

NARAGUTA (NIGERIA) TIN MINES, LTD. NIGERIA

Office: A. J. Culley, Friars House, 39 New Broad St., London, E. C. 2, England.

F. N. Best, chairman of board of directors; F. O'D. Bourke, gen. mgr.; C. G. Lush, cons. engr.

Inc. January, 1910, in Great Britain. **Cap.,** £175,000; £1 par; all issued.

Profit for 1918 was £42,034, of which £26,250 was distributed. Balance forward was £11,401. Reserves are £20,000. **Dividends:** 70% to December, 1918.

Property: 19 sq. miles in Bauchi province, Northern Nigeria, equipped with hydraulic plant.

Production: 520 tons in 1916; 517 tons in 1917, and 430 tons in 1918. Costs were £133 per ton in 1917.

NIGERIAN TIN CORPORATION, LTD. NIGERIA

Office: E. J. Andrews, sec., Capel House, 54 New Broad St., London, E. C. 2, England.

O. Wethered, chairman of board of directors; R. T. Hancock, mgr.

Inc. Oct. 14, 1909, in Great Britain. **Cap.,** £100,000; £1 par; 79,567 issued.

Profit during 15 months ended March 31, 1918, was £12,340, of which £9,964 was distributed and £7,116 carried forward. **Dividends:** 55% to October, 1918.

Property: 2,424 acres and river leases in Northern Nigeria. Company has large interests in other properties in Nigeria, also in Cornwall and Malaya.

Production: 161 tons in 1917 and 87 tons in 1918.

OFFIN RIVER GOLD ESTATES, LTD. NIGERIA

Office: W. N. Humphrey, Coventry House, South Place, Finsbury, E. C. 2, England.

F. N. Best, chairman of board of directors; T. J. Cullen, mgr.

Inc. Dec. 27, 1900, in Great Britain. **Cap.,** £300,000, in 45,000 cum. 7% pfd. and 255,000 ord. shares of £1 par; of which 30,000 and 252,920, respectively are issued. Debentures: £22,850 of 7% authorized; £20,000 issued. No profits are being made or dividends paid.

Property: concession for gold, covering 100 sq. miles; also 158 miles along the Offin river, where one of the company's dredges is at work; also

several hundred acres of tin-bearing land in Northern Nigeria, from which the tin is recovered by sluicing and calabashing. Company also owns rubber plantations.

Production years ending December 31:

Year	Yield	tons	Year	Yield	tons
1918.....	£408	119	1916.....	14,253	164
1917.....	8,464	165	1915.....	18,610	29

Evidently the gold property is about worked out.

RAYFIELD (NIGERIA) TIN FIELDS, LTD. **NIGERIA**

Office: G. E. Bance, Capel, House, New Broad St., London, E. C. 2, England.

O. Wethered, chairman of board of directors; J. M. Iles, gen. mgr.

Inc. May 9, 1912, in Great Britain. **Cap.,** £500,007; £1 par; increased October, 1919, from £400,007; all issued. Also £17,175 of 6% debenture stock outstanding.

Profit in 1917 was £42,911, of which £20,000 was paid in dividends. Balance forward was £36,626. Cash assets exceeded liabilities by £64,000. Profit in 1918 was £36,917.

Dividends: 25% to December, 1918.

Property: about 5,500 acres in Bauchi province, Northern Nigeria, equipped for hydraulicking.

Production: 843 tons of black tin in 1916 (15 months), 679 in 1917, and 679 tons in 1918.

ROPP TIN, LTD. **NIGERIA**

Office: H. St. J. Hodges, 20 Copthall Ave., London, E. C. 2, England.

E. Davis, chairman of board of directors; J. Daniel, mgr.

Inc. Dec. 14, 1911, in Great Britain. **Cap.,** £68,750 par 5s; 301,726 issued; also £11,940 6% first-mortgage debentures outstanding, £15,000 5% second-mortgage debentures, and £8,000 6% loan.

In 1917 the profit was £36,099, plus £13,134 balance from 1916. Dividends absorbed £37,156. Balance forward was £12,077. Profit in 1918 was £52,150.

Dividends: total 260% from 1913 to 1918, inclusive.

Property: 61 sq. miles in Bauchi province, Northern Nigeria, worked by two 2¾-cu. ft. dredges, hydraulic plant, and natives with calabashes.

Production: 670 tons of black tin in 1917, and 837 tons in 1918.

RUKUBA (NIGERIA) TIN MINING CO., LTD. **NIGERIA**

Office: H. Dobbin, Friars House, 39 New Broad St., London, E. C. 2, England.

S. S. Bastard, chairman of board of directors; R. W. Hannam, cons. eng.

Inc. Jan. 30, 1912, in Great Britain. **Cap.,** £100,000; £1 par; all issued. Profit in 1917 was £4,393. **Dividends:** 10% in 1918.

Property: 21 sq. miles in Bauchi province, Northern Nigeria, most of which has been leased on 22½% royalty basis.

Production: was 122 tons of black tin in 1916, 101 tons in 1917, and 132 tons in 1918.

TIN AREAS OF NIGERIA, LTD. **NIGERIA**

Office: W. S. Griffin, 1 Giltspur St., London, E. C. 1, England.

J. G. M. Brownjohn, chairman of board of directors; A. S. Williams, manager.

Inc. March 8, 1910, in Great Britain. **Cap.,** £500,000; 5s. par; 790,000 issued.

In 1918 the profit was £29,684, of which £11,250 was distributed; £12,682 was carried forward. Reserve is £10,000. **Dividends:** 40% from 1912 to 1918.

Property: 2 sq. miles in Northern Nigeria, equipped for ground-sluicing and calabashing.

Production: 141 tons of black tin in 1916, and 138 tons in 1917.

TIN FIELDS OF NORTHERN NIGERIA, LTD. **NIGERIA**

Office: A. J. Culley, sec., Friars House, 39 New Broad St., London, E. C. 2, England.

S. R. Bastard, chairman of board of directors; D. Clemens, mgr.; R. W. Hannam, cons. eng.

Inc. Oct. 7, 1909, in Great Britain. **Cap.,** £100,000; £1 par; 70,007 issued.

Profit for year ended March 31, 1918, was £12,199, £8,425 was carried forward. Profit in 1919 was £2,956.

Dividends: 15% in 1918.

Property: 12 miles in Northern Nigeria, equipped with hydraulic plant.

Production: 113 tons of black tin in 1917, 108 tons in 1918, and 118 tons in 1919.

PORTUGUESE EAST AFRICA

ANDRADA MINES, LTD. **PORTUGUESE EAST AFRICA**

Office: 286 Salisbury House, London, E. C. 2, England.

Directors: J. C. P. d'Andrada, J. L. Bergson, H. Bousquet, R. Burnay, and F. G. C. E. Robellaz (managing).

Inc. Sept. 11, 1911, in Great Britain. **Cap.,** £250,000 in 235,000 ord. shares of £1 and 150,000 dfd. shares of 2s. par, all issued.

Last accounts show a total profit of £22,111 for 3 years ended Dec. 31, 1915.

Property: 614 lode and 75 alluvial claims in Manica district. The Braganza lode mine is closed, but a dredge operating on the placer ground recovered 19,698 oz. of gold from February, 1914, to December, 1915, making a profit of £45,234.

MOZAMBIQUE CO. (COMPANHIA DE MOCAMBIQUE)

Office: S. H. Sharpe, act. sec., Thames House, Queen St. Place, London E. C., England. **Head office:** 10 Largo da Biblioteca Publica, Lisbon, Portugal.

Inc. March 8, 1888, given Roval Charter, Feb. 11, 1891, and reconstituted May 5, 1892. **Cap.,** £1,500,000; £1 par; issued and paid 1,399,998. A 5% dividend paid in 1911.

The company, which possesses sovereign rights over an area of 65,000 sq. miles, is also the owner of all unalienated land and mining rights in this area, which embraces the central and richest portion of Portuguese East Africa.

The Manicaland goldfield or mining district lies within a radius of 16 miles around Macequece. Geologically speaking, the field is part of the Umtali mining field of Rhodesia. It is a belt of schistose rocks traversed by gold-bearing quartz veins, the gold also being occasionally found in the schist wall rock. Dredging for alluvial gold is being successfully carried on.

Copper ores also exist in the district, the Edmundian mine being in this locality.

Company issues for £1 a mining license that gives the holder a right to prospect for 12 months. Each license gives the right to peg-off (stake) a block of 10 mineral claims, each 100 m. square for lode and placer deposits, and 500 by 1,000 meters for non-metallic minerals.

Claim rents, corresponding to claim licenses, in Rhodesia and the Transvaal, are 10 shillings per claim, in the second year, increasing 50% yearly to a maximum of £3. Rent for a non-metallic claim is £5.11 the second year, doubling each year thereafter up to £55.11 per claim annually. Royalties payable to Companhia de Mocambique for gold are on a sliding scale on the gross output, in the case of monthly outputs up to 800 oz. of fine gold, and vary from 1 to 4%. Above 800 oz. gold output, the royalty is 10% of the net profits. For all other metals and non-metallic substances the royalty is 10% of the net profit.

RHODESIA

ANTELOPE GOLD MINE (RHODESIA), LTD.

Office: 8 Old Jewry, London, E. C. 2, England.

Directors: J. C. Prinsep, chairman of board of directors; H. A. Piper, cons. engr.

Inc. Nov. 25, 1908, in England. **Cap.,** £400,000; shares 5s. par; 1,393,128 issued.

Revenue in 1918 was £79,565, of which £1,389 was profit.

Property: 170 claims, 1½ acres each, 60 miles S. of Bulawayo, Rhodesia. Reserves were estimated in September, 1916, at 110,987 tons, assaying $10.10 per ton, reduced to 76,000 tons of $9.90 ore, due to shortage of labor.

Development: by vertical and incline shaft 1,400′ deep. The 14th level showed the orebody to be of undiminished size and value, but a dike, encountered in mid-1919, cut off the ore.

Equipment: complete for mining, also 150-ton mill using 2 Krupp ball-mills, 4 furnaces, tube-mill, 12 pans, and 2 filter-presses.

Production:

Year	Ore treated, tons	Gold, oz.	Average value per ton
1918	39,830	18,224	.....
1917	46,334	22,096	35/ 6 ($8.46)
1916	45,927	21,580	34/10 (8.26)

BRITISH SOUTH AFRICA CO., THE **RHODESIA**

Head Office: 2 London Wall Bldgs., London, E. C., England. A. P. Millar, act. sec. **Administrator of Southern Rhodesia:** Sir D. Chaplin, Salisbury. **Administrator of Northern Rhodesia:** Sir L. A. Wallace, Livingstone. **Res. Mining eng.:** A. H. Ackermann, Bulawayo.

Board of Directors: R. Maguire, P. Lyttelton Gell, Hon. Sir L. Michell, Sir H. Birchenough, Marquess of Winchester; Otto Beit, H. W. Fox, M. P.; Baron E. B. d'Erlanger, D. O. Malcolm, Br.-Gen. E. Baring, Duke of Abercorn.

Inc. Oct. 29, 1889. Present authorized capital is £9,000,000 in 9,000,000 shares of £1 each, having been increased at intervals from £1,000,000 in 1890; 8,937,533 shares are issued and fully paid. Bonds, £1,250,000 5% mortgage debentures.

Lands: about 400,000 sq. miles. The company acquired: (a) from the Central Search Association, Ltd., the Rudd-Rhodes Concession, consisting of the mining rights over the territory of the King of Matebeleland; the Central Search Association being entitled to one-moiety of the net receipts, which right was subsequently merged in the United Concessions, Ltd., and capitalized in 1894 by the issue of 1,000,000 fully-paid shares of the company; (b) mining rights over the territory of the chiefs Khama and Gungunhana; (c) administrative power over the whole British sphere north of the Zambesi and west of Nyasaland; (d) rights of the African Lakes Co. (acquired in 1894); (e) and also through the Victoria Falls Power Co., in which this company holds a large interest, the right to develop electrical energy at Victoria Falls.

The company adopted the name "Rhodesia" to describe all the territories under its administration; the portion south of the Zambesi being described as Southern Rhodesia. Company controls Bwana M'Kubwa and several other important South African copper properties by ownership of a large stock interest. Company is a gigantic corporation and is the owner of the mineral rights throughout its territory.

BWANA M'KUBWA COPPER MINING CO., LTD. **RHODESIA**

Office: R. E. Bayliss, sec., 19 St. Swithin's Lane, London, E. C. 4, England.

R. Littlejohn, chairman of board of directors.

Inc. March 16, 1910, in England. **Cap.,** £600,000; 10s. par; 925,053 issued. On June 30, 1918, company had an excess of £41,595 over liabilities.

Property: 47,097 acres, containing the Bwana M'Kubwa mine, 1,450 miles by rail from Beira, Portuguese East Africa, in northern Rhodesia. Reserves are estimated at 23,000 tons of 10% copper ore, 3,000,000 tons of 4.5%. and 1,200,000 tons of low-grade material. A 100-ton concentrator using Minerals Separation flotation is in operation.

Production: during the year ended June 30, 1918, the mill treated 16,295 tons of ore, yielding 1,419 tons of 40% copper concentrates.

Mine has been a long time reaching the stage of profitable operation, but from now on should yield a satisfactory return despite its large capitalization.

CAM & MOTOR GOLD MINING CO., LTD. **RHODESIA**

Office: Palmerston House, London, E. C. 2, England; and Salisbury, Rhodesia.

J. Weil, chairman of board of directors; C. B. Kingston, cons. eng.

Inc. Sept. 3, 1910, in England. **Cap.,** £617,500; £1 par; 599,043 issued. Reorganized in June, 1919, reducing the shares to a par of 7/6 each.

Revenue for year ended June 30, 1918, was £210,630, but expenditure exceeded this by £11,878. Debit balance, £20,709. Current assets total £89,829, and liabilities, £121,461, exclusive of the £50,000 debentures due in December, 1919.

Property: 286 claims, 429 acres, in the Hartley district of Southern Rhodesia.

Development: by 1,100′ steel-lined main shaft at the Motor mine. During 1917-18, 4,338′ of new work was done.

Reserves at the Cam mine, 107,300 tons, worth 39/2 ($9.38) per ton; at Motor mine, 384,700 of 37/3 ($8.91) ore; at Cam Good Shepherd mine, 107,300 tons of $9.38 ore.

Equipment: steam power, hoists, compressors, shops, and 500-ton mill employing 6 Krupp ball-mills, 6 Edwards roasting furnaces, tube-mills and cyanidation plant. As ore contains antimony and arsenic, its treatment is difficult.

Production: 142,766 tons of ore, yielding £208,772 in 1917-'18. In 1916 162,922 tons yielded £219,374, at a cost of $6.25 per ton, compared with $6.99 per ton in 1917-18.

This is a group of 3 good gold mines, containing reserves valued at £941,000. Owing to expensive development and plant-alterations profits have been small, but it is now proposed to increase the output to 700 tons daily if additional development warrants it. Company reports are admirable for their detail.

ELDORADO BANKET GOLD MINING CO., LTD., THE

Office: 8 Old Jewry, London, E. C. 2, England.

H. L. Sapte, chairman of board of directors. Local directors (Rhodesia): T. G. McDonald, G. Mitchell. The Gold Fields Rhodesian Development Co., Ltd., managers at Bulawayo and Salisbury, Rhodesia. C. E. Parsons, supt.

Inc. Nov. 27, 1906, in Great Britain. **Cap.,** £300,000; £1 par; all issued.

Profit: for year ended March 31, 1918, was £51,297, plus £61,698 balance from previous year. Dividends absorbed £45,000, and £63,785 was carried forward. Cash assets totaled £46,941, and liabilities, £7,572.

Dividends: 227% from 1909 to January, 1919, 15% being paid in 1918-'19.

Property: 161 claims (1½ acres each) in Lomagunda district of Rhodesia.

Development: to depth of 2,580′ by a 1,900′ main shaft and an auxiliary shaft below the 16th level.

Reserves were 31,700 tons of $9.90 ore, but since results at depth are disappointing, the mine is rapidly being exhausted.

Equipment: complete mining plant, 20 stamps, 2 Chilian mills, 8 grinding pans, and a cyanide plant.

Production: 48,629 tons yielded £114,010 in 1917-18; and £97,186 from 41,948 tons during 9 months ended December 31, 1918.

FALCON MINES, LTD. **RHODESIA**

Office: Gold Fields Rhodesian Development Co., 8 Old Jewry, London, E. C. 2, England.

J. C. Prinsep, chairman of board of directors; H. T. Brett, gen. mgr.; C. E. Parsons, cons. engr.

Inc. Feb. 26, 1910. **Cap.**, £600,000; £1 par; 400,000 shares issued and fully paid. **Cap.** originally £400,000, increased August, 1912, to provide for bond redemption. Bonds, £250,000 authorized, 6%; £158,078 outstanding.

In 1917-'18 profit was £75,310, plus £106,894 balance from previous year. In 1918-'19 the profit was £56,320, and credit balance carried forward was £159,907.

Dividends: 20% in 1916-1917; none since.

Property: comprises 380 claims, 578 acres farm lands near the Falcon mine; also the Athens mine, acquired from the Falcon (Rhodesia) Development Co., Ltd., by Rhodesia Cons. Ltd.

The orebodies are large, increasing from 17′ in width on the 3rd level to 50′ on the 9th level. Metal contents also increase from 2.45% copper and $3.68 gold per ton on the 3rd to 2.3% copper and 6 dwt. gold on the 9th level.

Development: by 1,100′ shaft and over 6 miles of workings. On No. 10 level the orebody is 180′ long, 70′ less than on No. 9, but the width and value are similar. Reserves amount to 800,000 tons, averaging $5.40 gold and 2.32% copper. Development work on No. 11 level proved disappointing in 1919.

Equipment: crushing plant, equipped with 3 jaw-breakers and 4 trommels, separating the fine and coarse ores. Sorted ore of 5½% copper content and 9% of total output is sent to furnaces. The 500-ton mill, installed in 1915, has 36 Nissen stamps, tube-mills, Dorr thickeners, vanners and a 9-cell Minerals Separation flotation plant.

The *smelter equipment* includes 12 hemispherical blast roasting pots, two blast-furnaces, each of 300-ton daily capacity, two 12,500 cu. ft. turbo-blowers, electric crane and 12 converters of 15-ton copper capacity. Copper is cast into bars of 360 lb., containing 10 oz. gold and 20 oz. silver. The plan of treatment is similar to that of the standard plants in the United States.

See article "Ore Treatment at Falcon Mine," by H. R. Adams, S. African Mng. Journ., December 30, 1916, p. 421.

Production, years ended June 30:

Year	Tons Ore treated,	Copper, lb.	Gold, oz.	Silver, oz.	All costs
1919.....	150,961	5,934,000	33,597	68,794	47/7 ($11.42)
1918.....	170,074	7,064,000	37,701	80,528	46/8 (11.20)
1917.....	203,049	7,647,000	35,248	70,876	.....
1916.....	218,792	7,640,000	38,569	73,862	30/7 (7.27)
1915.....	.....	5,766,000	31,461	53,303	.....

GAIKA GOLD MINING CO., LTD. RHODESIA

Office: 8 Old Jewry, London, E. C. 2, England.

Directors: A. Davidson, chairman, J. C. Prinsep, and G. R. Saunders.

Inc. Dec. 19, 1902, in Great Britain. **Cap.**, £300,000; £1 par; 273,495 issued.

The year June 30, 1918, ended with a profit of £13,775. Dividends absorbed £13,675. In 1919 the profit was £13,624, of which £8,204 was distributed. **Dividends:** since 1911 total 65½%, including 5% in 1917-'18, and 3% in 1918-'19.

Property: 215 claims (1½ acres each) in the Sebakwe district of Matabeleland, Rhodesia.

Development: by 16 shafts, exposing 60,000 tons of 12.40 dwt. ore, a decrease of 20,000 tons and 0.7 dwt. from 1918. On No. 3 level of No. 16 shaft, 120′ of 35.5 dwt. ore has been opened; also on No. 2, and in a winze.

Equipment. complete for mining, with 5 stamps, 1 tube-mill, 1 Chilian mill, and cyanide plant.

Production: Year	Ore treated, tons	Gold yield	Cost per ton
1919	36,789	£66,860	.....
1918	38,554	76,568	29/10 ($7.07)
1917	38,320	84,007	29/ 6 (6.99)

GLOBE AND PHOENIX GOLD MINING CO., LTD. RHODESIA

Office: T. Priest, sec., 35 Old Jewry, London, E. C. 2, England.

Earl Russell, chairman of board of directors; T. Haddon, gen. mgr.; J. Macarthur, mine mgr.

Inc. Oct. 18, 1895, in England. **Cap.,** £200,000; 5s. par; all issued.

Profit for 1917 was £347,280, of which £300,000 was distributed. Profit in 1918 was £114,065, and dividends £120,000. Reserves total £123,812.

Dividends: total 1107%, 40% being paid in 1918

Property: 70 mining claims (1½ acres each) in Rhodesia, 140 miles N. of Bulawayo.

Development: by 3,149′ incline and 2,300′ vertical shafts.

Reserves: at beginning of 1919 were 143,333 tons, averaging 29.9 dwt. per ton.

In the apex suit, started by the Amalgamated Properties of Rhodesia, the Globe and Phoenix won in every court, the final decision being given in 1919.

Equipment: complete, with 40-stamp mill, roasting and cyaniding plant.

Production: in 1918 was 66,383 tons of ore yielding 81,244 oz. gold, compared with 75,465 tons in 1917, yielding gold valued at £403,371, and 77,464 tons yielding 102,473 oz. gold in 1916.

LONELY REEF GOLD MINING CO., LTD. RHODESIA

Office: A. D. Owen, 34 Bishopsgate, London, E. C. 2, England.

Officers: C. F. Rowsell, chairman of board of directors; C. B. Kingston, gen. mgr.

Inc. Jan. 13, 1910, in Rhodesia. **Cap.,** £325,000; £1 par; 271,007 issued.

A profit of £106,143 was made in 1917, of which £60,977 was paid in dividends. Balance forward was £14,192. Revenue in 1918 was £209,712, and dividends £48,273.

Dividends: 10% in 1911; 30% in 1912; 30% in 1913; 20% in 1914; 15% in 1915; 20% in 1916; 30% in 1917; 25% in 1918.

Property: 234 claims, 351 acres, 40 miles N. of Bulawayo, Bubi district, Rhodesia.

Development: by 3,240′ shaft. Reserves are estimated as 176,097 tons worth 24.1 dwt. per ton, an increase of 31,000 tons and 5.31 dwt. per ton.

Equipment: 20 stamps, 3 tube-mills, and cyanide plant.

Production: in 1918 was 54,320 tons yielding £208,396; compared with 57,870 tons in 1917, yielding £221,299 and 59,320 tons yielding £174,857, with net profit of £70,314 in 1916.

REZENDE MINES, LTD. RHODESIA

Office: F. M. Ward, sec., 4 London Wall Bldgs., London, E. C. 2, England.

Sir A. Bailey, chairman of board of directors; Sir P. B. S. Wrey, v. c.; J. P. Farrar, L. E. B. Hanan, and Sir E. M. Clarke. L. H. Blackbeard, mine engr.

Inc. Dec. 11, 1908. **Cap.,** £120,000; £1 par; 118,435 issued.

Profit in 1917 was £8,352; total credit balance, £45,545. In 1918 the profit was £46,620. **Dividends:** 74% from 1912 to 1918, inclusive.

Property: 583 claims (1½ acres each) in Penhalonga valley, Umtali, Rhodesia.

Development: by shafts, the deepest being 1,400′ on incline. Reserves are estimated at 447,690 tons by directors, and 175,374 tons of 12.5 dwt. ore by the consulting engineer S. R. Jameson.

Equipment: complete at mines, and stamp mill with cyanide plants.

Production: 54,000 tons in 1918, yielding £125,528; 59,500 tons in 1917, yielding £94,532.

RHODESIA BROKEN HILL DEV. CO., LTD. **RHODESIA**

Office: T. Donald, 19 St. Swithin's Lane, London, E. C. 4, England.

E. Davis, chairman of board of directors; R. K. Macartney, mine mgr.; Hooper, Speak & Co., cons. engr.

Inc. Aug. 19, 1910. **Cap.,** £350,000; 5s. par; 991,083 issued.

Property: 1,690 claims (1½ acres each), 374 miles from Victoria Falls, Rhodesia. Fully described by S. J. Speak in "Mining Magazine," October, 1919.

Geology: the ground contains a number of "kopjes," ("buttes" or hills), carrying lead and zinc ores. No. 1 and 2 kopjes are 65 and 90′ high, respectively; No. 2 contains zinc ore with iron ore and a little lead. Over 300,000 tons of 32% zinc ore have been exposed, which tonnage was increased by drilling operations carried on in 1919. No. 1 kopje shows, in section, a block of dolomite replaced by oxidized ore containing numerous boulders of zincified dolomite; many caves and vugs with bone remains. A sand-filled central core adjoins oxidized ore, grading into replaced dolomite, high in zinc but low in lead.

Development: by open quarry work which is hampered by a large inflow of water, as much as 170,000 gal. per hour being pumped 40′ to surface.

Equipment: mine pumps, tramways, 2 blast-furnaces for lead ore and 2 more to be erected. A plant for treating zinc ore is under consideration.

Production: 26,000 tons of lead to October, 1919, when the output averaged 1,000 tons per month.

Property is as yet in its infancy, and is thought to have a prosperous future.

RHODESIA CHROME MINES, LTD. **RHODESIA**

Office: T. Donald, sec., 365 Salisbury House, London, E. C.

Inc. June 27, 1908. **Cap.,** £60,000; shares £1 par; 59,457 issued.

Dividends: 10% in 1911; 20% in 1912; 20% each in 1913 and 1914; nil in 1915; 45% in 1916; 20% in 1917.

Property: 885 acres, in the Gwelo and Selukwe districts, Southern Rhodesia.

Production of chromic-iron ore:

Year	Tons	Value	Year	Tons	Value
1918	28,628	.....	1914	48,207	£107,612
1917	72,962	£327,347	1913	63,383	141,481
1916	88,871	333,170	1912	69,260	154,600
1915	60,581	175,792			

Company is a close corporation, and reports are not issued.

RHODESIA COPPER & GEN. EX'N & F. CO., LTD. **RHODESIA**

Office: T. Donald, 365 Salisbury House, London, E. C. 2, England.

Sir E. Davis, chairman of board of directors.

Inc. March 5, 1909, in England. **Cap.,** £352,793, in 1,398,046 shares of 4s. 6d. and 101,954 of 7s. 6d. par, of which 1,173,405 of the former are issued. On May 31, 1918, there were cash assets amounting to £228,540.

Dividends: were 5% in 1910-'11; 3% in 1913-'14; 3% in 1915-'16; 2% 1916-'17; nil in 1918.

Property: 640 sq. miles near the Kafue river, 64,733 acres of farm lands, 500 mining claims, 1½ acres each, also ½ interest in 130 and ⅛ interest in 150 claims, all in Northern Rhodesia. On some of the claims fair quantities of copper ore have already been opened. To develop some of the claims the Rhodesia Broken Hill Development (lead-zinc), Kafue Copper Development, and Bwana M'Kubwa Copper companies have been organized.

SHAMVA MINES, LTD. **RHODESIA**

Offices: 8 Old Jewry, London, E. C. 2, England, and Bulawayo, Rhodesia.

E. S. Bikenruth, chairman of board of directors; J. G. McDonald and G. Mitchell in Rhodesia. W. Wallace, mine mgr.

Inc. April 5, 1910, in England. **Cap.,** £600,000; £1 par; all issued.

In 1918 the profit was £101,436, compared with £164,893 in 1917. **Dividends:** 27½% in 1915; 30% in 1916; 26¼% in 1917; 20% in 1918.

Property: 243 acres, 1½ acres each, in Abercorn district, Rhodesia. **Development:** by tunnels. Reserves are estimated at 2,005,000 tons, averaging 4.3 dwt. ($4.30) per ton. **Equipment:** includes 3 Gates crushers, 56 Nissen stamps, 10 tube-mills, and cyanide plant, with monthly capacity of 50,000 tons.

Production: Year	Ore treated, tons	Gold yield	Profit
1918	556,891	£388,424	£101,436
1917	587,806	431,543	164,893
1916	582,980	448,723	183,481

Total costs are about 9s. ($2.16) per ton. This is the largest gold producer in Rhodesia. Reserves are large, but are low grade, and although the amount has been increased 300,000 tons in 2 years, it has been done by including lower grade ore, the value per ton of the total reserves being 90 cents per ton less than in 1916 estimates.

ZAMBESIA EXPLORING CO., LTD. **RHODESIA**

Office: L. Scotland, sec., Friars House, New Broad St., London, E. C. 2, England.

Tyndale White, chairman of board of directors; Robert Williams, managing director; R. Williams & Co., mgrs. and engrs.

Inc. March 26, 1891. **Cap.,** £20,000, increased 1892, 1893, 1897, 1898, 1900, 1903, 1905, 1909 and 1911, to present figure of £870,000; £1 par; issued, 687,860, fully paid. Debentures: £250,000, at 5½%, callable at 106% on or before February 28, 1918, or six months after termination of war, whichever was the later date, £213,009 outstanding.

A dividend of 100% was paid February 7, 1896. Company floated the Tanganyika Concessions, Ltd., which see.

Property: consists of about 31,668 acres farm lands; 19 townsites; an interest in 20 mining claims; an 85% interest in 20 other mining claims, and a one-half interest in 10 mining claims. Company also owns 174,644 shares of Tanganyika Concession, Ltd.; £1,090,040 Benguella Railway bonds; 11,000 Union Miniere du Haut Katanga shares; £10,000 Rhodesia Railways bonds; £15,704 Tanganyika Concessions, Ltd., bonds, and £1,425 debentures of the Rhodesia Railways.

SOUTHWEST AFRICA

OTAVI MINES & RAILWAY CO. **SOUTHWEST AFRICA**

(Otavi Minen & Eisenbahn Gesellschaft).

Fully described in Copper Handbook, Vol. XI.

Property formerly owned by German interests, was taken over during the war by the S. A. Government, and is now controlled by the Southwest Africa Co., Ltd.

SOUTHWEST AFRICA CO., LTD., THE **SOUTHWEST AFRICA**

Secretary and offices: C. Launspach, 1 London Wall Bldgs., London, E. C. 2, England.

E. Davis, chairman of board of directors; Johan Askevold, mgr. at Grootfontein, S. W. Africa.

Inc. Aug. 18, 1892, in England. **Cap.,** £300,000, increased successively to £400,000, £500,000, £1,000,000, and finally, in 1902, to £2,000,000; £1 par; 1,750,000 issued.

Dividends: were 5% in 1908; 7½% in 1909; 5% in 1910; 7½% in 1911; 5% in 1912 and 1913, none since. During 1917 the income totaled £28,174, including £26,418 dividends on investments, which were valued at £1,288,874 at the end of the year. These consist mainly of British and foreign Government bonds. A profit of £95 was made.

In 1918 the profit was £5,793, and £94,634 was carried forward. Cash amounted to £474,590; investments held in London, £605,114; and investments in Berlin, £733,759.

Property: comprises about 20,000 sq. miles in which company has min-

ing rights, and about 1,600,000 acres of unsold freehold land in Damaraland; a one-half interest in mining rights to 23,000 sq. miles in Ovamboland; a two-thirds interest in the South African Co., Ltd., owning about 66,000 sq. miles of mining rights, in Angola, Portuguese S. W. Africa, nearly one-half interest in the Hanseaticer Mining Co., owning mining rights covering about 15,000 sq. miles; a large share interest in the Otavi Mines & Railway Co., small interests in the Southwest African Mining Syndicate and the Otavi Exploring Syndicate, Ltd. The Otavi Mines & Railway shipped 51,000 tons of ore and matte in 1913-14.

In March, 1920, a mandate was given the Union of South Africa over "German Southwest Africa," by the Allied powers. Operations at the mines can therefore be resumed.

TRANSVAAL

ANGLO-AMERICAN CORP'N. OF SO. AFRICA, LTD. TRANSVAAL

Offices: C. W. Moore, sec., 5 London Wall Bldgs., London, E. C. 2, England; and 120 Broadway, New York.

Ernest Oppenheimer, chairman of board of directors.

Inc. Sept. 25, 1912, in the Transvaal. **Cap.,** £1,000,000; £1 par; all issued. Directors possess power to double the capital, if necessary.

Business: company has interests in the Rand Selection Corporation, Brakpan Mines, Springs Mines, Daggafontein Mines, and New Geduld Deep. Its tender for operating the western portion of Farm De Reitfontein No. 14 was accepted by the Union Government, and the West Springs, Ltd., was organized to work the property.

In March, 1920, it was proposed to amalgamate this and the Rand Selection Corporation, the Anglo to issue 1,320,000 new shares.

Company is primarily an exploration and holding company.

BRAKPAN MINES, LTD. **TRANSVAAL**

Offices: J. H. Jeffreys, sec., 5 London Wall Bldgs., London, E. C. 2, England, and 409 Corner House, Johannesburg, Transvaal.

E. R. Lynch, chairman of board of directors; C. R. Davis, mine mgr.; M. J. Turner, asst. mgr.; J. Erving, cons. mech. eng.; C. E. Knecht, cons. mining eng.

Inc. Feb. 16, 1903, in the Transvaal. **Cap.,** £850,000; £1 par; 791,000 issued.

Revenue in 1917 was £1,168,455; £482,120 was profit and £367,525 was distributed. Respective figures for 1918 were £1,089,957, £366,010, and £257,107.

Dividends: from 1912 to 1918, inclusive, total 267½%, 32½% being paid in 1918.

Property: 3,387 claims in the Far East Rand goldfield.

Development: by 5 shafts, deepest 3,800′, one being an incline. New work in 1917 amounted to 18,451′. Reserves are estimated at 2,718,000 tons of 8.7 dwt. ore, the reef having a thickness of 67″.

Equipment: electric power, complete with hoists, compressors, ventilating fans, tramways, shops, 160 stamps, 12 tube-mills, and cyanide plant of 75,000 tons monthly capacity, assay-office, and dwellings. Plant is to be doubled by 1922.

Production, years ended December 31:

Year	Ore treated, tons	Gold, oz.	Average p. t. dwt.	Extract., %	Total cost
1918.....	617,100	258,272	8.31	.....	25/5 ($6.10)
1917.....	677,500	276,738	8.17	96.70	20/3 ($4.86)

This is one of the new mines of the Rand.

CENTRAL MINING & INVESTMENT CORPORATION, LTD.

Office: 1 London Wall Bldgs., London, E. C. 2, England; J. L. Siddall, sec.; Sir Lionel Phillips, chairman of board of directors.

Officers: H. C. Boyd, F. Raleigh, and E. G. Izod, mgrs. at Johannes-

burg; F. Geim, P. Troquet, and A. W. Rogers, mgrs. in London. H. F. Marriott, cons. eng. in London; E. Dew, con. mech. and elec. eng.

Inc. May 9, 1905, in England. **Cap.**, £3,400,000; shares £8 par; all issued.

Profit in 1917 was £349,090, and £397,000 in 1918. Reserve fund is £450,000.

Dividends: 1918, 5% per share; 1917, 5% (8s. per share); 1916, 5%; £2 16s. per share from 1908 to 1911, inclusive; 5% in 1912; 2½% in 1913 and 1914; nil in 1915; 5% in 1916, 1917 and 1918.

Company is a holding concern, interested in the Bantjes, City Deep, City & Suburban, Crown Mines, Daggafontein, Durban Roodepoort Deep, New Heriot, New Modder, Nourse Mines, Robinson Deep, Robinson Gold, Rose Deep, Village Deep, Village Main Reef, Rand Mines, Ferreira Deep, Geduld Prop., Geldenhuis Deep, Modder B., Modder Deep, and East Rand Proprietary companies, all large gold producers on the Rand.

Corporation is responsible for the initiation of and holds a controlling interest in Trinidad Leaseholds, Ltd., a highly successful oil company in the island of Trinidad. It also possesses a substantial interest in the Magadi Soda Co., Ltd., and is actively connected with the base metal industry in Great Britain through its interests in the British Metal Corporation, Ltd., Williams, Foster & Co., and Pascoe, Greenfell & Sons, Ltd.

CITY DEEP, LTD. TRANSVAAL

Office: A. Moir & Co., sec., 1 London Wall Bldg., London, E. C. 2, England.

Sir E. A. Wallers, chairman of board of directors; P. W. Sherwell, mgr.; E. H. Clifford, cons. eng.

Inc. Feb. 15, 1899, in the Transvaal. **Cap.**, £1,250,000; £1 par; all issued.

The profit in 1917 was £682,020, plus £211,214, balance from previous year. Dividends absorbed £562,500. Balance forward was £216,462. Profit in 1918 was £447,718.

Dividends: from 1912 to 1918, inclusive, 205%, 27½% being paid in 1918.

Property: 1,081 claims on the Rand, worked by 3 vertical shafts 4,340′ 4,340′, and 227′ deep; and another being sunk. Reserves at beginning of 1919 were 3,342,700 tons, averaging 9.6 dwt. per ton.

Equipment: complete for mine and for mill of 80,000 tons monthly capacity, with 190 ordinary and 4 Nissen stamps, 9 tube-mills, and cyanide plant.

Production, year ended December 31:

Year	Ore treated, tons	Gold Yield	Working Profit
1918	670,100	£1,274,969	£447,718
1917	744,100	1,468,104	655,998

CONSOLIDATED GOLD FIELDS OF SOUTH AFRICA

Offices: H. C. Porter, sec., H. D. Sidgraves, asst. sec., 8 Old Jewry, London, E. C. 2, England. E. C. Goodhart, mgr., 12 Rue des Pyramides, Paris, France; 233 Broadway, New York.

Lord Harris, chairman of board of directors. **Johannesburg staff:** D. Christopherson, mgr; F. L. Brown and C. Hely-Hutchinson, asst. mgrs. **Engineering staff:** David Wilkinson, cons. engr.; **Staff in America:** Alfred de Ropp, agt.; Amor F. Keene and H. H. Webb, cons. engrs. J. G. McDonald, agt. in Rhodesia.

Inc. Aug. 2, 1892, in England. **Cap.**, £2,000,000; £1 par; and £2,500,000 in 1,250,000 6% first-cumulative preference shares and 1,250,000 6% second-cumulative preference shares; total capital, £4,500,000. Debentures outstanding total £50,000 of 5½%.

Company is a holding concern, having investments valued at £3,767,201, in many important mines and other industries, including: Abbontiakoon Mines, American Trona, Cam & Motor Gold Mining Co., Crown Mines, Falcon Mines, Gold Fields American Development Co., Government Gold Mining Areas (Modderfontein) Consolidated, Lonely Reef Gold Mining Co., Mississippi River

Power, Robinson Deep, Shamva Mines, Simmer Deep, South American Gold & Platinum, and Victoria Falls & Transvaal Power Co., all described under their respective titles. Company also owns considerable real estate in the Transvaal, Rhodesia, and London.

Financial statement for year ended June 30, 1918, shows an income of £432,081, of which £412,540 was profit; £300,000 was paid in dividends. After writing down investments and providing for contingencies, etc., the balance out of £1,070,954 available after allowing £705,808 for depreciation of investments, and £150,000 for preference dividends, etc, was £210,095.

Dividends: on first preference shares is paid Jan. 1 and July 1; on second preference, April 1 and October 1; on ordinary, since the Boer War, 25% in 1901-02; nil in 1902-03; 12½% in 1903-04; 15% in 1904-05; nil in 1905-06; 12½% in 1906-07; 20% in 1907-08; 35% in 1908-09; 30% in 1910-11; 17½% in 1911-12; 10% in 1912-13; 5% in 1913-14; 7½% in 1914; 7½% in 1915-16; 7½% in 1916-17; 7½% in 1917-18.

CONSOLIDATED LANGLAAGTE MINES, LTD. TRANSVAAL

Officers: 10-11 Austin Friars, London, E. C. 2, England, and Cons. Investment Co., Ltd., Consolidated Bldg., Johannesburg, S. A.

Directors: J. Munro, chairman; W. L. White, cons. engr.; A. E. Payne, mine mgr.

Inc. September, 1902, in Transvaal. **Cap.,** £950,000; £1 par; all issued and fully paid; £300,000 in 5½% debentures authorized; outstanding, £75,000. Company was formed to acquire the New Croesus Gold Mining Co., Ltd., and the Langlaagte Star Mining Co., Ltd.

Annual report for years ending December 31, shows:

Year	Revenue	Profit	Dividends	Balance from Last Year	Balance Forward
1919 (last quarter)	£151,115	£78,485	£71,250	.....	.....
1918	637,122	159,232	47,500	£59,082	£77,431
1917	729,938	228,553	166,250	98,627	59,082
1916	785,637	279,662	213,750	75,196	98,627

Dividends: for 1913, 10%; 1914, 20%; 1915, 25%; 1916, 22½%, 1917, 17½%; 1918, 5%.

Property: 343 claims, and 210 deep level claims, on farm Langlaagte, No. 13, 4 miles west of Johannesburg. Also 30 claims under lease for erecting plants and 3 water-rights.

Development: on the southern end of the property, the East and West shafts have been sunk 4,057′ and 3,752′ (incline depth), to work the deep levels. New openings in 1918 totaled 13,814′. There were 125 drills operated. The flow of water was as much as 16½ million gallons in a month. Ore reserves are estimated at 2,132,778 tons, valued at 6 dwt. per ton, with a stoping thickness of 49″.

Equipment: includes 100-stamp mill with 1,900-lb. stamps, 10 tube-mills and cyanide plant with capacity of 53,000 tons monthly.

Production:

Year	Tons	Gold, oz.	Cost per ton
1919 (last quarter)	114,000	35,300	$5.42
1918	503,300	148,730	4.55
1917	585,650	171,326	4.10
1916	627,050	184,938	3.88
1915	636,500	184,839	3.50

CONSOLIDATED MAIN REEF MINES & EST., LTD. TRANSVAAL

Office: Downes, Munns & Co., 286 Salisbury House, London, E. C. 2, England, and Rand Mines, Ltd., Corner House, Johannesburg, Transvaal.

M. Honnet, chairman of board of directors; E. A. Wallers, cons. engr.; J. E. Healey, gen. mgr.

Inc. July, 1896, in the Transvaal, to acquire the properties of the Main Reef Gold Mining Co., Ltd., and the Cons. Anglo-Tharsis Gold Mining Co.,

Ltd. **Cap.,** £950,000; £1 par, increased to £1,247,602 in January, 1918; all issued.

Property: 1,976 claims and an estate of 7.66 sq. miles six miles west of Johannesburg.

Development: ore reserves to below 4,000′ in depth are 1,425,870 tons averaging 7.3 dwt. per ton.

Equipment: includes 240-stamp mill, 6 tube-mills, cyanide plant and necessary surface equipment.

Production, years ended December 31:

Year	Ore treated, tons	Gold Yield	Cost per ton
1918	539,760	£760,496	22/7 ($5.35)
1917	342,895	501,281	19/6 (4.68)
1916	294,766	442,649	.....

Increase of tonnage in 1918 is due to absorption of two other mines and mills.

CROWN MINES, LTD. **TRANSVAAL**

Offices: A. Moir & Co., 1 London Wall Bldgs., London, E. C. 2, England; and The Corner House, Johannesburg, Transvaal.

S. Evans, chairman and managing director; H. C. Boyd, director. H. S. Martin, cons. eng.; A. J. Brett, gen. mgr.; A. V. Lange, and T. Simpson, joint managers; and S. H. Pearce, reduction officer.

Inc. March 31, 1892, in the Transvaal. **Cap.,** £1,000,000; 10s. par; 1,880,212 issued. **Debentures:** £1,000,000, 5% first mortgage authorized £573,500 outstanding.

Profit in 1917 was £628,898, of which £376,042 was distributed; and £410,642 and £188,020 respectively in 1918.

Dividends: totaled 727% from 1898 to 1910; 120% in 1910; 110% in 1911, 1912 and 1913; 85% in 1914; 65% in 1915; 50% in 1916; 40% in 1917; 30% in 1918.

Property: 2,339 claims, 3,508 acres, on the Rand, Transvaal.

Development: by 14 shafts. Ore is hoisted through No. 5 and 7 shafts, which are connected by two main haulage-levels.

Ore reserves estimated as follows:

Year	Tons	Gold per ton, dwt.
1918	8,298,100	6.30
1917	11,429,000	5.90
1916	9,938,000	6.25

Equipment: immense mining and reduction plants, including 835 stamps, 26 tube-mills, sand and slime plants, capable of treating 7,666 tons of ore daily.

Production, years ending December 31:

Year	Ore treated, tons	Gold Yield	Working Profit	Cost per ton
1918	1,861,000	£2,528,760	£410,704	22/9 ($5.46)
1917	2,100,000	2,700,096	670,000	19/4 ($4.50)
1916	2,666,000	2,887,777	815,620	16/8 (4.00)

This company is probably the largest gold producer in the world.

EAST RAND PROPRIETARY MINES, LTD. **TRANSVAAL**

Offices: The Corner House, Johannesburg, Transvaal; and 4 London Wall Bldgs., London E. C. 2, England.

Sir Evelyn Wallers, chairman of board of directors; The Central Mining & Investment Corporation, manager at mine; E. C. J. Meyer, sec., Rand Mines, Ltd.

Inc. May 6, 1893 in the Transvaal. **Cap.,** £2,514,000; £1 par; 2,445,897 issued.

Debentures: £1,500,000 authorized; £835,620 outstanding.

Company controls the Angelo, Cason, Driefontein Cons., Blue Sky and Comet companies, operating on the Rand, covering an area of 4,273 claims.

During 1915 a net profit of £514,940 was made. Dividends absorbed £275,163, and there was carried forward £193,354. In 1918 the profit was only £2,926. Cash assets totaled £326,485.

Dividends: since 1903 total 350%, but from 1913 to 1916 they dwindled from 25 to 5%; with none in 1917 and 1918.

Property: 4,273 claims, 1½ acres each, on the Rand, Transvaal.

Development: by numerous shafts and extensive workings. Reserves in 1916 were estimated at 4,800,000 tons of $6.40 and 9,800,000 tons of $4.40 ore, but were only 2,732,000 tons of $6.20 in 1917, and 2,200,000 tons of $6.50 ore at end of 1918. Recent development work has been unsatisfactory.

Equipment: full complement for mining; 440 stamps, 19 tube-mills and cyanide plants.

Production, years ending December 31:

Year	Ore treated, tons	Gold Yield	Working Profit
1918	1,372,300	£1,597,075	£52,915
1917	1,741,300	1,910,384	188,951
1916	1,936,326	2,365,107	514,940

In 1914, the directors thought that 20 years' profitable work was ahead of the company, but, like several other great consolidations on the Rand, the predicted estimates were not realized. While this is one of the world's great gold producers, it is very probable that a large production cannot be continued for more than a year or two longer.

FERREIRA DEEP, LTD. **TRANSVAAL**

Offices: The Corner House, Transvaal, S. A.; and 1 London Wall Bldgs., London, E. C. 2, England.

H. C. Boyd, chairman of board of directors; P. Cazalet, cons. engr.; P. Selby, mine mgr.

Inc. Aug. 25, 1898, in the Transvaal. **Cap.,** £1,000,000; £1 par; 980,000 issued.

Accounts for year ended Sept. 30, 1916, showed: net profit, £452,699; cash balance, £117,461, after payment of £379,750 in dividends. In 1918 the profit was £211,716, and £147,984 was carried forward, after distributing £220,500.

Dividends: 1902 to 1918, inclusive, 627%, 22½% being paid in 1918.

Property: 207 mining claims at Witwatersrand, formerly owned by the Barnato Cons. Mines, Ltd., the Rand Mines, Ltd., and the Ferreira Gold Mng. Co., Ltd., each of these companies receiving a stock interest in the Ferreira Deep Ltd., in payment for the claims.

Development: by extensive workings. Ore reserves were estimated on Sept. 30, 1916, at 1,632,600 tons, averaging 8.3 dwts. gold; 1,305,500 tons of 7.6 dwt. in 1917; and 932,400 of 8 dwt. in 1918.

Equipment: complete power and mining plants, with 280 stamps, 7 tube-mills and cyanide unit.

Production, years ending September 30:

Year	Ore treated, tons	Gold Yield	Cost per ton
1918	508,200	£806,487	23/ 5 ($5.57)
1917	586,320	957,973	.....
1916	643,460	1,130,227	20/11 (5.07)

GEDULD PROPRIETARY MINES, LTD. **TRANSVAAL**

Office: H. Rogers, Pinners Hall, Austin Friars, London, E. C. 2, England.

H. Newhouse, chairman of board of directors; S. Macphail, gen. mgr.; P. M. Anderson, cons. eng.

Inc. March 28, 1899, in the Transvaal. **Cap.,** £1,500,000; £1 par; 1,150,000 issued.

Profit in 1917 was £187,143. Dividends paid were £97,000. In 1918 profit was £242,428. **Dividends:** 5% in 1914; 10% in 1915, 1916 and 1917; 11¼% in 1918.

Property: 2,481 claims in the Heidelberg district, East Rand.

Development: by 7 shafts. Reserves were 2,510,000 tons of 7.5 dwt. ore at end of 1918, an increase of 310,000 tons.

Equipment: complete with 100 stamps, 7 tube-mills, and cyanide plant.

Production: 425,550 tons yielding £631,364 in 1917; 513,200 tons yielding £745,818 in 1918. Costs are around £1 ($5) per ton.

GENERAL M'G & FINANCE CORP'N, LTD. **TRANSVAAL**

Head office: H. W. Dalton, sec., General Mining Bldg., Johannesburg, Transvaal.

Sir G. Albu, chairman of board; A. French, mgr.; E. Hay, tech. advisor; E. Farrar, mechanical engr.; H. W. Clayden, electrical engr.; A. Heymann, cons. chemist.

Inc. Dec. 30, 1895, in the Transvaal. **Cap.,** £1,875,000; shares £1 par; all issued.

Company has large interests in and manages the Aurora West United, Meyer & Charlton, New Goch, Roodepoort United, Van Ryn, and West Rand Cons. mines, all producers. Also owns the Cinderella Cons., New Steyn, and Rand Collieries, partly developed.

Profits in 1916 were £35,616, an increase of £20,509; £44,144 in 1917; and £25,434 in 1918.

Dividends: have been irregular, amounting to 67% up to 1911; nothing since 1910.

GOV'T GOLD M'NG. AREAS (MODDERFONTEIN) CONS., LTD.

Offices: 10 and 11 Austin Friars, London, E. C. 2, England; and Consolidated Bldg., Johannesburg, Transvaal.

S. B. Joel, chairman of board of directors; M. J. Turner, mgr.; W. L. White, cons. eng.

Inc. Feb. 26, 1910, in the Transvaal. **Cap.,** £1,400,000; £1 par; all issued.

Profit in 1915 was £160,612, of which £111,599 was carried forward; and in 1917 £693,916, with £146,332 carried forward.

Total revenue in 1918 was £2,162,584 yielding, £876,326 profit, of which the government's share was £369,982. Dividends amounted to £385,000.

Revenue for last quarter of 1919 was £611,719, of which £246,226 was profit, plus £206,400 gold premium.

Dividends: 5 paid to end of 1919, the last of 20%, on December 31.

Property: 2,633 claims, 1½ acres each, on the Far East Rand, Transvaal.

Development: four 7-compartment shafts, 2,538′, 2,433′, 3,893′, and 3,821′ deep, two 3,100′ apart and two 4,000′ apart. Main "reef" was cut in N.-W. shaft in 1912 at depth of 2,395′, where it was 31″ wide, and worth $7.15 per ton. The dip is 15° S. W. In N.-E. shaft reef was cut at 2,273′, being 21″ wide, worth $7.70; at 3,579′ in the S. E. shaft it was 57″ wide, worth $16.50; and in the S.-W. shaft at 3,608′, 30″ wide, worth $3.80 per ton.

Ore reserves. 3,665,000 tons of 6.9 dwt. in 1915; 4,930,000 of 7.2 dwt. in 1916; 7,016,000 tons of 7.5 dwt. in 1917; and 9,445,000 tons of 8 dwt. in 1918.

Equipment: complete, with 200 (2,000 lb. each) stamps, 25 tube-mills, and cyanide plants, with monthly capacity of 135,000 tons. There are 5,400 natives employed.

Production, years ending December 31:

Year	Ore treated, tons	Gold Yield	Working Profit	Cost per ton
1919 (last quarter)	338,000	£611,719	£246,226	21/9 ($5.22)
1918	1,303,500	2,162,585	876,327	19/7 (4.63)
1917	1,298,000	1,930,657	693,916	19/– (4.56)
1916	744,000	1,008,643	204,688	21/6 (5.10)
1915	576,100	720,000	156,210	19/6 (4.68)

The above table shows the progress of this great new gold producer.

JOHANNESBURG CONS. INVESTMENT CO., LTD. TRANSVAAL

Office: T. Honey, 10 Austin Friars, London E. C. 2, England.

S. B. Joel, chairman of board; G. Imroth, mgr. in South Africa; W. L. White, cons. eng. in Johannesburg.

Inc. September, 1889, in the Transvaal. **Cap.,** £4,500,000; £1 par; 3,950,000 issued.

Profit for year ended June 30, 1918, was £200,739, plus £159,557 from previous year. Dividends absorbed £197,500; £161,796 was carried forward. Investments are valued at £3,317,058.

Dividends: 157½% from 1894 to 1918, inclusive; 3% in 1918.

Company carries on a general agency, real estate, and investment business, but has large interests in the following mines: Consolidated Langlaagte, Ginsberg, Government Gold Mining Areas (Modderfontein), Langlaagte Estate & Gold, New Primrose Gold, New State Areas, New Unified Main Reef, Randfontein Central, Van Ryn Deep, and Witwatersrand Gold, all gold producers save the New State, which is developing.

KNIGHTS DEEP, LTD. TRANSVAAL

Head office: Consolidated Gold Fields of S. A., Ltd., Box 1167, Johannesburg, Transvaal. **London office:** 8 Old Jewry, E. C. 2, England.

D. Christopherson, chairman of board of directors; G. A. Chalkley, mine mgr., Box 192 Germiston, Transvaal.

Inc. Sept. 14, 1895, in the Transvaal. **Cap.,** £743,526; £1 par; all issued.

The year ended July 31, 1918, showed a working profit of £21,019; the net balance carried to appropriation account being £3,211. **Dividends:** total declared to December, 1918, 252½%; nothing in 1918.

Property: 506 claims situated partly on the farm Elandsfontein No. 11 and partly on the farm Driefontein No. 12, Witwatersrand.

Development: ore reserves estimated in 1918 at 1,671,000 tons that average 4.43 dwt., exclusive of 83,000 mine tons of partly developed ore carrying 5.03 dwt. gold per ton. Recent development indicates that certain blocks, including above reserves cannot be profitably worked under 1920 conditions.

Equipment: 400 stamps, 11 tube-mills, and cyanide plants.

Production: year ended July 31, 1918, 1,140,700 tons of ore yielding gold to the value of £842,442, compared with £886,295 from 1,196,500 tons in 1917.

LANGLAAGTE ESTATE & GOLD MNG. CO., LTD. TRANSVAAL

Office: 10 Austin Friars, London, E. C. 2, England.

S. B. Joel, chairman of board of directors; J. Munro, V. c.; W. A. Krige, mgr.; W. L. White, cons. eng.

Inc. Jan. 13, 1888, in the Transvaal. **Cap.,** £950,000; £1 par; 886,500 issued.

Revenue in 1918 was £647,999, of which £139,083 was profit. After paying dividends of £110,813, etc., balance forward was £70,898. Profit for last quarter of 1919 was £54,785.

Dividends: total 571½% since 1889; 12½% for 1918; 7½% on December 31, 1919.

Property: covers a large area on the Rand. Block B mine contains 1,060,594 tons of 6.9 dwt. ore, which is worked by an incline shaft 2,983′ deep. New work in 1918 totaled 8291′. The Langlaagte mine is worked out.

Equipment: complete with 200-stamp mill containing 5 tube-mills and cyanide plant.

Production: in 1918 was 152,282 oz. of gold from 533,690 tons of ore, with a total cost of 19/ ($4.56) per ton. Output for last quarter of 1919 was 104,790 tons of 24/6 ($5.88) ore, with total costs of 23/6 ($5.64) per ton.

MESSINA (TRANSVAAL) DEV. CO., LTD. TRANSVAAL

Head office: 1 London Wall Bldgs., London, E. C. 2, England. **Mine office:** Messina, Zoutpansberg, Transvaal, South Africa.

Officers: C. F. H. Leslie, chairman of board of directors; A. B. Emery, gen. mgr.

Inc. Jan. 30, 1905, in England. **Cap.**, £250,000; shares 5s. par; 727,154 issued. Capital increased from £110,000 to £200,000 in 1908, and to present amount in 1911. **Bonds:** £250,000 issued April, 1912, at 95%, redeemable at 105% by drawing or purchase in open market at or under that price; £171,000 outstanding. Interest guaranteed to Jan. 1, 1917, by Camp Bird, Ltd. (of Colorado).

In 1918 the income was £399,096, of which £25,175 was profit. Balance at end of previous year £156,687, was reduced to £133,770.

The year ended June 30, 1919, resulted in a loss of £39,373, after allowing £55,600 for depreciation and railway guarantee.

Dividends: in 1915-16 were equal to 40%; 20% in 1916-'17; nil in 1917-'19.

Property: about 22,432 acres of copper-bearing lands, including the Messina and Vogelsang mines; also coal and lime claims in the Zoutpansberg district of the Transvaal. Ore contains chalcocite, bornite, and some chalcopyrite occurring in veins in granite.

Development: by the 1,033' Messina and 1,742' Vogelsang shafts, and extensive workings.

Ore reserves: in 1916 were estimated at 208,061 tons of 4.75% copper ore to No. 16 level; 273,447 tons of 3.59% in 1917; and 297,803 tons of 3.45% in 1918. The Vogelsang is likely to become a large producer. In 1919, reserves were 415,000 tons of 3.25% ore; also 325,000 tons of 1.4% jig tailings.

Equipment: adequate for all present needs, includes a 250-ton mill and 2 reverberatory furnaces.

Production, years ending June 30:

Year	Ore treated, tons	Copper, %	Copper, long tons
1918	120,899	3.47	3,537
1917	142,588	3.98	5,111
1916	112,043	5.43	5,732
1915	91,033	....	5,331
1914	64,304	....	4,007
1913	24,847	....	1,473

MODDERFONTEIN B GOLD MINES, LTD. TRANSVAAL

Office: A. Moir & Co., 1 London Wall Bldgs., London, E. C. 2, England.

Sir L. A. Wallers, chairman of board; C. L. Butlin, mgr.; H. S. Martin, cons. eng.

Inc. Nov. 18, 1908, in the Transvaal. **Cap.**, £700,000; £1 par; all issued.

In 1918 the profit was £658,587; dividends, £577,500, and balance forward to 1919, £198,045; compared with £709,601, £595,000 and £246,570, respectively.

Dividends: from 1912 to 1918, inclusive, total 442½% (£3,027,500); 82½% for 1918.

Property: 1,467 claims in the Far East Rand.

Development: new work in 1918 was 9,894', compared with 9,941' in 1917. Of this, 60% was pay-ore. A deep circular shaft, 20' in diameter, is being sunk. Ore reserves are estimated at 3,378,000 tons, averaging 9.2 dwt. per ton across 62 inches.

Equipment: complete with 80 ordinary and 24 Nissen stamps, 8 tube-mills, and cyanide plants of 60,000 tons monthly capacity.

Production, years ending December 31:

Year	Ore treated, tons	Gold Yield	Cost per ton
1918	605,500	£1,253,614	19/8 ($4.72)
1917	517,500	1,193,717	19/5 (4.66)

MODDERFONTEIN DEEP LEVELS, LTD. **TRANSVAAL**

Office: H. Rogers, Pinners Hall, Austin Friars, London, E. C. 2, England.

H. Newhouse, chairman of board of directors.

Inc. April 26, 1899, in the Transvaal. **Cap.,** £500,000; £1 par; all issued.

Profit in 1918 was £593,851. Dividends amounted to £487,500.

Dividends: 35% in 1915; 67½% in 1916; 85% in 1917; and 97½% in 1918.

Property: 377 claims in the Far East Rand, developed by vertical shafts, opening 3,450,000 tons of 8.8 dwt. ore.

Equipment: complete with mill capable of treating 1,500 tons daily, or over 44,000 tons monthly.

Production, years ending June 30:

Year	Ore treated, tons	Gold Yield	Cost per ton
1918	505,950	£1,035,472	17/5 ($4.18)
1917	494,400	964,343	16/4 (3.88)

NEW KLEINFONTEIN CO., LTD. **TRANSVAAL**

Office: J. H. Clark, 208 Salisbury House, London, E. C. 2, England.

Wm. Dalrymple, chairman of board of directors; E. J. Way, cons. eng.

Inc. April 2, 1894, in the Transvaal. **Cap.,** £1,300,000; £1 par; 1,151,540 issued.

Net profit in 1917 was £196,115, of which £57,577 was distributed; £115,548 was carried forward. In 1918 the profit was £49,828 out of a yield of £860,265.

Dividends: from 1894 to 1917, inclusive, 212%; including 5% in 1917.

Property: 1,805 claims on the Witwatersrand, covering 4.7 miles on the strike of the reef, and developed by 8 shafts. The property, which is divided into 3 sections, is dependent on the future of the apex section. Reserves are estimated (1919) at 2,048,000 tons averaging 5.78 dwt. per ton, compared with 2,943,994 tons in 1916.

Equipment: complete for an output of 77,000 tons of ore per month.

Production, years ending December 31:

Year	Ore treated, tons	Gold Yield	Working Profit
1918	674,740	£860,265	£49,828
1917	785,090	1,013,300	216,289

Costs are 24/- ($5.76) per ton.

NEW MODDERFONTEIN GOLD MNG. CO., LTD. **TRANSVAAL**

Head office: Rand Mines, Ltd., Corner House, Johannesburg, Transvaal. **London office: A.** Moir & Co., 1 London Wall Bldgs., London, E. C. 2, England.

Sir E. A. Wallers, chairman of board of directors; E. M. Sharp, mgr.; H. S. Martin, cons. engr.

Inc. June 1, 1895, in Transvaal. **Cap.,** £1,400,000; £4 par; all issued and paid up. Shares are to be split into 10 shillings par in 1920.

Accounts for year ended June 30, 1916, show profit of £766,235, of which £455,000 was paid in dividends. In 1918 the profit was £850,878, of which £568,750 was distributed. Balance forward was £306,744.

In 1919, dividends absorbed £875,000 and taxes £215,000; the balance forward was £255,867.

Dividends: 70% from 1906 to 1911; 25% in 1911; 30% in 1912; 30% in 1913; 31¼% in 1914; 32½% in 1915; 32½% in 1916; 40⅝% in 1917, and 30% in 1918.

Property: 1,265 claims, 1,808 acres, considered by some authorities one of the greatest gold mines in the world, when production, present profits and future possibilities are considered.

Development: by 13 shafts to 2,258'. Ore reserves estimated at 9,000,000 tons, assaying 8.6 dwt. gold per ton.

Equipment: includes mill with 236 stamps, 15 tube-mills and cyanide

plants, capable of treating 100,000 tons per month. Eight more Nissen stamps are to be added, increasing monthly capacity by 10,000 tons.

Production, years ending June 30:

Year	Ore treated, tons	Yield per ton	Cost per ton
1919	920,500	43/10 ($10.52)	20/2 ($4.84)
1918	684,100	45/7 (10.87)	21/3 (5.07)
1917	656,700	43/4 (10.36)	19/5 (4.61)
1916	635,000	48/2 (11.54)	17/3 (4.14)

NEW STATE AREAS, LTD. **TRANSVAAL**

Office: 10 Austin Friars, London, E. C. 2, England.

S. B. Joel, chairman of board of directors; M. J. Turner, mgr.; W. L. White, cons. eng.

Inc. Feb. 20, 1918, in the Transvaal. **Cap.,** £1,500,000; £1 par; all issued, part paid.

At end of 1918 cash amounted to £169,246, and stores £39,096.

Property: 1,176 claims on farm De Springs No. 15, and 874 claims on Geduld No. 24, in the Far East Rand.

Development: to end of 1919, £650,000 had been spent on development and equipment, and by Jan., 1920, one shaft was down 1,065′ and another 1,441′. Both shafts should strike the reef at about 3,600′ depth by the year 1921. They are 27′ 9″ by 12′ 9″ inside measurement

Equipment: includes boilers, hoists, 50-drill compressor, electric power, shops and all necessary buildings. Company employs 300 natives underground.

NOURSE MINES, LTD. **TRANSVAAL**

Office: A. Moir & Co., 1 London Wall Bldgs., London, E. C. 2, England.

H. C. Boyd, chairman of board of directors; S. Beaton, acting mgr.; H. S. Martin, cons. eng.

Inc. Sept. 12, 1894, in the Transvaal. **Cap.,** £850,000; £1 par; 827,821 issued. Profit in 1917 was £60,977, and £131,013 was carried forward. Revenue in 1919 was £620,000 of which £15,393 was profit.

Profit in 1917 was £60,977, and £131,013 was carried forward.

Revenue in 1919 was £620,000 of which £15,393 was profit.

Dividends: total 266% from 1898 to 1918, inclusive; 10% in 1918.

Property. 669 claims on the Witwatersrand.

Development: by vertical shafts. Ore reserves total 1,526,100 tons. New work in 1919 amounted to 15,000′.

Equipment: capable of mining and treating 50,000 tons per month.

Production: 471,000 tons of 26/2 ($6.26) ore in 1918; and 495,100 tons of 28/- ($6.72) in 1917. Output in 1919 was 482,000 tons averaging 27/1 ($6.50) at a cost of 26/7 ($6.38).

PREMIER (TRANSVAAL) DIAMOND MIN. CO., LTD. **TRANSVAAL**

Offices: J. A. Stevens, sec., 6½ Austin Friars, London, E. C. 2, England; T. D. Edington, sec., and W. M. Chalmers, asst. sec., Cullinan Bldg., Johannesburg; M. S. Knowles, mine sec., Elandsfontein, Transvaal; and Credit Lyonnais, 19 Boulevard des Italiens, Paris, France. **Diamond office:** W. Busch, 14 Holborn, Viaduct, London, E. C. 1, England.

Sir T. M. Cullinan, chairman of board of directors; D. McHardy, gen. mgr.; L. J. Howes, mine mgr.

Inc. Dec. 1, 1902, in the Transvaal. **Cap.,** £800,000, in 160,000 5s. preference shares and 320,000 2s. 6d. deferred shares, all issued. Control is held by De Beers Consolidated.,

Profit for year ended Oct. 31, 1918, was £665,272. Of this the Union Government took £400,245, due under the law, and £252,500 was distributed. Net current assets were £468,000.

Income for 1919 was £1,961,259, of which £1,210,980 was profit. The government's share was £726,588. Dividends absorbed £432,500.

Dividends: paid regularly on preference shares, they being entitled to a cumulative dividend of 250% per annum. Deferred shares received a total of 5200% from 1904 to 1918-'19, inclusive, 850% being paid in the last year.

Property: 3,484 diamond-bearing claims in the Pretoria district of the Transvaal, developed by open-cut to depth of 250'. Drilling has shown diamond-bearing ground to depth of 1,000'. Reserves to 360' are estimated at 32,500,000 loads (1,600 lb. each).

Equipment: suitable for handling and treating 50,000 loads daily.

Production:

Year	Ground treated loads	Yield, carats	Value per load	Cost per load
1919	4,529,261	815,267	.....	.....
1918	4,805,851	851,573	5/— ($1.20)	2/3 ($0.54)
1917	4,928,629	906,341	4/10 (1.16)	2/3 (0.54)
1916	1,572,252	419,947	6/— (1.44)	2/8 (0.64)
1915	Closed on account of war.			
1914	7,683,943	1,417,755	3/3 (0.78)	2/6 (0.60)

RANDFONTEIN CENTRAL GOLD MIN. CO., LTD. TRANSVAAL

Office: 10 Austin Friars, London, E. C. 2, England.

S. B. Joel, chairman of board of directors; G. H. Beatty, gen. mgr.; W. L. White, cons. engr.

Inc. March 26, 1907, in the Transvaal. **Cap.**, £4,500,000; £1 par; all issuel. **Debentures:** £3,000,000 6% authorized, of which 2,315,600 are outstanding.

Financial Statement, years ended December 31:

Year	Revenue	Working Profit	Balance forward
1919 (last quarter)	£486,117	£174,077	.....
1918	1,991,839	108,072	£27,669
1917	.....	478,063	335,018
1916	2,835,892	834,555	418,200

Dividends 17½% from 1912 to 1918; none since 1915.

Property: 2,296 claims, 1½ acres each, on the Rand, Transvaal.

Development: by 12 main shafts along the 7 miles of reef. New openings in 1916 totaled 112,026', including 2,151' of shaft sinking; and 52,210' in 1918, with 4,084' of sinking. Deepest shaft is 3,652'.

Reserves: consist of 4,944,302 tons of $7.80; 3,486,917 tons of $4.60, and 3,268,654 tons of $2.80 ore, a total of 11,699,873 tons. The last mentioned is at present unprofitable. At the end of 1918 the total was 4,254,000 tons of 6.8 dwt. gold ore across width or thickness of 50".

Equipment: extensive and modern, including 1,000-stamp mill, 26 tube-mills, and cyanide plants, capable of treating 185,000 tons per month. Employs 11,600 natives.

Production, years ending December 31:

Year	Ore treated, tons	Gold Yields	Cost per ton
1919 (last quarter)	419,200	£486,117	23/8 ($5.68)
1918	1,745,000	£1,991,839	21/6 (5.10)
1917	2,017,181	2,467,636	.....
1916	2,209,622	2,890,000	18/1 (4.34)

The above tables show steadily decreasing returns, which in 1918 was partly due to floods, labor troubles, and epidemic. When the new shafts and pumping stations are completed a larger output and gold production is expected, as development work is satisfactory.

RAND MINES, LTD. TRANSVAAL

Office: A. Moir & Co., 1 London Wall Bldgs., London, E. C. 2, England.

Sir E. A. Wallers, chairman of board of directors; E. T. Mellor, cons. geologist; H. A. Read, financial manager.

Inc. Feb. 22, 1893, in the Transvaal. **Cap.**, £550,000; 5s. par; 2,125,995 issued. Listed on London Stock Exchange. On Dec. 29, 1919, 60,000 American shares were listed on the New York Curb, representing 150,000 English shares. These shares were offered the public at $40. Bankers Trust Co., New York, transfer agent, Chase National Bank, New York registrar.

Company is closely affiliated with the Central Mining & Investment Corp., successor to Wernher Beit & Co.

Financial Statement:

Year	Revenue	Dividends Paid	Carried Forward	Reserve Fund	Value of Investments
1918.....	£458,690	£451,773	£361,074	£2,805,628	£3,166,003
1917.....	727,070	770,673	348,898	2,877,878	3,142,418

Dividends: 3020% since 1898; 85% being paid in 1918; and 100% in 1919.

Property: the company owns a substantial though not a controlling interest in the producing mining companies named in the following table, and also 1,252 claims owned outright. Its shareholdings are so extensive that it practically dominates many of the companies and its income is derived almost entirely from the dividends paid by them.

Mines	Int. held by Rand mines, %	Tons	Gold yield, per ton	Profit*	Ore Reserves tons
Bantjes Cons.....	14.00	.....	....	£13,640	95,000
Brakpan	0.22	617,000	35/4	£355,798	2,718,000
City Deep.....	15.80	670,000	41/–	452,777	3,342,000
Consolidated Main Reef.	0.38	539,760	28/2	151,879	1,425,870
Crown Mines.....	46.00	1,861,000	27/2	410,704	8,298,000
Durban Roodeport Deep.	28.80	300,450	30/–	30,068	1,078,500
East Rand Proprietary..	1.67	1,372,300	23/3	52,916	2,268,000
Ferreira Deep.....	39.30	508,200	31/9	211,716	932,400
Geduld Proprietary.....	0.55	513,200	29/–	220,086	2,510,000
Geldenhuis Deep.....	48.20	591,000	23/2	1,332	1,549,600
Jupiter	11.74	266,500	24/–	7,611	787,000
Modderfontein B.....	7.81	605,500	41/-	658,587	3,378,000
Modder Deep.....	1.70	506,100	40/-	519,701	3,450,000
New Modderfontein.....	7.14	684,100	45/7	833,260	9,000,000
Nourse	46.90	471,000	26/2	58,180	1,513,000
Robinson Deep.....	.....	529,300	27/–	3,121	1,725,000
Robinson Gold.....	5.30	493,700	21/8	63,785	943,000
Rose Deep.....	38.40	616,900	23/–	139,813	2,909,500
Village Deep.....	10.80	562,300	28/–	66,256	1,874,000
Village Main Reef.....	9.60	265,900	29/2	89,290	628,150
Wolhuter Gold.....	1.60	382,950	24/–	78,875	856,870

*Operating profit, not including sundry revenues, for 1918.

Thirteen mines in the near Eastern and Central Rand produced 8,421,670 tons of ore in 1918; three in the West Rand gave 1,127,050 tons, and two in the Far East Rand gave 1,397,000 tons. Total profits were £3,336,663 against £4,748,353 in 1917.

The Modder and Spring companies in the Far East Rand are believed to have a long assured life with continuance of dividends and the Rhodesia Broken Hill should soon reach the dividend stage. The holdings are so varied that depletion at one property is offset by development in another mine.

Disbursements to company shareholders for the 11 years ended December 31, 1919, total £10,600,000 or 188% per annum on the shares issued. As this company is interested in mines producing 40% of the Rand output, and the Rand produces 40% of the world's gold, it dominates 16% of the gold output of the entire world.

ROBINSON DEEP, LTD. **TRANSVAAL**

Offices: J. T. Bedborough, 8 Old Jewry, London, E. C. 2, England; and Consolidated Gold Fields Bldgs., Johannesburg, Transvaal. D. Christopherson, chairman of board of directors.

Inc. Dec. 31, 1915, in the Transvaal to acquire assets of Robinson Deep Gold Mining Co., Ltd. **Cap.**, £925,000, in 500,000 cumulative preference A shares of 1s. each and 900,000 shares of £1 each. All A shares and 781,807 B shares are issued credited as fully paid.

Dividends: 8s. on A shares in 1916; 4s. in 1917; 2s. in 1918.

Property: 557 claims, 835 acres, on the Rand, Transvaal.

Development: by 3 shafts, one a new 7-compartment shaft 4,500′ deep. Reserves are given as 1,717,000 tons, assaying 6.9 dwt. per ton, and 131,000 tons partly developed, assaying 6.5 dwt. per ton.

Equipment: includes 300 stamps, 10 tube-mills, and cyanide plants.

Production, years ending December 31:

Year	Ore treated, tons	Gold Yield	Profit
1918	529,300	£713,442	£34,225
1917	561,400	772,619	142,691
1916	632,000	934,522	306,688

Costs are about 26/- ($6.24) per ton.

ROOIBERG MINERALS DEVELOPMENT CO., LTD. **TRANSVAAL**

London Agency: John H. Clark, sec., 208 Salisbury House, London, E. C.

Wm. Dalrymple, chairman of board of directors; J. C. Wilson, act. mgr.; E. R. Schoch, sup't'g eng.

Inc. May 19, 1908, in the Transvaal. **Cap.**, £180,000; £1 par; all issued. Statement for year ended June 30, 1918, shows revenue of £85,334 and profit of £8,265. For same period in 1919 the revenue was £54,687, and expenditures £70,178.

Dividends: has paid 102½% since 1910; 5% in 1916-'17; none since.

Property: tin claims in the Waterburg district of the Transvaal.

Development: by 619′ main shaft with 5.164′ of new work in 1918; this work costing $9.30 per ton of ore mined. Surface prospecting is done by hydraulicking, as at Nipissing, Cobalt, Ontario.

Equipment: 10 stamps, tube-mill and concentrators.

Production:

Year	Ore Treated, Tons	Tin, Per Cent. Metal	Extraction, Per Cent.	Metal Produced, Tons	Cost per Ton
1918-'19	14,948	1.60	.....	350*	.....
1917-'18	18,702	1.89	82.01	320	.....
1916-'17	38,557	2.85	79.80	646	.....
1915-'16	36,460	3.02	77.95	707	$12.10
1914-'15	37,263	2.82	78.27	731	10.24
1913-'14	40,643	3.18	78.81	887	11.46
1912-'13	35,917	3.56	72.85	832	12.92

*Black tin; includes that from slime.

This is one of the few base-metal producers of the Transvaal.

SIMMER DEEP, LTD. **TRANSVAAL**

Offices: J. T. Bedborough, 8 Old Jewry, London, E. C. 2, England; and Consolidated Gold Fields of South Africa, Johannesburg, Transvaal.

D. Christopherson, chairman of board of directors; C. D. Leslie, cons. engr.; H. S. MacGregor, mine mgr.; O. P. Powell, supt. engr.

Inc. Nov. 30, 1906, in the Transvaal. **Cap.**, £1,750,000; £1 par; 1,650,000 issued. **Debentures:** £755,000 5½% first mortgage, of which £689,400 are outstanding.

Accounts for 1915 showed a loss of £2,356 after paying £45,952 debenture interest and £9,848 sundries. Total reserve given as £493,622. In 1917 there was a loss of £13,483, with reserve of £519,985. In 1918 there was a loss of £27,871.

Property: 1,035 deep-level claims, 1,550 acres, on the Rand, developed by 4 shafts, one being 3,161′ deep on incline. Reserves are estimated at 1,097,000 tons of 4.8 dwt. ore, and 146,000 tons of partly developed ore worth 4.5 dwt. per ton.

Equipment: includes two hundred and twenty 1,670-lb. stamps, 10 tube-mills and cyanide plants.

Production: the 1916 return was £682,067 from 762,700 tons ore treated, giving £63,706 net; in 1917 the yield was £586,971 from 621,800 tons of ore and net profit was £28,495. In 1918 516,700 tons of ore mined and milled yielded £518,254, but the loss for the year was £16,939. Costs are around 21/- ($5.04) per ton.

SIMMER & JACK PROPRIETARY MINES, LTD. **TRANSVAAL**

Office: J. T. Bedborough, 8 Old Jewry, London, E. C. 2, England.

D. Christopherson, chairman of board of directors; C. D. Leslie, cons. engr.; O. P. Powell, supt. eng.; C. H. Greathead, mgr.

Inc. 1887, in the Transvaal. **Cap.,** £3,000,000; £1 par; all issued. Profit for year ended June 30, 1916, was £275,857, of which £262,500 was paid in dividends and £92,234 carried forward. In 1918 these respective figures were £179,805, £112,500, and £138,193. In 1919 the revenue was £665,849, of which £375,000 was distributed.

Dividends. since 1889 total 382¼%; 1¼% being paid in 1918-'19.

Property: 624 claims, 936 acres, on the Rand, Transvaal. **Reserves:** estimated at 1,318,000 of 5.8 dwt. partly developed ore. Waste sorted out is 3% of ore mined.

Equipment: complete, with 320 stamps, 7 tube-mills and cyanide plant.

Production, years ending December 31:

Year	Ore treated, tons	Yield	Cost per ton
1919	605,900	£665,849	19/1 ($4.78)
1918	685,300	£791,893	17/5 (4.13)
1917	765,300	819,079	15/5 (3.65)
1916	797,900	896,000	14/4 (3.46)

SPRINGS MINES, LTD. **TRANSVAAL**

Offices: J. H. Jeffreys, sec., 5 London Wall Bldgs., London, E. C. 2, England; and Corner House, Johannesburg, Transvaal.

F. R. Lynch, chairman of board of directors; B. D. Bushell, mine mgr.; C. E. Knecht, cons. eng.; J. Erving, cons. mech. eng.

Inc. May 4, 1909, in the Transvaal. **Cap.,** £1,500,000; £1 par; 1,153,500 issued. **Debentures:** £315,000 authorized of 6% first mortgage; £131,785 outstanding.

Revenue in 1918 was £905,877, of which £423,695 was profit, and £144,187 was paid in dividends.

Dividends: 10% in fully paid £1 shares of West Springs for every 10 of Springs held, on July 2, 1918; and 12½% on December 30, 1918.

Property: 1,332 claims, 1,998 acres, on De Rietfontein No. 14 farm, East Rand, adjoining the West Springs, Ltd.

Development: by two 7-compartment shafts, both over 3,500′ deep. Reserves are estimated as 2,368,000 tons, assaying 9.3 dwt. per ton.

Equipment: electric and steam power, hoists, compressors, shops, 80 heavy (2,000 lb.) stamps, 8 tube-mills, and cyanide plant of 40,000 tons monthly capacity.

Production, years ended December 31:

Year	Ore treated, tons	Gold Yield	Profit
1918	427,610	£905,777	£424,664
1917	313,065	610,441	264,442

This is an important mine, which started gold production early in 1917.

UNION CORPORATION, LTD. **TRANSVAAL**

(Formerly Goerz & Co.)

Offices: 94 Main St., Johannesburg, South Africa; Pinners Hall, Austin Friars, London, E. C. 2, England; 34 Rue Vignon, Paris, France.

Directors: J. Temperley, chairman of board; Henry Strakosch, managing director; Joseph Kitchin, mgr.; E. J. Hess and C. T. Pott, joint sub-mgrs.; Henry Clark, sec.; Johannesburg: H. Newhouse, mgr.; V. J. Ronketti, sec, Paris: M. Tourret, agent. Engineering staff: P. M. Anderson, W. J. Cruddas, and J. B. Overbeek.

Inc. Dec. 29, 1897, in the Transvaal. **Cap.**, £1,015,000, in 1,000,000 ordinary and 15,000 founders shares, £1 par. In 1898 200,000 fully-paid ordinary shares were issued at £1.12 6d. and 100,000 such shares in exchange for the 15,000 founders shares. In 1904 225,000 shares were issued at £2.10 each; in 1905, 75,000 shares at £2.10, making total capital of £1,400,000. In 1917, in order to meet depreciation on several of the shareholdings, capital was reduced by writing off 7/6 per share. Present capital is £875,000 in 1,400,000 shares of 12/6 each. All the shares are issued and fully paid.

Net profits for fiscal year ending December 31, 1918, were £170,364, including £24,984 brought forward from 1917; £20,000 was placed to reserve account, leaving £45,364 to be carried forward. Dividends: 12% in 1918.

Company is a holding corporation, and controls or is heavily interested in the following Witwatersrand gold mining companies:

Geduld Proprietary Mines, Ltd., Modderfontein Deep Level, Ltd., Princess Estate & Gold Mining Co., Ltd., Randfontein Deep, Ltd., Van Dyk Proprietary Mines, Ltd., and Withok Proprietary Company, Ltd.; also in Klerksdorp Exploration, Land & Estate Co., Ltd., holding mining and land interests in South Africa, and in La Fe Mining Co., Ltd., a silver-lead-gold property in Mexico, and in the San Francisco Mines of Mexico, Ltd., a silver-lead-zinc property in Mexico. It also owns other claims and land interests in the Transvaal and in Mexico.

The company carries on a general finance business, and is also in the administration and management of industrial undertakings, mainly mining or those allied to the mining and metallurgical industries.

VILLAGE MAIN REEF GOLD MINING CO., LTD. TRANSVAAL

Office: F. de M. Cunynghame, sec., 8 Old Jewry, London, E. C. 2, England.

M. A. Bramston, chairman of board of directors; J. Chilton, mgr.; P. Cazalet, cons. engr.

Inc. Nov. 28, 1890, in England. **Cap.**, £472,000; £1 par; all issued. Company owns 118,000 fully paid shares in the Village Deep, Ltd.

Accounts for 1916 showed revenue of £505,974; profit was £106,508. Dividends amounted to £118,000. The previous balance was £245,611; that carried forward to 1917 was £197,866. In 1917 the profit was £120,309, of which £94,400 was distributed and a total of £181,000 carried forward.

Dividends: since 1898, total 855%, including 10% in 1918.

Property: 172 claims, 1½ acres each, on the Rand, Transvaal. Reserves are estimated at 628,150 tons, carrying 7.1 dwt. per ton.

Equipment: complete with 120 stamps, 6 tube-mills and cyanide plants. At the sorting plant 14.3% is discarded, assaying 64c. per ton.

Production: in 1916 was 333,885 tons of $7.50 ore, yielding 115,749 oz. gold. Total extraction was 92.4% at a cost of 19s. 2d. ($4.60) per ton. In 1917, 322,950 tons were treated, yielding £447,976; and in 1918, 265,700 tons yielded £388,504. Costs are about £1 ($4.80) per ton.

The assured life of this mine appears to be about 3 years, although new work may develop a further tonnage of profitable ore.

WEST SPRINGS, LTD. TRANSVAAL

Promoted by Anglo-American Corporation of South Africa, Ltd.

Office: E. Shephard, 5 London Wall Bldgs., London, E. C. 2, England.

Ernest Oppenheimer, chairman of board of directors; T. T. Nichol, mine mgr.; C. E. Knecht, cons. eng.

Inc. June 14, 1918, in the Transvaal. **Cap.**, £1,400,000; shares £1 par; all issued: 400,000 being fully paid and 1,000,000 2s. paid.

Financial position on July 31, 1918, showed £451,040 cash; £25,836 equipment, and £5,938 general expenditure to that date.

Property: a Government lease of mineral rights on 2,236 claims on Farm De Rietfontein No. 14, Far East Rand, Transvaal, immediately west of the Springs Mines, Ltd., with which arrangements were made for development and purchase of West Springs shares. A share of profits is payable to the Union Government.

Development: two shafts are being sunk, and the reef was expected to be cut at 3,800'.

This is one of the new companies operating in what is considered to be an important section of the Witwatersrand.

ZAAIPLAATS TIN MINING CO., LTD. **TRANSVAAL**

Office: E. G. Crake, Pinners Hall, Austin Friars, London, E. C. 2, England. A. Gilbertson, mgr.; W. J. Gau, cons. eng.

Inc. Aug. 18, 1908, in the Transvaal. **Cap.,** £63,750, in 255,000 shares of 5s. par, all issued.

Profit for year ended July 31, 1918, was £52,186. Dividends absorbed £19,125, and £17,425 were carried forward. Reserve was £10,000.

Dividends: from 1908 to February, 1919, inclusive, 625%; 30% in 1918-19.

Property: 234 tin claims, 23 miles W. of Potgietersrust, Transvaal, equipped with 15 stamps, 4 tube-mills, and concentrator; there is also a smelter.

Production: 355 tons of 70% metal concentrate from 28,132 tons of ore in 1916-17, and 521 tons from 17,078 tons in 1917-18. Costs are around 60/- ($14.40) per ton.

WEST AFRICA

GOLD COAST COLONY

ABBONTIAKOON MINES, LTD.

Office: E. Price, sec., 19 St. Swithin's Lane, London, E. C. 2, England. E. Davis, chairman of board of directors; S. H. Ford, supt. engr.; Consolidated Gold Fields of South Africa, cons. engrs.

Inc. Feb. 24, 1909, in England. **Cap.,** £800,000; 10s. par; 1,273,601 issued.

Profit in 1918 was £16,842 against £6,087 in 1917, and £51,490 in 1915. Balance forward to 1918 was £59,072. The year 1919 resulted in a loss of £6,332.

Dividends: in 1914, 20%; in 1915, 5%; nothing since.

Property: 918 claims, 1½ acres each, near Tarkwa, Wassau, Gold Coast Colony, West Africa, on the Government railroad.

Development: by 3,264' shaft. Reserves are given as 285,250 tons of 33/6 ($8.05) ore.

Equipment: mill with 25 stamps, 2 tube-mills, and cyanide plant of 15,000-ton monthly capacity.

Production:

Year	Ore treated, tons	Value	Cost per ton
1918	106,481	£208,435	38/- ($9.12)
1917	116,688	221,408	36/- ($8.64)
1916	117,885	231,000	27/- (6.50)

ABOSSO GOLD MINING CO., LTD. **GOLD COAST**

Office: 461 Salisbury House, London, E. C. 2, England.

T. F. Dalglish, chairman of board of directors; C. E. Jobling, gen. mgr.; D. A. Thompson, relieving; and G. W. Campion, supt.

Inc. June 18, 1901, in England. **Cap.,** £400,000; £1 par; all issued.

Profit for year ended June 30, 1916, was £25,024; in 1918 there was a loss of £1,795. The balance of £46,062 from 1917 was reduced to £24,267.

Dividends: since 1905 total 65%, 5% being paid in 1916; nothing since.

Property: in the Wassau district, Gold Coast Colony, West Africa. **Development:** by 1,880′ shaft. Ore reserves were estimated at 237,280 tons, worth $7.80 per ton in 1916, and 280,330 tons of $7.98 ore in 1918. The stoping width is 64″.

Equipment: complete for mining, steam power, also 50 stamps, tube-mill, grinding pans, and cyanide plant, of 15,000 tons monthly capacity.

Production, years ending June 30:

Year	Ore treated, tons	Yield	Cost per ton
1919	80,075	£132,027	32/6 ($7.80)
1918	102,256	152,320	29/- (6.96)
1917	112,460	167,270	26/1 (6.25)
1916	113,300	179,459	25/7 (6.14)

ASHANTI GOLDFIELDS CORPORATION, LTD. GOLD COAST

Office: H. Morgan, sec., 6 Southhampton St., Holborn, London, W. C. 1, England.

Earl of Bessborough, chairman of board of directors. J. S. Watkins, mgr.; W. R. Feldtmann, cons. engr.

Inc. May 25, 1897, in England. **Cap.,** £250,000; 4s. par; 1,103,057 issued.

Profit for 1919 was £152,396, compared with £159,621 in 1918 and £173,281 in 1916. Dividends absorbed £154,428. Balance forward to 1919 was £105,471. Reserves total £117,375. Of the total profit in 21 years, 94.3% has been distributed to shareholders.

Dividends: since 1900 total 947%, 70% being paid in 1918, and 75% in 1919.

Property: 100 sq. miles at Obuasi, in Gold Coast Colony, West Africa, 124 miles from the coast. Mine is the largest producer in the region.

Geology: the Obuasi shoot occurs in disturbed ground, close to the intersection of two fissure planes. The normal fissure filling or vein formation is a brecciated graphitic schist, in places very friable. The main vein is a solid quartz body 1,000′ long on some levels, and from 3 to 40′ wide. The ore, owing to parallel streaks of graphite, has a banded structure. Some gold is free, the remainder being in pyrite and other sulphides. The Ayeinm shoot, in the same main fissure, is pear-shaped in horizontal section, being 700′ long and from 4 to 60′ wide. Gold content in both shoots is erratic.

Development: by shafts to 2,000′ depth. Mining is rendered difficult by the weakness of the rock, the irregular and great thickness of the quartz, the flat pitch of the shoot and the graphitic selvage on the footwall.

Reserves have varied as follows:

Year	Tons	Dwt. per ton	Gross Value
1919	529,500	27.2	.....
1918	526,200	28.5	£2,735,000
1917	534,100	24.5	2,772,000
1916	436,600	24.9	.....

Ore extraction costs are 12/- ($2.88) and development 7/ ($1.74) per ton. Methods are described by Johnston in "The Mining Magazine" of September, 1917.

Equipment: complete for mining, with mill containing 50 stamps, 7 ball-mills, Edwards' roasting furnaces, fine grinding and cyanide plant of 15,000 tons monthly capacity. The power plant will be enlarged during 1920.

Production: years ended June 30:

Year	Ore treated, tons	Yield	Cost per ton
1919	85,566	£429,271	59/– ($14.24)
1918	105,452	464,102	54/- (12.96)
1917	116,883	483,911	49/3 (11.79)
1916	136,994	475,958	44/7 (10.70)

Total production to end of 1918 has yielded £5,523,749. This is one of the world's biggest gold mines, operated under peculiar difficulties.

PRESTEA BLOCK A, LTD.

Offices: E. Price, sec., 19 St. Swithin's Lane, London, E. C. 4, England.

E. Davis, chairman of board of directors; C. P. C. Beresford, gen. mgr.; H. F. Marriott, cons. eng.

Inc. Nov. 20, 1903, in Great Britain. **Cap.,** £1,150,000; £1 par; 1,049,876 issued.

In 1917 there was an operating loss of £20,728. Cash assets were £143,055, and liabilities, £45,989; reserve fund was £24,851. The year 1918 resulted in a loss of £18,470, after allowing £29,521 for depreciation and other charges.

Property: 747 claims, 1½ acres each, and lumber and rubber concessions near the Ancobra river, Gold Coast Colony.

Development: by 3 shafts, exposing 527,669 tons of 39/3 ($9.39) ore at the end of 1917, and 427,325 tons of 38/4 ($9.06) ore a year later.

Equipment: 110-stamp mill and cyanide plant; practice described by P. T. Bruhl in "Eng. & Min. Journ." of February 23, 1918.

Production:

Year	Ore treated, tons	Gold Yield	Cost per ton
1918	190,906	£322,350	32/4 ($7.72)
1917	229,249	284,025	31/4 (7.48)

TAQUAH MINING & EXPLORATION CO., LTD. GOLD COAST

Office: T. J. Foster, sec., 461 Salisbury House, London, E. C. 2, England.

T. F. Dalglish, chairman of board of directors; G. W. Campion, mgr.

Inc. Dec. 29, 1900, in Great Britain. **Cap.,** £500,000; £1 par; 349,979 issued.

Profit for year ended June 30, 1918, was £43,320; £21,948 was carried forward to 1919. Profit in 1919 was £51,204.

Dividends: 100% from 1909 to June, 1919.

Property: large concessions in Gold Coast Colony, West Africa. **Development:** by 2,470' shaft, and current operations on lower levels. Reserves were 213,469 tons of 57/- ($13.68) ore on June 30, 1918; and 210,406 of 54/9 ($13.14) a year later.

Equipment: complete mining plant and 50-stamp cyanide mill.

Production:

Year	Ore treated, tons	Yield	Cost per ton
1919	59,213	£169,184	.....
1918	64,829	180,786	37/— ($8.88)
1917	63,883	175,643	36/11 (8.86)

ADDENDA AND ERRATA

United States

American Metal Co., Ltd.—Capital increased to $14,000,000 in March, 1920.

American Smelting & Refining Co.—Cash receipts in 1919 amounted to $243,843,367, against $392,001,155 in 1918. The net income was $5,595,585, a decrease of $2,111,914. The second half of the year resulted in an increase of $1,300,000 of profit above that of the first half. The profit and loss surplus on December 31 was $1,085,658 lower than at the beginning of 1919. Sales of metals totaled $225,107,151, a decline of $134,953,335. The situation in Mexico was considered hopeful, and all the company's smelters were in blast.

American Zinc, Lead & Smelting Co.—Operations in 1919 resulted in a loss of $19,266, while the profit on a loan to the Carson Hill Gold Mining Co. of California was $450,000. The surplus forward to 1920 was $3,695,152. Dividend of $1.50 paid May 1, 1920.

Copper Export Association.—Estimates by John D. Ryan place world's stocks of copper in March, 1919, at 3,430,000,000 lb., since which time the apparent consumption was 2,970,000,00 lb., exceeding the production for any one year.

Minerals Separation North American Corporation.—Acquired the Scott flotation patents used by Butte & Superior, which will not have to pay royalty.

National Lead Co.—Net earnings in 1919 were $4,632,560, and surplus at end of year, $18,553,965. Common stock received 5% in dividends. The cost of manufacturing white lead and other products has been doubled. The output was 10,000 tons behind orders.

New Jersey Zinc Co.—To build additional zinc oxide and lithopone plants in Colorado and Pennsylvania. Shareholders, on May 12, to vote on proposal to increase capital from $35,000,000 to $50,000,000; $7,000,000 of increase to be paid as a stock dividend, equal to 20% of present holdings. Shareholders to have the right to subscribe to $7,000,000 of the new issue at $100 per share. Employees will be offered $1,000,000 at a price not yet fixed.

Phelps Dodge Corporation.—Production in 1919 was 103,930,558 lb. copper; 141,269 lb. lead; 1,296,938 oz. silver, and 16,269 oz. gold. The copper sold at an average of 17.13 cents per lb. net. Total revenue was $28,366,438, and expenditures, $25,152,093. Current assets at end of year were $38,681,867, and liabilities, $17,682,550. All of the Branches yielded 1,571,162 tons of ore. First quarter of 1920 yielded 23,000,000 lb. of copper. In March, 20 shares of the Corporation were sold at public auction at $230 each.

United States Smelting, Refining & Mining Co.—C. G. Rice is the new president. Dividends in 1920, to April 15, total $3 per share. Net profit for 1919 was $6,641,214. Surplus increased from $1,317,290 to $3,007,857. Production was 8,919,044 lb. copper; 68,648,864 lb. lead; 7,680,548 lb. zinc; 146,749 oz. gold, and 17,758,498 oz. silver. The two mills in Mexico averaged 76,500 tons of ore daily. The financial position is regarded as strong.

United States Steel Corporation.—Iron ore mined in 1919 amounted to 25,423,093 tons, a decrease of 10.3%. The Oliver Iron Mining Co. is preparing for a busy season in 1920.

Yukon Gold Co.—Operating profit in 1919 was $511,158, less $175,828 for interest, etc., and $1,444,015 for depletion, depreciation, and stock investments, the year resulting in a deficit of $1,108,684. There are now 3 dredges in the Yukon; 4 in California, and 1 in Idaho; while 3 have been sent to Malaya to dredge tin-bearing ground. Company is exploiting silver-lead claims in the Mayo district, 200 miles S. E. of Dawson, Yukon Territory.

Alaska

Alaska Gold Mines.—Year 1919 resulted in total operating loss of $273,397. Gold recovered averaged 66 cents per ton, which is 22 cents lower than in 1918. In 5 years the output was $7,503,740. Operations can be continued only as long as advantage is taken of extracting ore broken in stopes or prepared for mining, on which costs have already been paid, according to the president of company.

Alaska Sulphur Company.—Development and equipment under way to produce 100 tons of sulphur daily for paper mills of Northwest. Deposit is at Lost Harbor, Akun Island, S. W. Alaska. T. H. Landswick of Seattle, secretary.

Bon Alaska Mining Co.—Inc. 1916, in Washington, with capital of $1,000,000; shares $1 par, listed on New York Curb in February, 1920. Company owns 28 claims in the Wrangell district, S. E. Alaska. Ores carry silver, lead, zinc, and gold. Samples of shipping ore are said to average 31.4 oz. silver and 48.9% lead. Property considered to lie in same belt of rocks as prevail in the Portland Canal district, where the Big Missouri and Premier mines lie, over 100 miles away. Development consists of 1,500′ of tunnels, etc. When shipping 20 tons of $100 ore daily, a profit of $1,100 is expected by management.

Gold Bullion Mine.—Reported sold in February, 1920, to Hugh Doheny and L. C. Thompson of Montreal, Quebec, for $500,000. Equipment to be enlarged.

Kennecott Copper Corporation.—Dividend of 50c. paid March 31, 1920.

Arizona

Arizona Commercial Mining Co.—On No. 6 level the orebody is 40′ wide, carrying 6% copper, for over 100′, up to April, 1920. First quarter of year yielded 1,900,000 lb. copper. Net quick assets approximate $550,000.

Arizona Copper Co., Ltd.—Production for first quarter of 1919 was 9,000,000 lb. Rumored that control of company may pass to American interests.

Calumet & Arizona Mining Co.—Operating profit for 1919 was $1,906,364, less $1,381,948 for depletion, etc., leaving $524,416 net. The surplus at end of year was $13,229,770. Production was 44,991,107 lb. copper; 995,366 oz. silver, and 28,530 oz. gold. At the Gadsden mine at Jerome, 5,619 ft. of work was done, but operations were suspended in March, 1920. Option was taken on the Cornell mine in British Columbia. First quarter of 1920 yielded 10,300,000 lb. copper. A dividend of $1 per share paid March 22, 1920.

Central Copper Co.—J. N. McCauley, pres., 71 Broadway, New York. Inc. in Arizona. Cap. $10,000,000; 50c. par. Property: 31 claims in Tevis and Dos Cabezos districts, Cochise county, Arizona. Veins carry copper. Prospectus very optimistic.

Consolidated Arizona Smelting Co.—About 900,000 lb. of copper being shipped monthly to refiners. Operating profit in 1919 was $96,294. Surplus at end of year was $172,076.

Helvetia Copper Co.—Seven oil wells in Texas are yielding an average of 9 barrels each daily.

Inspiration Consolidated Copper Co.—Receipts from sales of copper during 1919 were $11,045,222, and expenses, $6,747,658. After allowing for depreciation, etc., net balance was $4,186,628. Surplus was reduced to $9,879,259. Ore reserves are given as 77,477,000 tons. The mill worked at 55% capacity, and gave a better recovery. Tests in leaching oxide ore are

satisfactory and are being continued. Dividend of $1.50 per share paid April 26, 1920. First quarter produced 20,900,000 lb. copper.

Iron Cap Copper Co.—Operating profit in 1919 was $249,032. Copper sold was 5,823,008 lb. Current assets are $909,251, and liabilities $323,227. Dividend of 25c. per share paid March 18, 1920. Good progress being made on new mill.

Jerome Grande Copper Co.—Selling treasury shares in March, 1920, to pay for further exploration and installation of electric plant.

Miami Copper Co.—Dividend of 50c. paid May 15, 1920. Production for first quarter was 13,500,000 lb.

Mile-Wide Copper Co.—Application made in February, 1920, to place property in hands of receiver.

New Cornelia Copper Co.—Operating profit in 1919 was $1,601,198, less $1,583,952 for depletion and depreciation, leaving $17,246 net. Sales of copper were 29,972,106 lb. The works operated satisfactorily. Production for first quarter of 1920 was 10,400,000 lb. Dividend of 25 cents a share payable May 24, 1920.

New King of Arizona Mining Co.—Formely King of Arizona, now being developed.

Old Dominion Co.—Operating profit for 1919 was $73,685, against $1,147,079 in 1918. Production was 28,166,396 lb. copper, 5,755 oz. gold, and 137,071 oz. silver. Ore reserves were increased by 440,000 tons. First quarter of 1920 yielded 6,900,000 lb.

Ray Consolidated Copper Co.—Production in 1919 was 46,746,893 lb., which sold at an average of 17.90c. Costs were 15.62c. After dividends of $2 per share, there was a deficit of $1,410,917. On March 31, 1920, a dividend of 25c. was paid. First quarter of 1920 yielded 11,600,000 lb.

Shannon Copper Co.—Net quick assets in March, 1920, were $453,598. Company may enter the oil business.

Shattuck-Arizona Copper Co.—The year 1919 resulted in a loss of $21,893. Revenue was $1,069,698. Dividends amounted to $262,500. Surplus was reduced to $1,732,365. First quarter of 1920 yielded 1,000,000 lb. copper, 1,930,000 lb. lead, 41,000 oz. silver, and 460 oz. gold.

Shea Copper Co.—Information on page 382 from reliable source, but not guaranteed.

Silver King of Arizona.—Par value of shares increased to $5, and issue of $500,000, 7%, 10-year convertible bonds sanctioned.

Superior & Boston Copper Co.—Year ending September 30, 1919, showed a loss of $14,863, reducing profit and loss credit to $16,401. Surplus account was $455,101. By January 1, 1920, neither the Old Dominion nor North veins had been cut on 1,000′ level. On 1,200′ level the Eastern vein is 48′ wide, but carries only 0.4% copper. The footwall vein on 400′ level maintains its richness and width. Seventeen cars of ore yielded $38,303 from the smelter.

United Arizona Extension Mining Corporation.—Inc. March, 1920, with capital of $1,500,000, shares $1 par, to develop 13 claims near Cordes station, close to the Arizona Binghampton.

United Eastern Mining Co.—Gold production in 1919 was $2,031,594, from 97,325 tons of ore. Ore reserves are valued at $6,000,820. Dividend of 21c. paid for first quarter of 1920.

United Verde Copper Co.—Dividend of $1.50 per share paid in March, 1920.

United Verde Extension Mining Co.—The 20,000,000 lb. of copper on hand at beginning of March, 1920, was reduced to 7,000,000 lb. by end of month. Output for first quarter was 10,600,000. Gross revenue in 1919 was $5,464,924, of which $3,340,900 was operating profit. Reserves for depletion and depreciation totaled $2,359,180. The net loss was $235,156. Surplus was reduced to $5,904,068.

Arkansas.

Boston & Arkansas Mining Co.—The old Davis zinc-lead-copper mine in Sevier county is being reopened. It is fully equipped, and is in charge of C. L. Larson.

California

Argonaut Mining Co.—On account of fire in the adjoining Kennedy mine, operations were suspended in March, 1920.

Blue Ledge Mine.—This promising property almost on the Oregon boundary, in Siskiyou county, is shipping copper ore regularly to the Tacoma smelter.

Carson Hill Gold Mining Co.—In March, 1920, work on the 1,100′ level had exposed 10′ of ore averaging $56 per ton, from which daily shipments were 30 tons. The mill is being enlarged.

Central Eureka Mining Co.—The 3,500 and 3,700′ levels are opening well. Dividend of 5c. paid January 12, 1920. Reserve fund being built up.

Feather River Copper Co.—The 2,500′ tunnel is in over 500′. Electrically-driven machinery installed. Interests in the Kay Copper Co. of Arizona are behind this venture.

Gruss Mining Co.—A 1,000′ tunnel is being driven to develop a copper vein. Mill is to be remodeled.

Kennedy M. & M. Co.—On account of fire, operations were suspended in March, 1920.

Natomas Company of California.—Income from all sources in 1919 was $2,934,470, of which $167,548 was operating profit. Against this must be placed $651,674, non-operating expense. Indebtedness was reduced to $431,123, and mortgage and bonded debt to $10,751,785. Current assets at end of year were $1,036,335, and liabilities $196,123. Gold production was $1,775,124, of which $461,484 was profit.

Nevada Pacific Exploration Co.—Gold ore blocked out in this mine near Forest Hill, estimated as worth $400,000, and 50-ton mill ready. Nevada interests behind this venture.

New Idria Quicksilver Co.—Output in 1919 was 7,400 flasks. Net profit was $1,050. Better ore and market now prevailing.

North Star Mines Co.—Gold production in 1919 was $1,181,346, of which $102,856 was profit. One dividend of 4%, $100,000, was paid in June. Little development was done at the North Star, while results at the Champion promise little for the future. Costs were $18.04 per oz. of gold, compared with $9.51 in 1913.

Colorado

American Smelting & Refining Co.—The Leadville District mill was taken over on a long lease in March, 1920. It is to be remodeled to dress low grade complex ores from the Yak tunnel and other mines.

Colorado Fuel & Iron Co.—Iron mines yielded 715,145 tons of ore in 1919. Net operating profit was $4,165,366 from all sources.

Cresson Consolidated Gold M. & M. Co.—10 cents per share paid March 10, 1920, making $8,491,163 to date. Production in 1919 was $1,039,500 from 94,920 tons of ore.

Golden Cycle Mining & Reduction Co.—Dividend rate reduced from 3 to 2c. monthly in April, 1920.

Leadville Leasing Corporation.—Organized in February, 1920, by A. R. Bailey to operate four mines on Breece, Carbonate, and Idaho Park hills, Leadville. Ores carry high silver content.

Little Jonny Mine.—Gold ore from this Leadville mine is being treated at the Golden Cycle mill at Colorado Springs.

Portland Gold Mining Co.—Dividends of 2c. per quarter reduced to 1½c. in 1920. New orebody on 2,300′ level shows 4 to 5′ of 1 oz. ore.

San Juan Silver Syndicate.—Organized to develop claims near Ouray. Considered by promoters to be a "double-barrelled opportunity."

Sunnyside M. & M. Co.—Surface equipment burned in April, 1919, rebuilt, and in April, 1920, the mill was dressing 500 tons of ore daily, employing 350 men. The gold-silver-lead-copper-zinc-iron ore is concentrated by flotation.

Tonopah Placers Co.—Three dredges moved 3,122,571 cu. yd. in 1919, averaging 9.8 cents per yard. The profit was $16,284, plus $6,788 from miscellaneous items.

Vindicator Consolidated Gold Mining Co.—First quarterly dividend in 1920 passed.

Idaho

Bunker Hill & Sullivan Mng. and Conc. Co.—Dividends in 1919 were $1,144,500, and $490,500 in first quarter of 1920, making $23,659,470 to date.

Callahan Zinc-Lead Co.—New name for Consolidated Interstate- Callahan M. Co. First quarter of 1920 yielded 23,780,000 lbs. of zinc concentrate, 9,020,000 lb. lead concentrate, and 82,090 oz. silver.

Federal Mining & Smelting Co.—Four mines were operated during 1919, two in Idaho and two in Oklahoma. Reserves in the Morning mine at Mullan are 1,088,600 tons, and in the Independence at Hailey, are 53,000 tons. These mines produced 172,330 and 13,380 tons, respectively. Receipts from all sources were $2,474,864, and expenses $1,756,718. Dividends absorbed $449,479. Quick assets at end of year were $1,708,531 in excess of liabilities. Prospects for 1920 are considered bright, on account of the lead, silver, and zinc markets.

ERRATA: Hecla Mining Co.—On page 701, in the table, the column under 1919 should read.

Ore sales, etc.	$1,692,771
Operating charges	1,066,232
Net profit	626,539
Dividends	600,000
Current assets	1,822,226
Current liabilities	63,318

On Hecla's 2,000′ level, 3′ of high-grade lead-silver ore was cut in February, 1920. Dividend of 20c. a share payable June 28, 1920.

Hercules Mining Co.—Shipping ore to Bunker Hill smelter in February, 1920, instead of to Northport, Wash.

Nabob Consolidated Mining Co.—Milling resumed in March, 1920. Shares to be listed on New York Curb.

National Copper Mining Co.—Operations finally stopped early in April, 1920, and equipment to be sold.

Yukon Gold Co.—Dredge during 1919 dug 1,519,035 cu. yd. averaging 10.39c., at cost of 9.05c. per yard.

Michigan

Ahmeek Mining Co.—Dividend of 50c. a share paid March 31, 1920. Net earnings in 1919 were $640,424. Production was 17,223,111 lb. copper, of which 12,167,613 lb. was delivered at average of 18.81c. Costs were 14.02c.

Allouez Mining Co.—The year 1919 resulted in a loss of $73,738, equal to 1.98c. per lb. on the 3,020,067 lb. delivered.

Arcadian Consolidated Mining Co.—Work resumed in April, 1920. Company is financed for 2 years' exploration.

Calumet & Hecla Mining Co.—First 3 months of 1920 yielded 16,600,000 lb. copper. Large shipments of metal being made. Copper delivered in 1919 realized $5,263,076, but expenses on same were $5,666,726. Total operating loss was $652,286. The year ended with a surplus of $241,659.

Franklin Mining Co.—The year 1919 resulted in a deficit of $192,930. Production was suspended in May. The output was 1,062,879 lb. On No. 18 and 19 levels 200,000 tons of good ore reported awaiting extraction.

Hancock Consolidated Mining Co.—Initial shipment in February, 1920, of 1,700 tons of ore to mill yielded 15 lb. (0.75%) copper per ton. Results on No. 44 level reported encouraging.

Indiana Mining Co.—Deficit for 1919 was $10,020. Property has been idle since May, 1918. It is well equipped.

Isle Royale Copper Co.—Operating at 60% capacity, production being at rate of 13,000,000 lb. per annum. Quick assets in February, 1920, were about $1,800,000 net. No dividend paid in first quarter. Net earnings in 1919, before deducting taxes, etc., were $416,491. Production was 13,007,647 lb. of which 8,834,380 lb. was sold at 18.6c. per lb. Costs were 15.8 cents.

Keweenaw Copper Co.—No exploration was done in 1919. Investments amount to $1,724,201.

Mass Consolidated Mining Co.—Mine still closed. Copper on hand in February, 1920, was 1,000,000 lb. Timber and surface rights on 600 acres sold for $25,000.

Mayflower-Old Colony Copper Co.—Assessments and interest during 1919 totaled $109,993. Exploration cost $99,386. Balance on January 1, 1920, was $14,823. Assessments in 1920, to March 17, realized $128,000. Driving on 1,709′ level said to be encouraging.

Mohawk Mining Co.—Good ore first opened on 22nd level of No. 4 shaft north persists to 25th. Copper output averaging 1,000,000 lb. monthly. Operating costs in 1919 totaled 9c. a pound. Financial position is strong. Dividend of $1.50 paid on May 1, 1920.

Naumkeag Copper Co.—Assessment of 50c. a share on November 1, 1919, realized $35,186. Results of work on the Pewabic lode at 1,000′ depth were so discouraging in January, 1920, that work was stopped there, and started at the adit level to crosscut the whole Pewabic series.

Osceola Consolidated Mining Co.—Production in 1919 was 10,824,331 lb., of which 7,766,460 lb. was delivered at 18.65c. Costs were 18.08c. Net profit after allowing for depreciation was $112,559.

Quincy Mining Co.—A dividend of $1 per share paid March 29, 1920.

St. Mary's Mineral Land Co.—The sale of 6,302 acres of timber land realized $216,875. Dividends received from the Champion mine were $4 per share. Cash at end of 1919 amounted to $95,953, against $206,168 a year ago.

Seneca Copper Corporation.—Second mill test of 715 tons in February, 1920, averaged 57 lb. (2.85%) copper per ton of ore. Shipments to Baltic mill to be resumed in May. Report by R. A. Parker of Denver, says that the Kearsarge lode has been opened on 3 levels as rich and wide as in adjoining mines, and within 2 years the mine should be on a good paying basis.

South Lake Mining Co.—Production was not resumed during 1919. Physical condition of mine is reported good. Current liabilities exceeded assets by $150,316 at end of year. $2 per share of the unpaid subscriptions to capital stock payable March 22, 1920.

Superior Copper Co.—Year 1919 resulted in loss of $92,938. Production was 563,935 lb. Metal sold realized 18.67c., and costs were 31.57c. per lb. Net current assets are $539,444, mostly cash or equivalent.

Victoria Copper Mining Co.—Production in 1919 was 1,245,590 lb. copper from 89,206 tons of ore, equal to a 0.69% yield. The year resulted in a loss of $35,808. Current assets are $395,096, and liabilities $262,385. Development was considered satisfactory.

Winona Copper Co.—Work was suspended in February, 1919, and the yield was only 561,238 lb. Revenue was $113,390, and expenditure $202,375. First two months of 1920 yielded 339,000 lb. copper. In March there was 300,000 lb. unsold.

Wolverine Copper Mining Co.—Regular dividend for March, 1920, was passed. Output for first 2 months was 510,000 lb.

Missouri

American Zinc, Lead & Smelting Co.—New zinc-lead deposits discovered 10 miles S. of Joplin, and extensive drilling under way.

Eagle-Picher Lead Co.—Drilling new zinc-lead deposits 10 miles S. of Joplin.

St. Joseph Lead Co.—Owing to great demand for lead, company's works are at full capacity.

Underwriters Land Co.—Drilling new zinc-lead deposits 10 miles S. of Joplin.

United Zinc Smelting Corporation.—Capacity of works at Moundsville, W. Va., being doubled.

Montana

Anaconda Copper Mining Co.—A dividend of $1 per share, payable May 24, 1920, making $2 for current year. Production for first quarter was 55,000,000 lb. The Emma mine is producing 15% zinc and 8 oz. silver ore, also 150 tons daily of manganese ore, to be increased three times. The ferro-manganese plant at Great Falls is in operation, where also superphosphate is being made, and the copper rod mill working to capacity.

Barnes-King Development Co.—Gold production in February, 1920, was $42,377. Directors decided in March to buy 17,500 shares, at $1 each, of the Kansas-Montana Oil & Gas Co., which is drilling a well for oil in Fergus county, Montana. Oil is expected at depth of 2,400 feet.

Boston & Montana Development Co.—Recent developments are reported as encouraging. Regular shipments of ore being made. Foundations for mill complete.

Butte & Superior Mining Co.—Net profit in 1919 was $864,989, after allowance for depreciation and depletion ($916,272). Monthly production running 13,000,000 lb. zinc and 210,000 oz. silver. Earnings in January and February, 1920, at rate of $9 per share per annum. Net quick assets approximate $3,000,000. Settlement over flotation patents not expected for several months.

Butte Copper & Zinc Co.—Regular shipments of manganese and zinc ore being made from the Emma mine under the 50-50 working agreement with the Anaconda company.

Davis-Daly Copper Co.—Daily output in April, 1920, was 400 tons of 6½% copper ore. Good developments reported on 2,700′ level. Net profit in January was $27,000. Dividend of 25c. paid March 30. Financial position good.

East Butte Copper Mining Co.—Production in 1919 was 146,542 tons of ore, yielding 19,987,733 lb. copper, 698,146 oz. silver, and 1,013 oz. gold. Gross income was $4,342,390. Net profit was $524,189. Costs were 16.58c. a pound. An interest has been taken in property near Tonopah, Nevada; in the Mule Creek oil field of Wyoming; also in Kansas and Oklahoma.

Elm Orlu Mining Co.—In apex dispute with Anaconda over part of the Pilot Butte copper vein, ground being examined and compromise probable.

North Butte Mining Co.—Monthly production in 1920 at rate of 1,800,000 lb. Development at 3,200′ depth on Edith May vein is good. The East Side properties are producing ore. Net cash assets approximate $1,700,000.

Nevada

Arizona Silver Mining Co. and associated companies.—Certain Boston brokers who were very active in an advertising campaign in these shares were arrested under the Massachusetts law in March, 1920, and fined up to $1,000 each on April 21.

Bluestone M. & S. Co.—Sales of metals during 1919 realized $494,913. There was a net loss of $248,601.

Gold Zone Divide Mining Co.—Report of February 2, 1920, states that 2,256′ of new work was done on the 500′ level. Drift on what is supposed to be the Divide fissure cut a vein 40′ wide assaying $6 per ton across full width. N. E. and S. W. drifts, and a 100′ winze are being driven to determine pitch of the vein. Property is well equipped.

Jim Butler Tonopah Mining Co.—Net profit for 1919 was $28,563. Ore production was only 5,711 tons, averaging $23.48 per ton. Total costs were $15.08. Results were not encouraging, and only small profits may be expected for 1920.

Nevada Consolidated Copper Co.—Dividend of 25c. paid March 31, 1920. First quarter of year produced about 12,000,000 lb. copper. Net profit for 1919 was $1,225,357, Total surplus was reduced to $8,160,533.

Red Hill Florence Mining Co.—Assessment No. 5, of 1½c. per share, payable February 10, 1920. Receipts in 1919 were $28,214, including $24,726 from assessments. Mine development cost $20,090. Cash on January 1, 1920, was $6,888. Physical condition of the mine is considered encouraging.

Rochester Nevada Silver Mines Co.—Name changed to Rochester Silver Corporation. Capital, $2,000,000; shares $1 par. The relative equities of the 3 companies consolidated remain unaltered from original scheme. At beginning of 1920, net current assets were $142,383. Last quarter of 1919 yielded a profit of $71,722 from 13,923 tons of $14.30 ore. Costs are $9.14 per ton, but are expected to be reduced to $7.25. Ore reserves are equal to 200 tons a day for one year.

Simon Silver-Lead Mines Co.—Capital increased in April, 1920, from $1,500,000 to $2,000,000; shares $1 par.

Tonopah Belmont Development Co.—Net profit in 1919 was $569,806. Ore reserves are larger than in previous year. Price received for silver was 10 cents per ounce higher than in 1918, but costs were 15 cents more.

Tonopah Divide Mining Co.—Former directors re-elected in April, 1920. Report for full year 1919, dated April 10, 1920, shows that 1,012,800 shares are outstanding. Cash assets exceed liabilities by about $31,000. Ore shipments amounted to 9,612 tons, averaging $29.35 per ton. Costs were $19.83 per ton. New work covered 4,605′, making 7,578′ to date. The shaft was sunk 217′, and is 585′ deep, where leaching and oxidation continue unchanged. The lower levels have failed to open the high-grade ore opened above. Reserves are estimated at 52,000 tons averaging 20 oz. silver and 0.08 oz. gold, and 16,000 tons carrying 5.12 oz. silver and 0.125 oz. gold. The total value is about $1,500,000.

Tonopah Extension Mining Co.—Dividend of 5 cents a share paid April 1, 1920. Development continues satisfactory, and in the Victor section, 3 veins—8, 6, and 13′ wide, respectively, have been opened to the 1,760′ level.

Tonopah Mining Co.—Net earnings and income during 1919 were $402,207. Dividends totaled $300,000. Net value of investments, cash, supplies, loans to subsidiaries, etc., totals $5,381,247. Output was 41,298 tons of $18.74 ore. Costs totaled $6.37 per ton. Ore reserves are undeterminable, but should supply the mill with 150 tons daily for about one year.

New Mexico

Chino Copper Co.—Output in 1919 was 40,488,706 lb., and net operating profit on $1,038,908. After paying dividends, there was a deficit of $1,501,443. Surplus of quick assets reduced to $4,444,384 at end of 1919. First quarter of 1920 yielded 11,300,000 lb.

South Dakota

Homestake Mining Co.—Operations gradually returning to normal after the fire and flooding of mine. No dividends paid so far in current year.

National Tin Corporation.—Work resumed in February, 1920, and ore sent to mill.

Trojan Mining Co.—Mill working at full capacity.

Tennessee

Tennessee Copper & Chemical Corp.—Three contracts for three years each have been made for sale of sulphuric acid at about $10 per ton.

Report for 1919 states that 413,877 tons of ore yielded 10,407,228 lb. copper at cost of 18.715c. per lb. After allowing for operating expenses and interest there was a loss of $325,379. Current assets are $6,255,097, and liabilities, $1,022,399. Ore reserves total 3,273,645 tons. Acid production was 266,627 tons.

Utah

Bingham Mines Co.—Net income from all sources in 1919 was $80,306. Dividends totaled $112,000. Previous surplus of $365,877 was reduced to $261,231. The mines are responding to the intensive development campaign.

Daly West Mining Co.—Metals sold in 1919 realized $179,910. Surplus was reduced by $21,647. Cash balance on January 1, 1920, was $141,979. After lapse of 7 years, a dividend of 15 cents paid April 1. The new development campaign has been most satisfactory.

Eagle & Blue Bell Mining Co.—Dividend of 10c. a share paid April 10, 1920.

Judge Mining & Smelting Co.—Receipts from metals, etc., were $724,898 during 1919, and expenses $588,692. At end of year the cash balance was $148,385, plus $135,000 for unsold zinc. Dividend No. 36, of 12½c. per share, was paid April 1, 1920. Physical condition of mine is good for large output, and a continuous run is assured for the remodeled zinc plant.

Moscow M. & M. Co.—Property consolidated with that of Red Warrior and Beaver Combination companies, and new company organized under name of Moscow Silver Mines Co.

Silver King Consolidated Mining Co.—Net value of ore mined in 1919 was $275,970. Dividends amounted to $70,000.

Utah Consolidated Mining Co.—Exploration covered 17,407'. Reserves are 848,000 tons of copper ore and 38,400 tons of lead ore. Production was 5,710,346 lb. copper, 13,072,177 lb. lead, 10,548 oz. gold, and 373,180 oz. silver. Profit for 1919 was $181,966. Current assets at end of year were $2,135,907, and liabilities $204,220.

Utah Copper Co.—Monthly production in 1920 at rate of over 9,000,000 pounds.

Wyoming

Quin "B" Mining Co.—Office: Equitable Bldg., Baltimore, Md. Incorporated in Arizona in 1916, with capital of $500,000; $1 par; and owns 5 claims in Carbon county, Wyoming. A 275' tunnel is said to have opened half a million tons of 3% copper ore.

Canada

British Columbia

Granby Consolidated Mining, Smelting & Power Co.—New issue of 5-year 8% convertible debentures on market, April, 1920. Copper production at rate of 2,000,000 lb. monthly, all from the Anyox property. Proposed to concentrate the remaining ore at Phoenix.

Manitoba

Mandy Mining Co.—Gross value of 8,482 tons of copper ore sent to Trail, B. C., during 1919 was $629,666. Net income was $217,452. Surplus at end of year was $168,318. Production for 1920 will be about 9,000 tons of ore. Equipment sold in March, 1920, to syndicate developing the Flin Flon property.

Nova Scotia

Bradford Mines, Ltd.—Office: Halifax, N. S. Inc. in Nova Scotia, with capital of $1,000,000, shares $1 par, 430,000 issued. To develop 264 acres of mineral ground in the Tangier district, 40 miles by water from Halifax. Ore is gold bearing, and is free milling. There are said to be a large number

of veins, estimated to contain 750,000 tons of $15 ore. Deepest workings are at 600'. Property is fully equipped, including electric power and mill. Estimated net earnings are $141,823 per annum, plus revenue from sale of power.

Ontario

Beaver Consolidated Mines.—Profit in 1919 was $158,216, and balance at credit of profit and loss account was increased to $1,049,081. Holdings in Kirkland Lake Gold M. Co. are placed at $362,262. Production was 301,781 oz. silver. Broken ore in mine is valued at $231,264. Development was satisfactory.

Gifford-Cobalt Mine.—Work probably to be resumed in summer of 1920.

Keeley Silver Mines, Ltd.—Subsidiary of Associated Gold Fields of Western Australia was organized in March, 1920, to develop the Keeley mine in the South Lorrain area near Cobalt.

Kerr Lake Mines.—Report of March 16, 1920, states that on February 29, cash and securities were valued at $2,415,027, equal to $4 per share. Production for first 2 months of year was 213,234 oz. silver. A fully equipped silver mine, in Utah, with 87,000 tons of 18 oz. ore, also a gravel property in New Zealand, with an estimated profit of $3,436,000, now being equipped with a dredge, have been acquired.

King Kirkland Gold Mines, Ltd.—Incorporated, April 1920, to operate in Kirkland Lake district.

Kirkland Lake Gold Mining Co.—Operations in 1919 were hampered by a strike. Reserves are sufficient for the new 150-ton mill for 2 years.

La Rose Mines.—Profit for 1919 was $51,736. Surplus was $514,424.

Ontario Smelters & Refiners.—Company operates plant of Standard S. & R. Co. at Chippewa, Ontario; also owns land in the Temiskaming district. Capital is $750,000, of which $500,000 is outstanding. In March, 1920, $250,000 of 7% first-mortgage bonds were offered. Annual turnover is estimated at $440,000.

Silver Islet Mine.—The Nepigan Mining & Lands Co., owner of this mine, on an island in Lake Superior, near Port Arthur, first worked in 1869, has granted an option to American interests. Considerable ore is said to be available for mining.

Thompson-Krist Gold Mining Co.—Being consolidated with the Porcupine-Crown company in April, 1920.

Mexico

Sonora.

Canario Copper Co.—Capital increased from $2,000,000 to $20,000,000 in December, 1919, and par value of shares from $1 to $10.

El Fuerte M. & S. Co.—Acquired smelter of Choix Consolidated M. Co., and obtained lease on part of latter's mines in 1920.

Greene Cananea Copper Co.—Production in first quarter of 1920, was 10,100,000 lb. copper and 405,000 oz. silver.

South America

Chile

Chile Copper Co.—Year 1919 resulted in an operating profit of $1,267,895, but after paying interest, etc., there was a deficit of $1,720,165. Production in January, 1920, was 7,500,000 lb.

Peru

Cerro De Pasco Mining Co.—Monthly production in 1920 averaging 4,600,000 lb. copper. Total income in 1919 was $23,917,308, of which $2,283,628 was profit, after deducting operating charges, depletion, depreciation, interest, and taxes. Dividends amounted to $3,592,909. Surplus is $10,273,493.

Africa

Egypt

Barramia Mining & Exploration.—Sales of gold in 1919 amounted to £6,132. Operations resulted in a loss of £1,197. Balance at debit of profit and loss is £10,996. Mine has been closed, machinery sold, and company is being wound up.

Asia

Philippine Islands

Benguet Consolidated Mining Co.—Report for full year 1919 shows that 23,719 tons of 40.38 pesos (P1 = 50 cents U. S.) ore gave a net profit of P400,311. Dividends amounted to P200,000. Current assets are P359,180, and liabilities P42,957. Development has fallen behind ore extraction.

Australia

Tasmania

Mount Bischoff Tin Mining Co.—During half-year ended December 31, 1919, 127 tons of metallic tin sold realized £42,037. The profit was £12,114. After distributing £7,500 in dividends, and allowing for other charges, the net credit was £72,022. The 52,334 tons of ore yielded 0.23 lb metallic tin per ton. Cyril W. Gudgeon is the new general mine manager.

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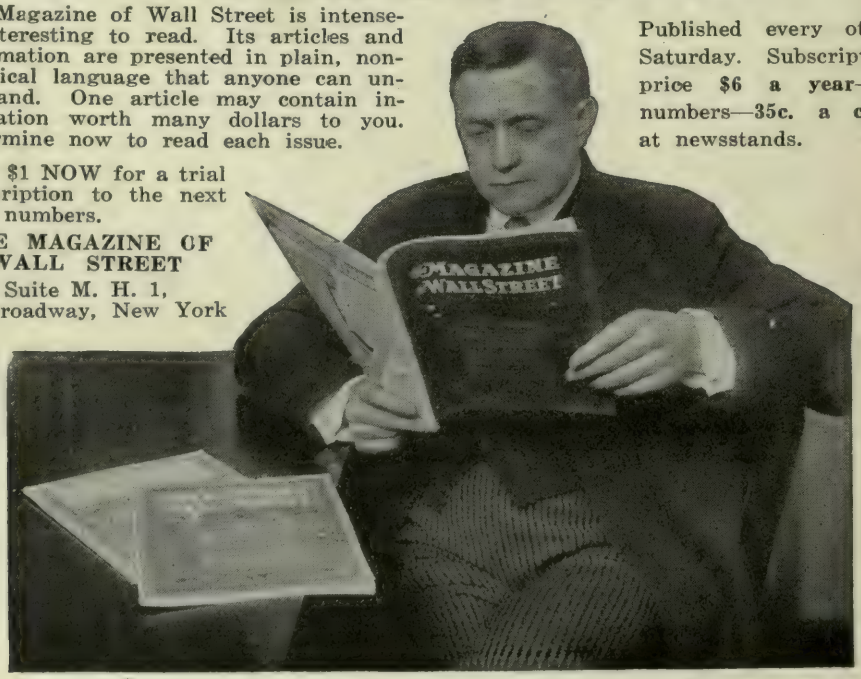

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